

**The**  
**CHARLIE**  
**FRANCIS**  
**Training System**

**by**  
**Charlie Francis**

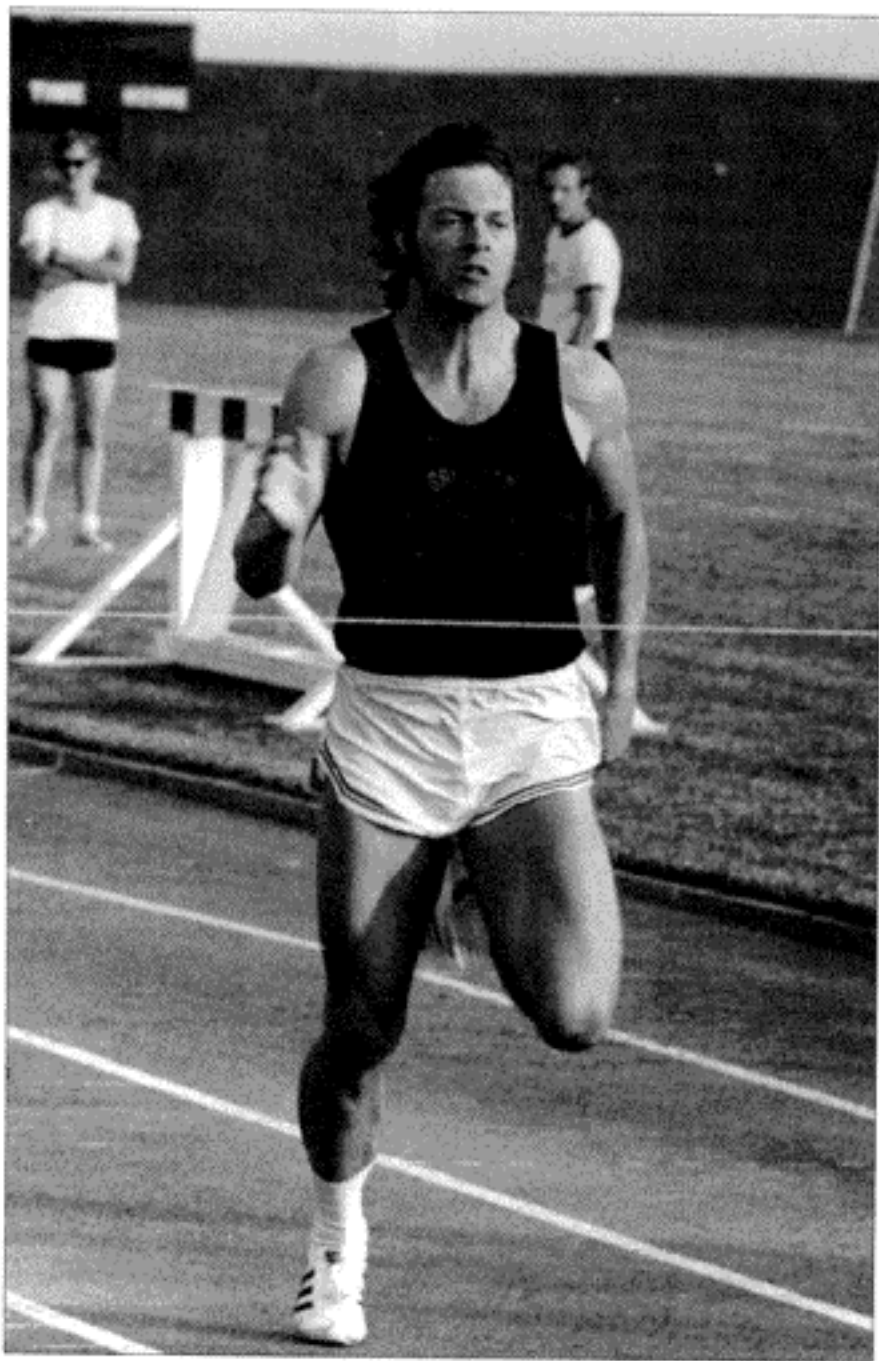
**The most comprehensive  
training and preparation  
system available.**



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Charlie, being a World Class Sprinter himself, (ranked number 5 in the world in 1971) was in a position to ask not only the right questions about the intricacies of sprinting but was also able to understand and use the answers. This experience, knowledge and understanding was not lost on Charlie Francis — he went on to develop the fastest human being the world has ever seen.

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# PREFACE I

## Charlie Francis — Communicator

This book is written in a question and answer format with the intent of leaving the full communication of Charlie Francis intact. There has been little or no attempt to translate Charlie's statements into 'academese' as this would serve only to distance the information from the sport art form which has generated it.

Many listeners underestimate the simplicity with which Charlie speaks — He speaks 'common sense.' Many coaches have come to expect apparently complex and scientific-sounding advice, and tend to reject the simplicity of wisdom.

Learning from this book or from any other source for that matter is no different. You can choose to learn only with your eyes and your ears, but at some point you must learn with your body as well, or full understanding/knowing may never come. When Charlie Francis speaks — you know you are hearing from someone who has 'been there.'

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*Learning with your body: when Charlie Francis speaks you know you are hearing from someone who has 'been there.'*

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# PREFACE II

## Charlie Francis — Coach

It is significant to note that the men who have contributed to the coach who is Charlie Francis represent the finest sprinting minds in the world — Gerard Mach, whose Polish sprinters won all sprints in the European Championships in 1966; Horst Hille, coach of the premier women sprinters of the former East Germany; Harry Jerome and Percy Duncan, both World record holders in the 100 metres and 100 yards respectively.

Charlie, being a world class sprinter himself, (ranked number 5 in the world — 1971), was in a position to ask of these men not only the right questions about the intricacies of sprinting but was also able to understand, and use the answers. This experience, knowledge and understanding was not lost on Charlie Francis — he went on to develop the fastest human being the world has ever seen in Ben Johnson.

Put drug use aside long enough to understand the methods of a man who has been called 'The premier sprint coach of this decade.'

You will need these methods and techniques whether or not you coach young or mature athletes, and whether or not your athletes are sprint specialists or require power and sprint capabilities to implement their chosen sport.

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*Shot putters, jumpers, and hurdlers represent only some of the athletes who have accessed the training methods and techniques of Charlie Francis to improve their power and/or sprint capability.*

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## PREFACE III

### Drug Use and High Performance

Much has happened since Ben Johnson won the Olympic Gold medal in Seoul in 1988 and was subsequently forced to surrender it after testing positive for steroid use. You will notice two characteristics upon reading the training methods described herein:

1. Ben is still referred to as the fastest human being in the world because his performance remains an irrefutable fact. Yes, he used steroids because they have been part of the equipment, intermittently or continuously, for most top speed and power athletes since the 1950's. It is now clear that drugs were methodically applied to virtually every athlete in what was the East German Sport System. Anyone who cares to know and listen to athletes will reach the inescapable conclusion that drug use is rampant. As an elite age-class shot putter I was personally competing against steroid assisted athletes in a Toronto high school as early as 1964.

It will become increasingly clear that many top competitors have used drugs at some point in their careers. It is not Ben's performance that is in question but the credibility of fellow athletes and coaches who choose not to admit to using the same methods.

2. Notice also that steroid use is not referred to in this book. (Please refer to Charlie's first book - 'Speed Trap' - for further information on this topic.) For any athlete to consider steroid use when the system of training methods described in this book are not first in place makes no sense, from the standpoint of performance or from the standpoint of the health and well-being of the athlete.

When you read the regeneration chapter you will realize that the great majority of athletes are still training and performing with hard-spasmed muscle (both organ and skeletal muscle) with the result that a full complement of tissue is not being presented to the training stimulus, let alone involved in the performance. This fact becomes doubly significant when one considers that the body must use protective inhibition in the presence of such spasmed tissue in order to survive training and performance without injury.

Interestingly enough, the effect of steroid use is not purely physiological; in addition to the psychogenic effects is the placebo or belief effect.

How much then, of the ultimate effect of steroid use on performance can be attributed to; (1) heightened aggression, which in turn leads to greater training effort and performance, (2) varied physiological effects on the unique physiology that is each athlete, (3) belief?

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Paul Patterson  
1991

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## PREFACE IV

### Sprint Training — It Underlies Sports Ranging From Gymnastics to Soccer

Seven of the ten events in the decathlon are predicated on key elements of sprint training; the approach sprint of the long jump, high jump, and pole vault, including explosive arm and leg movements, and the explosive whole body movements of the shot put.

Then let us consider the approach run of the gymnastic vaults and the explosive whole-body movements of the floor routines; the movement patterns involved in team sports, including short, explosive, whole body movements — changes in direction, chest passes in basketball, defensive reactions in football, and running in soccer. The training for all of these sports should be based at least in part on the techniques described in this book.

When it is clear that explosive leg movements are predetermined by explosive arm movements, you begin to appreciate how widely applicable the techniques described in "The Charlie Francis Training System" really are.

Add to this performance reality the Recovery/Regeneration, Electro stimulation, Growth and Development information, in addition to the Monitoring and Testing wisdom of Charlie Francis, and you have the most wholistic, integrated training model ever developed.

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## Foreword

### Coaching as an Art Form

In sport, the 100 metre sprint is the only pure representation of the Olympic ideal of farther, higher, faster, stronger — it holds a unique significance which has persisted since man has desired to know his limits.

If you wanted to witness the strongest human in the world would you go to view the iron cross in gymnastics or one of the weight classes in weight lifting or wrestling? If you wanted to witness the athlete who demonstrates higher or farther do you view the shot put, javelin or discus, the long jump, triple jump, the pole vault or the high jump? If you wanted to witness the fastest human in the world — there is no confusion — that role is conceded to the 100 metre sprint champion and Ben Johnson recorded the fastest 100 metre time in history — his coach was Charlie Francis.

Such an athletic performance represents an incredible blend of simultaneously occurring mind and body events.

In the developing years, the coach focuses on each event individually for the purpose of learning and knowing what the contributing factors to performance are and how they can be trained. At this stage of development the novice coach is little more than a mechanic who is sequentially attempting to service a physical vehicle by following a service manual.

As a coach evolves through learning and practice, he/she realizes that the separateness of training factors is in fact an illusion, and with this realization the elevation of coaching to an art begins.

**"One has to be able to thread together scientific knowledge and sport technique while listening to one's own feelings and the feelings of the particular athlete in question — it is at this point that coaching ceases to be a science and becomes an art."**

— Charlie Francis

An example illustrating this 'illusion of separateness' between training factors is the aspect of recovery/regeneration. Traditionally it is thought of as a series of techniques including active recovery, massage, hydrotherapy, or chemicals such as calcium, or Epsom salts which are applied post-stimulus. This simply represents incomplete understanding. Recovery/regeneration begins with harmony in the athlete's living environment, clear-cut sport and life goals, effective and caring verbal, non-verbal and tactile communication both between athletes and between the athlete and coach, optimum dietary principles applied with optimum timing, the correct training stimulus, applied at the correct time, and full recovery from a group of stimuli which constitute a workout. Some aspect bearing on recovery/regeneration is in reality occurring at all times.

To manage the complexity of factors optimally, the coach must develop and use the powers of visual, auditory, tactile, and instinctive/intuitive observation at as high a level as possible. Charlie Francis is a very gifted observer and it is predominantly on the basis of his observations that strength is prescribed, technique is corrected and analyzed, and the athletes well-being is ascertained. Traditional lab testing plays only a minor role.

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The ultimate goal of the coach-athlete dyad is to bring an athlete to peak performance, and to bring them to that state predictably in terms of place and time. Charlie Francis is a coach who illustrates such an elusive capability. As he has said himself, "The task faced by a coach is to comprehend the interplay between training factors and, based on that understanding, prescribe what your athletes need — when they need it."

One of his athletes relates; "Charlie is the brain surgeon of sprint coaches — he knows exactly when you should move from tempo — muscular endurance work to power work — he knows exactly when to stop your power work to optimize the stimulus yet avoid overtraining. It is uncanny how he knows when you are ready to change from one training element to another."

According to Charlie, "Many coaches are at a point in their evolution where they are imitating techniques and coaching philosophies which they have read about, purchased, inherited or been told about, not realizing that someone else's training program can never be optimal for their athlete and may even be harmful."

**"There is no cookbook of coaching techniques which will apply equally well to all athletes."**  
— Charlie Francis

The 12 year sequence of training prescriptions which was applied to Ben Johnson, leading up to world record performances, was specific to the needs of Ben Johnson. The sequence of training prescriptions applied to Angella Issajenko, Tony Sharpe, Desai Williams, Mark McKoy, Cheryl Thibedeau, and Molly Killingbeck, was specific to the needs of each of these athletes.

This book presents the opportunity to the reader to understand the process required to sprint as fast as genetic potential and training environment can allow, and to better understand the phenomenon that is a successful world class coach. The complexity of skills and information, the complexity that is each athlete, the long term personal commitment, the intellectual acumen, an incessant and constant drive to learn and understand and on occasion to know, the sensitivity, curiosity and finally the outright ability and determination to care for their athletes — all of these characteristics are either referred to directly or implied within this book.

**"It is one thing to talk about caring for athletes — it is quite another thing to do it!"**  
— Charlie Francis

Finally this book is also written for other interested parties who want to more fully understand the process by which the athletes who were under the guidance of Charlie Francis realized their potential. This understanding is useful to parents, teachers, sport administrators, physicians and other people who play a support role to coaches and athletes.

It is hoped also that the readers transcend their current understanding of the phenomenon that is sport, and of the coaches and athletes who implement this phenomenon. The driving force behind their desire to become and remain athletes and coaches is left for you to ponder further.

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Paul Patterson 1988

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## BIOGRAPHY

Charlie Francis' relationship to sprinting has been a long one. In 1966 as a 16 year old at De Lasalle High School in Toronto he recorded an Ontario Juvenile record of 9.6 seconds for the 100 yard sprint.

In the fall of 1968 Charlie accepted an athletic scholarship to Stanford University in Northern California, where he studied political science and history and received a bachelor's degree in 1971.

In 1971, now 21 years old, Charlie was being coached by Payton Jordan at Stanford, but in Canada worked with Percy Duncan. As a senior at Stanford he clocked 10.1 sec for 100 metres in Vancouver. Charlie Francis was ranked 5th in the world on the basis of this performance. Charlie was the Canadian 100 metre champion from 1970-1973 and competed for Canada at the 1972 Olympics in Munich.

In 1973, at 23 years of age, an age when most athletes are usually moving into their career peak, Charlie retired from sprinting. At that time there was simply not a system of support for athletes in Canada which could adequately provide for their living and competitive needs.

Charlie then moved into a 5 year career as a re-insurance underwriter. His coaching career began in 1976, when Peter Cross, a coach with the Scarborough Optimists' asked him to work with a group of junior sprinters. By the summer of 1978 results had been sufficiently rewarding that Charlie quit his job to coach full time without pay. During the next two years the performance results of his athletes were such that in April 1981 he became the first coach in Canada to be hired as a training centre coach.

By the end of 1982, after only one year in the sprint training centre, Francis-coached sprinters produced 89 personal bests, 12 Canadian records and 3 Commonwealth records. In 1982 Angella (Taylor) Issajenko was ranked 4th in the world for the 100 metres. Desai Williams held the Canadian record at 10.17 seconds for 100 metres and had won a silver medal at the World Student Games in 1983. Tony Sharpe ranked number 3 at 200 metres. in 20.22 seconds. in the world in 1982. Ben Johnson had a 10.19 seconds 100 metre personal best. Molly Killingbeck had won a silver medal in the 400 metres at the 1982 Commonwealth Games, one of 13 medals won by Charlie's athletes at these games.

Athletes coached by Charlie Francis won 8 of 14 medals acquired by Canada's track team at the 1984 Olympics in Los Angeles.

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**What was your situation at the time you were coming to the end of your career in 1973.**

## Q & A

The support in Canada was variable and sporadic. I had some rankings and several performances at a high level. I believed I could run against world level sprinters, I had done so and had proven that I could win on the given day.

The media at that time would accuse me of choking under pressure. The reason for inconsistent performances had little to do with choking. The fact was that I was able to peak for a single race setting, but with competitions involving multiple rounds and heats I would get into more trouble as each round went by because I couldn't regenerate fully enough to keep coming back with the same level of performance. Likewise I couldn't predict with any certainty on which day I would run well, because there was no real plan to guide me to predictable peaks, and as a result sometimes I would be running optimally and sometimes not. There was nothing you could hold up in front of you and say this is your target - this is where you are going and how you will achieve it.

When Gerard (Mach) came to Canada he would describe different planning scenarios and I simply didn't know the whys and wherefores of such theories. When I started coaching, he would say, "Charlie, you can't have your athletes run quarter miles the week before they are going to run a 100 metre race."

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### Coaching Record of Charlie Francis

Charlie Francis forged one of the world's leading sprint teams whose runners set 32 world records and won 9 Olympic medals.

#### Ben Johnson

	100 metres	9.79 sec	World & Canadian record
	200 metres	20.29 sec	
	50 yards	5.15 sec	World & Canadian record
	50 metres	5.55 sec	World & Canadian record
	60 yards	6.01 sec	Canadian record
	60 metres	6.41 sec	World & Canadian record
1987	World Indoor Champion		100 metres
1987	World Outdoor Champion		100 metres
1986	Commonwealth Champion		100 metres
1986	Goodwill Games Champion		100 metres
1985	World Indoor Champion		100 metres
1985	World Cup Champion		100 metres
1984	Olympic Games — Bronze		100 metres
1984	Olympic Games — Bronze		4 x 100 metre relay

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### Angella Issajenko

100 metres	10.97 sec	Canadian Record
200 metres	22.25 sec	Canadian Record
400 metres	50.5 sec	
50 yards	5.74 sec	World & Canadian Record
50 metres	6.06 sec	World & Canadian Record
60 metres	7.08 sec	Canadian Record
1987	World Indoor Championships — Silver	60 metres
1986	Commonwealth Champion — Gold	200 metres
1986	Commonwealth Games — Bronze	100 metres
1986	Commonwealth Games — Silver	4 x 100metres
1984	Olympic Games — Silver	4 x 100 metre relay
1982	Commonwealth Champion — Gold	100 metres
1982	Commonwealth Champion — Gold	4 x 400 metre relay
1982	Commonwealth Games — Silver	4 x 100 metres
1982	Commonwealth Games — Bronze	200 metres
— 50 career Canadian indoor and outdoor records over distances from 50 yards to 600 metres; 16 times Canadian Champion since 1979 in the 100 and 200 metres.		

### Desai Williams

100 metres	10.11 sec	
200 metres	20.29 sec	
400 metres	45.91 sec	
60 metres	6.52 sec (#3 all time World Performance)	
1986	Commonwealth Champion — Gold	4 x 100 metres
1984	Olympic Games — Bronze	4 x 100 metres
1983	World Championship Finalist	100 metres
1982	Commonwealth Games — Silver	4 x 100 metres
9 times Canadian Champion since 1972.		

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*You had the power and acceleration because you were doing training which was relatively specific to the demands of sprinting. The only question seemed to be how often you were doing the speed work and what form of recovery was required.*

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### Tony Sharpe

100 metres	10.19 sec	
200 metres	20.22 sec	Canadian Record
1984	Olympic Games — Bronze	4 x 100 metres
1984	Olympic Games Finalist	100 metres
1982	#3 World Performance	200 metres
1982	Commonwealth Games — Silver	4 x 100 metres

**As a coach how meaningful is it to reflect back to when you were an athlete yourself?**

Very meaningful — I was able to use that context to great advantage. Marv Nash once commented to me, "A lot of your coaching goes back to many of the things you were doing as an athlete with Percy Duncan. The only difference now is the way in which you are cycling all of the elements together. In reality even back then you were pretty close to doing what you needed to do and we all thought you were crazy at the time. You were doing all the short distance running and so on, compared to what the rest of us were doing. You had the power and acceleration because you were doing training which was relatively specific to the demands of sprinting. The only questions seemed to be how often you were doing the speed work and what form of recovery was required."



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In reality as an athlete I made the classic training error of doing high intensity speed work every day instead of twice a week or three times a week. In addition I was not doing enough training with heavy weights.

**Incomplete recovery then was a significant problem when you were an athlete?**

Yes it was. I could never consistently be at my maximum. The special technique and speed runs could never be fast enough because I was always loaded up with fatigue from the day before. The only times I freshened up were in the races themselves because I was forced to reduce the work volume.

**How did your coach Percy Duncan impact on your coaching skills?**

To begin with, Percy was also a sprinter. He was a former world record holder in the 100 yard dash. He had coached at Northwestern, at Stanford, and at Harvard Universities. It was largely through Percy's influence that I initially learned the value of massage. He was also a very sophisticated coach for the time in that he recognized that the 100 metre sprint consisted of different segments, — start, body, finish, and should be trained accordingly. He also introduced me to the short (20 - 30 metre) power work. He was really ahead of his time in certain ways. In addition he understood that basic forms of recovery had to be in place before training at a high level was possible.

**What other key people have had a influence on your coaching?**

Harry Jerome was very aware of his body and had a sophisticated program for that time. I spent a lot of time talking with him and he reinforced certain kinds of finish drills and acceleration drills that we do to this day.

**What has been the impact of Gerard Mach on your career as athlete and coach?**

Gerard Mach entered the picture as I was ending my career as an athlete in 1972-73. Gerard came to Canada as National Coach, bringing with him his knowledge on massage and regenerative techniques. He introduced me to the area of planning and periodization with time frames and specific performance targets. He would say that when you have a young athlete their goal is to perform at any time — just keep them going — let them achieve better and better performances and later on, as they mature, they will have to perform at the correct time — then they would have to win, when they need to win. It took a long time before I could piece these bits of information together.

**What was Gerard Mach's position in Poland?**

For many years in Poland, Gerard was the national sprinting coach after having been a National champion himself in 1948. Even as head coach, he was still competing on the relay team as late as 1959, 1960. In spite of the fact that he was a very young head coach, by 1966 his sprinters completely dominated the European

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championships. Each participating country was allowed only two entries in that meet and his sprinters finished first and second in every sprint event and won all the relays. He was the leading sprinting coach in the world at that time. Gerard was an innovator. He changed the training program, from single periodization (one peak a year) to double periodization (two peaks a year) which was unknown in Europe and yet was common in North America. They had no winter competitions in Europe, so Gerard pushed very strongly for them. At that time the conventional wisdom was that you could peak only once a year, and that if you were running fast at the beginning of the year you would surely fail at the end of the year. Gerard dispelled those myths. He showed that athletes could open up at the beginning of the season at their personal best levels and continue at that level right through the season.

**Describe the situation when Gerard began coaching in Canada.**

He was hired as National sprint coach in Canada in 1973 and I was still an athlete at the time. We thought his demands were radical but in fact he was just describing training conditions as they would be in the rest of the world. This was a totally unfamiliar context for us. At our first meeting he said we should have relay meetings, so he brought all the sprinters together and we went out to Etobicoke stadium. When he saw that the track was made out of tar he said, "This track is garbage, we will go to a tartan track. Where is the closest tartan track?" He was then informed that the nearest one was in Winnipeg. "What?! One hundred Tartan tracks in Africa and you don't have one in Toronto?" He couldn't believe the situation. He was simply bewildered by the training environment that existed in Canada at that time. I said to Gerard, "I can't leave my job to go to training camps." He replied, "Well Charlie, you are the national champion, they must send you and they must pay you too." What he was saying was normal for any other country in the western world. If you are national champion in any other country it does mean something. An employer in this country would most likely not hire someone if they knew he/she was the national sprint champion who would require time off for training camps and competitions.

Gerard had expected that he would come to Canada and do everything he wanted to as he had been used to in Poland, and by 1976 we'd be running well. Gerard very quickly learned that the problems he was faced with were overwhelming. He had to do virtually everything himself; he had to do all the massage, he had to do all the treatment. For example in 1975 when Canada sent a team to the PanAm Games, Gerard was the only coach for 30 to 40 athletes, with the 100 metre, 200 metre, 400 metre and 4 x 4 men's and women's relay.

**Can you expand on some of the things you learned from Gerard?**

One thing — probably the single most important thing he taught me was tenacity. Never give up! That's the one thing he always emphasized. Once you go down, once you give up, there's no hope, there's nothing. So you must not break down, you must not give up — you've just got to keep plugging, and no matter what you are faced with, you don't give up.

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Gerard also taught me certain techniques of massage applied at the level of skeletal muscle to find out how low or how high the tone should be. He would show you what you should expect to feel in the muscle of correctly prepared athletes and other things to look for. For instance, sometimes you have to put an athlete on his back and lift the knee in order to find certain lines of tightness in the hamstring that are deeper than would be found by superficial examination. Normally you wouldn't feel this tightness at all.

He tried to demonstrate all aspects of regeneration but it was a long learning process and I didn't have a complete frame of reference. As a result I was unable to look at things in retrospect because I needed to look at new information in the context of where I was, and initially I didn't know the right questions to ask. I didn't know how the training factors fit together, and I was not aware of how plans were set up and so on. Going through the actual coaching process each year, you begin to understand more and more of what you should be doing.

**What has Gerard's influence been on you from the technical standpoint?**

We never really discussed running technique. The real questions then related to the delivery of the training methods — When? How much? Why? How much recovery? How to avoid problems? How to schedule competitions? How to recover from injuries?

Gerard's injury rehabilitation program was very strong. He demonstrated that you can bring an athlete back from a hamstring pull in only ten days. Traditionally, you'd be looking at weeks, and of course, the longer it takes to come back, the more training time you are losing along the way. It's amazing to be able to bring the athlete back to the point of running 200 metre distances in five or six days and maybe back to running 100 metres in eight or ten days.

Gerard would prescribe extensive massage and other recovery techniques in combination with a system that would determine the distance over which you could accelerate, as you rehabilitated. This technique was based on the fact that your final speed is determined by how far you are able to accelerate. He would establish check marks and would bring the athlete through these check marks over a series of days. On the basis of the results he would give athletes individual exercises to do and assign progressively longer acceleration distances which determined with some certainty when the athlete was prepared to compete. I've never seen anything like it before or since. He also convinced me to continue power work throughout the entire season.

**When in your career did you believe that your athletes could win at the world level?**

Probably around 1979. By then I was working with athletes such as Desai Williams and Angella Issajenko who I knew had the talent necessary to win at that level. Ben Johnson was still developing at that time.

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In the 1978 Canadian Nationals with Peter Cross, we put three relay teams on the track, senior, junior, and juvenile, and they went 1-2-3 in the relay final. Hugh Fraser won the 100 metres, but the future with Desai, Ben, Mark, Tony, and with everybody who was involved became clear. Angella was 19 years old and had only been training for a couple of months when she ran a 23.87 sec — 200 metres and 62 flat in the quarter mile. It was clear to Peter Cross and myself that our club would dominate Canadian Track & Field for the next 10-15 years. 1978 was the last time any club in Canada would beat us.

**When did Ben Johnson start to believe in his own talent?**

In 1978 there was this teenager — 16 years old — asking me, after finishing fourth in the 50 metres at the Senior Nationals, "Do you think I can break the world record next year?" Ben was aggressive and believed in himself from the beginning.

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**How closely did the development of your club, the Scarborough Optimists' parallel your development as a coach?**

I would say that the evolution of the club, the athletes, and my own evolution as a coach were closely related.

We took our men's team consisting mostly of young kids, to Switzerland in 1978, to compete at a dual meet against the full national teams from Switzerland, West Germany, and several other major clubs. Some of the clubs were depleted because their top athletes were resting for the European Championships. Nonetheless, we beat Switzerland in a direct dual meet by one point. We caught them off guard, and to this day, some Zurich fans remember and still follow our athletes. They remember Desai Williams, Milt Ottey, Tony Sharpe, and others. Milt was a high school athlete and in the high jump cleared 7 feet for the first time, when we were there.

## CHAPTER 1

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# Talent Identification and Athlete Development

*"If it ain't broke, don't fix it."*



**Ben Johnson**

- 1. 1976 — Age 14 Years
- 2. 1980 — Age 18 Years
- 3. 1983 — Age 21 Years
- 4. 1987 — Age 25 Years — Toronto, Canada —  
5.15 sec. - 50 yds.

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**What are some of the myths relating to athlete development or talent identification?**

**Q & A**

A few myths come to mind:

*One is that you handle a young athlete in a certain way but then all of a sudden you change to an intermediate athlete or a mature athlete program.* In reality the transition between these phases is invisible. Athletes will tell you via their performance of training elements and their competition times what they are ready for next. As an example - core strength, core flexibility, and core power are emphasized heavily during an athlete's early years but this type of work is retained at a high level even with mature world class athletes.

*Another is that sprinters are born and not made.* Even a cursory examination of the development of our top sprinters and hurdlers will show that a minimum of five to eight years of correct training is required before a given athlete's potential becomes apparent. It can be argued, that most sprinters are 'un-made' rather than 'made' due to inappropriate training during their initial development. A common example of the result of inappropriate training is the conversion of the transitional muscle fibre of a young athlete to red endurance fibre rather than white fast-twitch fibre due to inappropriate volumes of endurance training. As a result of such inadequate training knowledge ultimate performance capabilities of the athlete are limited by the early training he or she undergoes.

*A third myth relates to the level and period of commitment required to succeed at a high level.* Many athletes at some point in their developing years, come to the conclusion that they must change coaches. It is difficult for athletes, particularly in North America, to understand that high level performance requires many years of high level training.

*The last myth that readily comes to mind is that power-related work cannot and should not be performed by young athletes.* Actually, through such play activities as throwing stones, rope climbing, tree climbing and jumping, children do perform all kinds of power related work and they do so safely. The key, however, is that the child himself determines what he can handle safely. The coach of a developing athlete must learn not to take this responsibility away from the developing athlete.

**How does the training principle of variety apply to young athletes?**

The principle of variety allows development of general strength and body awareness which is vital to an athlete's future development.

At the same time variety helps to keep kids interested. It makes training fun, and keeps them coming out to practice. A coach should always be on the lookout for new ways to present training stimuli to the young athlete.

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*The key, however, is that the child himself determines what he can handle safely. The coach of a developing athlete must learn not to take this responsibility away from the developing athlete*

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### **How do you handle the development of agility or body awareness in young sprinters?**

Agility is a form of special strength in combination with body awareness. The link of agility to the sprint is not immediately apparent and this work is sometimes inappropriately called non-related. I spend a lot of time with young sprinters, teaching them general skills. Each of the general skills, once acquired, enhances their ability to pick up more sophisticated skills. You are really trying to develop the same level of body awareness as an athlete already has who has played a great variety of sports. An athlete with such varied general sport abilities picks up new techniques very quickly. There are few training movements that such an athlete finds difficult to learn. You need to ensure that enough strength is in place at each level of technical sophistication before proceeding to a higher level of technical sophistication.

### **How does sprint training fit into the general development of the young athlete?**

Sprint training should underlie the initial and long term development of virtually every athlete.

Think of it:

- All of the jumps are preceded by a sprint; long & triple jump, high jump, pole vault.
- Accelerations during the implementation of various race strategies - particularly in the middle distance races 400 - 800 - 1500m, are sprints.
- Team sports such as hockey, basketball, football, soccer, lacrosse make heavy demands on one's sprint capabilities. The truly great team players are able to accelerate explosively both in defensive and offensive maneuvers.

### **At what age do sprinters peak?**

The male athlete has a reflex peak at age 22 with strength peaking at age 28-30 years. Ages 14 to 20 are spent laying the foundation for high performance. General estimates from the East Block allocate 2 quadrennials (8 years) to develop an athlete with top performances occurring in the ages of 21 - 28 years.

### **What are your views on 'core training' for young athletes?**

My thinking is that this is central to the development of the system. The body core should be properly developed before much is done in the way of weight training. You may do some strength groundwork with young athletes with circuit type training, but core training, or torso training comes first. In the more mature athlete the focus of core work is on developing power, -explosive power - through high intensity work, but when working with youngsters both circuit and core work are directed at building muscle or increasing muscle cross-section via high volume, medium intensity work (eg. 3 to 5 sets of 5-15 repetitions at 65-75% of maximum load). *With the young athletes particularly, they should do what they can do - when they can do it based on their ability and their training status.* You simply challenge the system as it is capable of being challenged.

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*You need to ensure that enough strength is in place at each level of technical sophistication before proceeding to a higher level of technical sophistication.*

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*Sprint training should underlie the initial and long term development of virtually every athlete. Team sports such as hockey, basketball, football, soccer, lacrosse make heavy demands on one's sprint capabilities. The truly great team players are able to accelerate explosively both in defensive and offensive maneuvers.*

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*With the young athletes particularly, they should do what they can do - when they can do it based on their ability and their training status.*

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The body type of the athlete will determine what is required in the way of core training. You may have a mesomorph or heavily muscled athlete for whom power work may be of more value than body building work. A re-adjustment of training to go easy on areas in which he is already strong while focusing on the weaker links in the chain may be advisable.

What I'm talking about with reference to core or central body training is not limited to weight training. We did a lot of CNS (Central Nervous System) related work to develop body control and we also did muscle endurance related work. This involves tempo work, medicine ball work, and a variety of different types of abdominal work. This type of work is particularly appropriate for young athletes. It does not require a high volume of work, it does not require a lot of equipment and it is easy to do. It can be structured to include games, individual work, partner work, and group work, and can provide variety and fun. This way the athletes are entertained while they are being trained. This keeps them together with their friends and enhances group cohesion.

**How do you know when it is time to expose the athlete to a higher level of difficulty?**

When we get around to focusing on starting technique out of the blocks, for example, the athlete must have the strength to push out of the blocks in the correct starting position. So on occasion you let them try to come out of the blocks. They will tell you where they're at by how they look while doing it. For example, one of the basic problem areas in starting technique is that during the start the lead knee will come forward before the driving leg is fully extended. This happens because the athlete is simply not strong enough to extend the rear leg fully under load or as fast as the front knee comes forward. When this is the case, the lead knee comes forward without the athlete having moved appreciably forward out of the blocks. If you were a young high jumper you would not lift your lead knee and then try to jump - you would swing your knee forward while applying force to the ground with the take-off leg to generate lift to the centre of gravity. Exactly the same principle applies to starting out of the blocks in sprinting. So you check young sprinters on occasion to see if they have the strength and power to come out of the blocks in the correct position. When they finally demonstrate that they can do it you can take them to the next level of difficulty. *But always reinforce correct technique for the purpose of developing positive self-esteem. Give athletes praise for their efforts - never criticize or ridicule. The correct selection of specific training elements in addition to practical skill tests or indicators, ensures successful completion by the participant. To build a powerful image of self you structure a string of successes.*

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*Initially you encourage multi-lateral development, but the eventual goal is to specialize in sprinting.*

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*They will tell you where they're at by how they look while doing it.*

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*But always reinforce correct technique for the purpose of developing positive self-esteem. Give athletes praise for their efforts - never criticize or ridicule.*

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*The correct selection of specific training elements in addition to practical skill tests or indicators, ensures successful completion by the participant. To build a powerful image of self in the young athlete you structure a string of successes .*

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### How much of a factor is stress or pressure in these initial years?

There is no pressure applied in the teaching and performance of general ability related activities. The athletes may or may not be aware of why they are performing medicine ball work, or free body strength work, for example. They are not overly concerned with understanding why. They have fun doing it, they have their buddies there, they can pit themselves against their contemporaries and so on. They are experiencing training effects while not being really conscious of the fact that they are training.

During this initial phase I am careful not to allow self-limiting inhibitions to develop. For example, initially we do only minimal work involving starting blocks. Block work tends to make athletes up-tight, particularly when they are not yet ready for it.

By the time the athletes are ready for block work everything usually falls into place without a lot of hassle and there is very little discussion with the athletes about their starting technique. If I spend a lot of time focusing the athletes' attention on how his foot behaved during the start I am encouraging in him a 'paralysis by analysis.' Athletes learn optimally by performing training elements correctly — not by listening to a bunch of words. If you make a young athlete who is trying to be a sprinter up-tight, you're both in deep trouble — and possibly permanently. You may never be able to totally remove the inhibitions that bad coaching may seat in an athlete.

*Teach one training element at a time. If you point out 'three problems' the athlete can correct only one — leaving two problems on his/her mind. Don't move away from one training element until it is correct. Teach increasing levels of skill — according to individual needs — when the athletes' body and performance of training elements indicate a readiness to handle them.*

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***Teach one training element at a time. If you point out 'three problems' the athlete can correct only one - leaving two problems on his/her mind. Don't move away from one training element until it is correct. Teach increasing levels of skill - according to individual needs - when the athlete's body and performance of training elements indicate a readiness to handle them.***

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### What effect does the height of the athlete have on sprinting performance?

The taller athlete has longer, less efficient levers than the shorter athlete. However, long levers are required for top speed. An ideal height for pure sprinting would seem to be in the 5'9" to 5'11" range, where levers are short enough for an explosive start yet long enough for top speed.

**You have said that 80-90% of your time with mature athletes is spent holding them back to avoid overtraining and only 10% of your time motivating them to do additional work or work which is not as enjoyable or familiar. How does this change when you are dealing with 14-15 year olds?**

At that age you're trying as much as anything to amuse them. You are trying to create an environment in which the training gets done almost as a by-product. Usually they have their contemporaries there, so as long as they are working in a group they will train. This environment is important. Without it there is not a lot you can say

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to motivate them and maintain their interest. At this age they may not be aspiring to anything specific, they don't know yet how far their talent is going to take them. So you make the workouts fun and reinforce to them the fact that they are coming out to practice to have a good time.

#### **What access do young developing athletes have to massage?**

Sometimes they have access, sometimes they do not. We try to arrange for massage schools to apprentice their massage students with us whenever possible. But even then, it is a good news — bad news story as the students vary widely in their levels of skill. If the massage student is reasonably well skilled then it works out fine.

We have dealt with the Kikkawa School of Massage in Toronto for this purpose and our developing athletes have the opportunity to receive massage from these people. If and when a developing athlete is included on a competitive tour or a trip to a foreign training camp he or she will have access to foreign massage therapists as well.

#### **Would it be correct to say that when developing the training program for either a 14 year old or a 24 year old you draw from the same basic training menu?**

Yes, you are applying the same basic principles but in different amounts and in different ways. Furthermore, in guiding the training of a young entry level athlete, monitoring and testing via observation is at least as important as it is in the training of mature athletes.

*You are giving each athlete what you think he or she needs, when you think he or she can handle it. This is going to be different for each athlete. Each training component will be applied differently depending on how quickly the athlete is maturing.*

Obviously, a full blown maximum strength phase is not fully applied with 14 year olds. They have not yet learned, at this age, to concentrate themselves sufficiently to recruit all their muscle fibres. This concentration skill is required before maximum strength work can be performed effectively. This, of course, does not mean that 14 year olds should not do high intensity strength work at all.

As Pasquel Belotti, an Italian sport scientist has said, youth training must not have too much low intensity exercise. There must be enough high intensity work so as to:

1. Maintain and improve specific skill.
2. Prevent loss of and maintain current volume of fast twitch fibre, and
3. Promote differentiation of transitional muscle fibre to fast twitch rather than slow twitch fibre.

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*You are giving each athlete what you think he or she needs, when you think he or she can handle it.*

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**Are there significant physical characteristics or idiosyncrasies in young athletes which you try to change?**

There are significant differences among athletes but I have learned to take a very conservative approach in deciding whether an idiosyncrasy should be changed or left alone.

I have, for example, had some athletes who were clearly leaning over to one side or the other when sprinting. If the athlete is able to run fast, smoothly and has no physical complaints I would leave the idiosyncrasy intact. We sent one of our girls for a series of treatments by a Canadian therapist with the result that her back alignment was improved but her sprinting deteriorated. In some cases corrective action will help but in other cases you are better to leave well enough alone. *Don't try to fix something that isn't broken.*

In some athletes there will be differences in the way their leg musculature is attached to the skeleton. This results in different lines of pull which may or may not represent injury potentials. You will usually be able to find such differences only while massaging the athletes, although in some instances you can see them. You would deal with this situation only if it constitutes a source of injury or if it seems to be impacting negatively on actual sprinting performance.

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*Don't try to fix something that isn't broken.*

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*As Gerard Mach used to say  
"The operation was a success  
— unfortunately the patient died!"*

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Photo Credit: Claus Andersen

Ben Johnson defeats Carl Lewis at the World Championships in Rome, Italy, 1987.  
Time : 9.83 seconds for 100 metres.

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*Note the differences in  
somatotype of Ben and Carl —  
Specifically: calf  
thigh  
chest  
neck  
shoulder*

*Ben's somatotype was the  
result of an 11-year training  
period designed to make Ben a  
sprint specialist.*

*Carl's training, on the other  
hand had to accommodate the  
body - weight reality of being  
airborne during the long jump.  
Event specialization is a  
critical aspect of talent  
identification and athlete  
development.*

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### **Some Characteristics of the Development of Ben Johnson**

1. He entered sport at an early age - 14 years old.
2. He was guided by an experienced and qualified coach. As a result he was given 'what he needed - when he needed it' thus avoiding the burn-out and 'trashing' which destroys many young athletes.
3. He was exposed to cutting edge training methods such as electronic muscle stimulation (EMS) at an early age (16). This in combination with additional power work promoted the development of Ben's latent power capabilities.
4. He was given free access, on demand, to regenerative massages and body work. The sophistication of this aspect of Charlie's training program grew as the modest support and resources for this aspect of the program (which Charlie pressed for relentlessly) gradually increased. The progression was something like this:
  - massage by coach 1978-1980
  - massage by therapist 1981-1986
  - massage by regeneration specialist 1986-1988.
5. He had only one serious injury (June 88 - 3rd degree hamstring pull).
6. His coach ensured that Ben's training needs were provided for even at the coach's personal expense.
7. He was exposed to both upper body and lower body maximum weights methods by age 18 resulting in a sprinter who could provide a credible showing at a power lifting competition.
  - body weight - 178 lbs.
  - bench press 10 reps x 352 lbs., 2 reps x 407 lbs.
  - 1/2 squat 2 sets x 6 reps x 600 lbs.

A key by-product of strength work particularly in the young athlete is maximization of the size of tendon attachments and bone dimensions so that later — the higher forces involved in faster starts and quicker runs can be handled safely. Plyometrics, which generate very high internal loads on tendons, ligaments and bones, can eventually also be handled safely with larger tendon attachments and bone dimensions.

8. Fund raising activities by coach, club manager, and agent were adequate to allow Ben to remain in sport long enough to realize his potential.
9. Ben never had to work at an off-track job during his entire running career.

## Athlete Development - Talent Identification Checklist

1. High level sprinters tend to be short tempered, explosive, and intense. A sprinter will have all of these characteristics even at a young age. An explosive personality is an indication of an explosive nervous system.
2. The athlete who can move his or her feet with high frequency is a candidate for sprinting. Checking the number of times a standing athlete can, alternately or with feet together, hop on the ground during a fixed period of time gives further indication of the explosiveness of that athlete's nervous system. Count the number of ground contacts over a 10 or 15 second time period and compare with the performance of proven sprinters.
3. Enough power-related work must be done during the early years (ages 13-17) to:
  - maintain genetically determined levels of white or power-related muscle fibre
  - promote the shift of transitional or intermediate fibre to white, power-related muscle fibre
4. Endurance work must be carefully limited to light - light/medium volumes to prevent the conversion of transitional or intermediate muscle fibre to red, endurance muscle fibre.
5. Power-related work for young athletes includes:
  - 'flat-ground' (no boxes) plyometrics, such as 2-legged hopping and skipping in various sequences
  - light medicine ball (6-8 lbs) work. This can be structured to develop power capabilities in the lower body, core, and upper body.
6. Young athletes should compete in races regularly and perform speed work with maximum intensity. They could actually compete in as many races as mature athletes as long as they perceive no pressure to do so. Racing keeps the young athlete interested and motivated.
7. Speed endurance work should be performed by young athletes over distances up to 150 metres. The volume of work, however, should be very low and carefully administered. The lactic/alactic energy systems require long-term development (i.e. power - speed related energy systems).
8. Young athletes who do not achieve high levels of oxygen uptake during a treadmill test but who perform well over 10-40 metre sprints probably have inherited a high proportion of white power-related muscle fibre.
9. Remember: a short athlete will show earlier development than a tall athlete. Tall athletes take a longer time to develop sprint technique because of their long limb-lengths.
10. The Coach must take care not to overemphasize winning at this stage of development. Personal Bests only are emphasized. Enthusiasm is reinforced and maintained through successive personal bests.
11. Free-body (no weights) strength movements are prescribed to very young athletes (ages 10 - 14) to gradually develop a sprinter's build within the constraints of the inherited body type. The inherited somatotype may be mesomorphic (heavily muscled) or ectomorphic (lightly muscled.)  
 Examples:  
 Mesomorphic sprinter's somatotype - Angella Issajenko, Ben Johnson. (See page 79)  
 Ectomorphic sprinter's somatotype - Molly Killingbeck, Mark McKoy. (See pages 33 and 41)

Until the desired sprint somatotype or body shape is in place, body-building or muscle cross-section methods are emphasized over maximum weight or power methods. Once the sprinter's build is in place, the reverse is true — maximum weights or power methods prevail over body-building-type strength training.

Development of a sprinter's build focuses on four key body segments or components:

- shoulders and upper arm development to allow for the required 'pistoning' of the arms (acceleration begins with the arms);
- multifaceted core development to maintain 'design posture' and allow for the 'running position' but also to provide a stable base for explosive arm and leg movements to occur;
- upper hamstring/gluteal development to provide for a high capacity of hip extension during the key 'pawing' phase of foot contact with the ground;
- calves are rarely focused on directly in strength work and are developed as a by-product of the hopping, skipping plyometric-type work in addition to actual sprinting.

12. The general guidelines to be followed by the coach can be typified by encouraging, developing, reinforcing flow or smoothness in performance, even during rudimentary exercises and beginning at a young age.

During this phase (youth), a coach must carefully develop technique to ensure proper muscle development and to ensure athlete safety. Proper selection of weights and exercises will ensure smoothness of execution.



## CHAPTER 2

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# SPRINT TECHNIQUE

*"Running occurs on the ground — sprinting occurs over it."*

*Percy Duncan*

*"Technique has not changed very much since the days of Jesse Owens. Where changes have occurred is in knowing how much work should be done - when it should be done - under what conditions it should be done - and how to recover fully from it."*

*Charlie Francis*



Photo Credit: Claus Andersen

Photo 1 — Ben Johnson racing — before he had learned how to “wait for it” (Canadian National Championships — 1982). The contorted face and raised shoulders are in stark contrast to his relaxed form seen on Photo 2 when setting a world record (1987). See page 13 — How did Ben learn to “wait for it.”

### What is the difference between running and sprinting?

Percy Duncan described the difference this way - "you run on the ground - you sprint over it." As the athlete becomes faster and stronger — shorter "contact times" of foot to ground result. As this happens the athlete loses the sensation of the foot pushing on the ground. The feeling of the up and down action of the legs dominates.

### Are the athletes' thoughts during a 100 metre sprint of any technical significance?

Harry Jerome told me something some time ago regarding what you think during a race. He said, "Wait for it!" Something that you would not normally think of, and that I remember to this day. When you try to accelerate in a race or when you try to *make a move* - particularly late in a race when you start pumping your arms - there is a lag time between when you increase your effort and when you actually begin to take off. During this period the acceleration seems to take forever because everything has slowed down. The 100 metres seems to take a long time to run - to the point where two-tenths of a second seems like a significant period of time. The result being that you just have to 'wait for it'. You must not keep *turning up* the effort or you will *tighten up*. You must give it a chance to happen - let it occur almost by itself. I was still running at the time and I had to learn to *wait for it* myself. I could feel what Harry Jerome was talking about. His insightful observation was further reinforced by what my coach Percy Duncan was showing me. Over time it became quite clear to me what 'wait for it' meant and how critical it was during an actual race.

### How did Ben learn to 'wait for it'?

With Ben there is a very close relationship between his *waiting for it*, his running relaxed, and the evolution of his self-confidence. You can see in photographs of earlier races in Ben's career that his face and his shoulders were not relaxed. He was therefore not running relaxed and you can assume that he was at that time not waiting for it. (See page 12)

Two years ago Ben was in his basement with his VCR watching videos of Lewis's races. He had been watching these videos all day long. At the end of the day he concluded that Lewis was still beating him because Lewis was running relaxed and he, Ben, was not.

If you examine the photograph of Ben during the last 10 metres of his World record 9.83 seconds in Rome, he looks as if he is half asleep - complete with half-lidded eyes, relaxed face, relaxed shoulders and open hands. (See page 8)

The lesson of patience is never totally learned, but this was the turning point which marked the final step in Ben learning to run relaxed. The link between confidence and the ability to *wait for it* are self-evident.

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*As the athlete becomes faster and stronger — shorter "contact times" of foot to ground result. As this happens the athlete loses the sensation of the foot pushing on the ground. The feeling of the up and down action of the legs dominates.*

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Ben Johnson racing at the World Championships Rome, Italy - 1987

Photo Credit: Tony Duffy - All Sport Photographic LTD.

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*The link between confidence and the ability to wait for it are self-evident.*

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## What is the place of technique in sprint training?

Correct technique is the necessary prerequisite for an athlete to begin to run well and for optimum development to occur. The neural motor patterns of correct technique must be wired in place at as young an age as possible. But it is a question of *which came first - the chicken or the egg*.

Certain qualities: absolute strength, strength balance, and power must be developed before a young athlete is able to get into the *sprint position* for the first time. Once this threshold is crossed you continue to develop muscle mass or cross-section until the desired sprint somatotype or body shape evolves. Flexibility or suppleness continues to be developed in core as well as in limbs and power characteristics are continually being over-laid on to new levels of strength or muscle mass. In addition, acceleration, speed, and speed endurance are being developed, while correct technique is constantly being reinforced.

It must be remembered that this is an extremely dynamic process. As you develop physical qualities to new levels, the neural motor patterns dictating correct sprinting technique must be updated to properly use these new levels of ability to run faster. Running at continually higher and higher speeds while still holding the sprint position is a critical aspect of learning to sprint.

### How consistent is technique with your athletes?

Let's set aside the situation of developing athletes for a moment and look only at the athletes who are at the world level.

You are using the same technical agenda to which you add the athlete's unique physical structure - complete with physical idiosyncrasies - to determine the gross expression of technique for that athlete and differences in technique between athletes. Sources of day-to-day differences in technique expression will be due to a whole array of factors: regenerative status, injury/muscle spasm status, confidence/relaxation and motivation.

### How do athletes' physical idiosyncrasies impact on their ability to develop optimal technique?

The decision as to whether an athlete's physical make-up will be a future limitation to performance should be made early in the athlete's career. In absolute terms, each of your athletes has differences in body segment lengths, location of muscle attachments, etcetera. If the athlete is running well, you assume that the physical idiosyncrasy is not a factor. Ben Johnson's left knee carries out to the side when he runs. So what? If an idiosyncrasy does not impact on performance, don't tamper with it. Olympic gold medallist Evelyn Ashford tilts over to the left. That too is not a limiting factor - for her!

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*It must be remembered that this is an extremely dynamic process. As you develop physical qualities to new levels, the neural motor patterns dictating correct sprinting technique must be updated to properly use these new levels of ability to run faster.*

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Photo Credit: Tony Duffy - All-Sport Photographic LTD.

Relaxed face and relaxed shoulders provide Angela the opportunity to 'flow' — the ultimate racing state.

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**Sources of day-to-day differences in technique expression will be due to a whole array of factors: regenerative status, injury/muscle spasm status, confidence/relaxation and motivation.**

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### Can the frequency of limb movement and stride length be increased?

Historically it was believed that frequency of limb movement was an innate neural characteristic — you were born with a certain ability. It was also felt that stride length would improve with gains in strength. Clearly both abilities can be improved. Strength gains — specifically power gains — through appropriate hopping, skipping and bouncing, will result in improvements in both stride length and stride frequency.

**Some athletes who have come to work with you have been training for the sprint without necessarily having been trained to get into the 'sprint position'. How have they reacted to your training?**

These athletes have usually been performing high volumes of work while using incorrect technique. I reduce the volume of work but increase the technical quality. They become upset and highly stressed during this initial period. They are concerned that they are not doing the same type of training as they had done elsewhere but even with reduced volume they get very tired and can't understand why.

In reality they are working just as hard with the reduced volume of work as they worked before but they are working far more effectively because of the improved sprint position they are holding. It simply takes time for them to become confident that their improved technique is translating into improved results.

I remember the point when Desmond Griffith, a developing sprinter, finally got into the 'sprint position' and held it for 30 metres and he had done a 10.55 second - 100 metre run. When he is able to hold the sprint position for 100 metres, he will begin to realize his potential.

An example of an athlete who was often injured as a young sprinter because she did not have the right configuration of strength abilities is Cheryl Thibedeau. She had insufficient hamstring and gluteus strength and had to work for months and months to develop it. In the meantime, she could hold the 'sprint position' only long enough to perform short (20-30 metre) distances at maximum speed.

### How do you define the 'sprint position'?

The 'sprint position' can be described as meeting the following requirements:

1. Head is held high and is the beginning of running tall.
2. The torso is erect and in a position of design posture.
3. The hand of the driving arm comes up to the level of the face.
4. The shoulders are relaxed.
5. The hips are high enough above the ground to allow the driving leg to extend fully to the ground.
6. The ankle of the recovery leg clears (i.e. travels above) the knee of the driving leg.
7. The ankle fully extends at the end of the leg drive.

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*By 1982 Ben's final stride length was established — 46.6 strides or 2.15m for 100m. His total improvement from then on was based on increased stride frequency — In seoul (1988) Ben was running at 5.2 strides per second at top speed.*

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*Clearly both abilities can be improved. Strength gains — specifically power gains — through appropriate hopping, skipping and bouncing, will result in improvements in both stride length and stride frequency.*

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**Can you expand upon the 'forward trunk lean' and how this relates to the 'sprint position'?**

By 70 metres of a 100 metre race Ben's exceptional stride frequency of 5 strides per second will diminish only slightly as he remains near top speed. His body by now is absolutely erect, he no longer requires the forward trunk lean that is required during primary acceleration. This again is related to laws of physics: The higher the velocity, the lower the rate of acceleration until acceleration becomes zero at maximum speed and obviates the need for any lean. *At this point the upright runner has the advantage since the hips can move most freely in the upright position.*

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*At this point the upright runner has the advantage since the hips can move most freely in the upright position.*

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## **Core Breathing Patterns vs. Acceleration**

**Do breathing patterns impact on sprint performance?**

It seems that they do. During Ben's 9.83 second - 100 metre performance in Rome, Italy, he accelerated during three phases: the initial 30 metres and during two subsequent phases. It appears that his acceleration phases occurred while he was exhaling and his deceleration phase while he was inhaling. This relationship is not inconsistent with other examples in sport: throwers and weightlifters, for example, perform the explosion or acceleration phase during an exhalation.

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*It appears that his acceleration phases occurred while he was exhaling and his deceleration phase while he was inhaling. This relationship is not inconsistent with other examples in sport: throwers and weightlifters, for example, perform the explosion or acceleration phase during an exhalation.*

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**Table 1: Time Analysis of Men's 100 metre Sprint**

A comparison of speed & acceleration between the world champion and the number two sprinter: Rome 1987

Metres	Johnson		Lewis		
	Split Time	Time of 10 Metre Segment	Split Time	Time of 10 Metre Segment	
10	1.86		1.94		
		1.01		1.03	
20	2.87		2.97		
		0.93		0.93	
30	3.80		3.92		
		0.86		0.85	
40	4.66		4.77		
		0.89		0.90	
50	5.55		5.67		
		0.83		0.83	
60	6.38		6.50		
		0.83		0.83	
70	7.21		7.33		
		0.90		0.90	
80	8.11		8.23		
		0.87		0.86	
90	8.98		9.09		
		0.85		0.84	
100	9.83*		9.93		
<b>Ben Johnson</b>			<b>Carl Lewis</b>		
Time		100m-9.83 sec.	Time		100m-9.93sec.
Reaction time:		193m.sec.	Reaction time:		196m.sec.
Number of Steps:		46.2 steps	Number of Steps:		43.6 steps
Avr. Freq. of Steps:		4.70/sec.	Avr. Freq. of Steps:		4.39/sec.
Avr. Length of Steps:		2.16m	Avr. Length of Steps:		2.29m
Fastest 10m section:		50-60m: 0.83sec	Fastest 10m section:		50-60m: 0.83sec

\* = World Record

NOTE the 3 distinct phases of acceleration - coinciding with 3 breaths

- i. 0-30 metres
- ii. 50-70 metres
- iii. 90-100 metres

NOTE: Reaction time = time elapsed from sound of starting gun and initiation of foot pressure on starting blocks

Data courtesy of the Biomechanics and Computing Department of FITVS Charles University - Prague, Czechoslovakia

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*Note the 3 distinct phases of acceleration — coinciding with 3 breaths. (See page 16)*

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**Table 2: Time Analysis of Men's 100 metre Sprint**

A comparison of speed & acceleration between the world champion and a "top 20" world sprinter: second Heat Semi-final - Rome 1987

Metres	Johnson		Hass		
	Split Time	Time of 10 Metre Segment	Split Time	Time of 10 Metre Segments	
10	1.84		1.99		
20	2.88	1.04	3.07	1.09	
30	3.83	0.95	4.09	1.02	
40	4.73	0.90	5.01	0.92	
50	5.64	0.91	5.94	0.93	
60	6.51	0.87	6.88	0.94	
70	7.38	0.87	7.81	0.93	
80	8.26	0.88	8.75	0.94	
90	9.15	0.89	9.70	0.95	
100	10.15	1.00	10.65	0.95	
<b>Ben Johnson</b>			<b>Christian Hass</b>		
Time		100m-10.15sec.	Time		100m-10.65 sec.
Reaction time:		127m.sec.	Reaction time:		176m.sec.
Number of Steps:		45.5steps	Number of Steps:		45 steps
Avr. Freq. of Steps:		4.48/sec.	Avr. Freq. of Steps:		4.23sec.
Avr. Length of Steps:		2.20m	Avr. Length of Steps:		2.22m
Fastest 10m section:		50-60m: 0.87sec	Fastest 10m section:		30-40m: 0.92sec

Data courtesy of the Biomechanics and Computing Department of FTVS Charles University - Prague, Czechoslovakia

**Table 3: Time Analysis of Women's 100 metre Sprint**

A comparison of speed & acceleration between a "top 5" and a "top 20" world sprinter: second Heat Semi-final - Rome 1987

Metres	Issajenko		Phipps	
	Split Time	Time of 10 Metre Segment	Split Time	Time of 10 Metre Segment
10	2.07		2.08	
		1.07		1.26
20	3.14		3.34	
		1.04		1.12
30	4.18		4.46	
		0.95		1.01
40	5.13		5.47	
		0.97		1.01
50	6.10		6.48	
		0.95		1.05
60	7.05		7.53	
		0.97		1.03
70	8.02		8.56	
		0.97		1.04
80	8.99		9.60	
		0.98		1.02
90	9.97		10.62	
		1.02		1.05
100	10.99		11.67	
<b>Angella Issajenko</b>		<b>Angela Phipps</b>		
Time: 100m-10.99sec.		Time: 100m-11.67sec.		
Reaction time: 222m.sec.		Reaction time: 230m.sec.		
Number of Steps: 49.2steps		Number of Steps: 50 steps		
Avr. Freq. of Steps: 4.48/sec.		Avr. Freq. of Steps: 4.28sec.		
Avr. Length of Steps: 2.03m		Avr. Length of Steps: 2.00m		
Fastest 10m section: 30-40m: 0.95sec		Fastest 10m section: 30-40m: 1.01sec		

Data courtesy of the Biomechanics and Computing Department of FTVS Charles University - Prague, Czechoslovakia

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### What is the action of the head and the hips during a sprint?

By direct observation or by shooting video straight on — the coach should be able to see 2 things:

1. head is stable and does not wobble from side to side;
2. one foot is landing directly in front of the other as viewed from the front.

For the feet to land correctly the hips must be loose and able to rotate freely.

## Shoulders — Core Relaxation

### How are you able to tell if an athlete is running relaxed?

Elevated shoulders are the most obvious indicator of inappropriate tension. This also affects performance directly, for when the shoulders rise the hips start to *lock up*.

The shoulders have to roll forward and backward with each stride while the hips roll alternately in the opposite direction to the shoulders. If the shoulders are tensed and pulled up around the neck they are not able to roll forward and backward optimally which means the hips 'lock-up' and are not able to roll optimally as well. Hip action is the most critical factor in sprinting since the greatest forces are generated around the hip joint. If the action of the hips is limited, sprinting efficiency is limited too. A poor level of lower core flexibility, and/or residual muscle spasm in this region, will prevent optimal technique from occurring.

### So relaxed running form begins with relaxed shoulders?

Yes!

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*Hip action is the most critical factor in sprinting since the greatest forces are generated around the hip joint.*

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## Legs — Core Technique

### How does the athlete achieve full extension during sprinting?

There are two types of extension: vertical extension occurs as the athlete gets into the sprint position while the velocity of the run allows the athlete to achieve full leg, or horizontal extension. You must have the correct strength qualities to get into and be able to hold the sprint position and to generate the velocity where full leg extension occurs.

### How important is flexibility in the quadriceps muscle to the action of the recovery leg at maximum speed?

Quadriceps (front thigh) flexibility is essential, as the foot of the recovery leg must pass above the knee of the support leg. This allows the leg lever to be shortened which in turn allows for higher stride frequency. This ability is dependant upon quadriceps flexibility.

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*So relaxed running form begins with relaxed shoulders? — Yes!*

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## How do you determine if Quadriceps Flexibility is sufficient?

Visually you can check it by observing whether or not the foot passes above the knee of the support leg, through touch you can check it by massage.

## Arms — Core Technique

### What role do the arms play in the sprint?

Correct arm action is central to successful sprinting. The arms play a key role particularly during the acceleration related to the start and also during subsequent accelerations. Given that Ben's stride frequency is in excess of 4.7 strides per second and 5.1 strides per second at maximum (46.6 strides over 9.83 seconds), arm frequency must match leg frequency. In fact, arm action must slightly precede leg action. The reality of this fact then is that the arms will piston at the same frequency of 4.7 times per second or 0.2 seconds per arm swing. To develop the necessary power qualities in the arms/shoulders and upper torso, we will use various upper body medicine ball techniques, maximum weight methods (low repetitions of heavy weights performed explosively) as well as actual starts and sprints.

During the start, the force of the forward and upward arm drive will dictate the duration and magnitude of the opposing foot's thrust. "I know that sprinting is controlled from the arms," Harry Jerome told me back in the early 1970's. I could feel all the acceleration coming from my arms when I was sprinting myself. I remember writing this in a paper and being contradicted heavily by others who said, "No, no, no, the body operates in synchrony, it doesn't work this way, this can't be validated." When scientists completed neurological pattern related research, they found that the arms do precede the legs slightly and that all control does come from the arms. But I didn't need anybody to justify that fact to me scientifically. I happen to know that it is a fact because I have experienced it myself.

## Hands — Core Technique

### Comment on the relevance of open or closed hands during the sprint.

Some coaches, such as Cerutti, have concluded that open hands equals rest and closed hands equals power. This may have validity but I don't believe that it can be applied as a general statement. In fact, Ben and Angella run with open hands.

This is an example of the neural conundrum which you face. It is known that clenched fists can trigger elevated blood pressure as a cue that the body is preparing for fight or flight. However, elevated shoulders may also trigger the same physiological readiness for fight or flight. We may not yet conclusively know what effect on sprinting clenched or open hands may have but we do know that elevated shoulders impact negatively on sprint technique and speed.

The real question is whether closed hands help or hinder power development during arm drive. Furthermore, is hand position a consistent neural trigger across all athletes? I don't believe so. I think the nervous system of any given athlete dictates which hand

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*"I know that sprinting is controlled from the arms," Harry Jerome told me back in the early 1970's.*

*"But I didn't need anyone to justify this fact to me scientifically. I happen to know this is a fact because I have experienced it myself."*

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*We may not yet conclusively know what effect on sprinting clenched or open hands may have but we do know that elevated shoulders impact negatively on sprint technique and speed.*

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position is optimal for that athlete.

## **Legs — Core Technique**

### **What is the difference in power output of the ankle and the hip?**

The forces generated by movement around the hip joint during sprinting is estimated to be seven times as powerful as the action of plantar flexing of the ankle.

### **How does the strength balance between hamstrings/quadiceps affect sprinting technique?**

If the upper legs have a strength imbalance favouring the quadiceps - which is usually the case - you will spend too much time on the ground in the support phase. An athlete who has quadiceps which are stronger than his/her hamstrings will feel his/her quadiceps working. Most sprinters feel primarily their hamstrings during an optimal run.

*"I know I am not having an optimal race when I can feel my quadiceps working. During an optimal run - I do not feel my quadiceps - I feel only my hamstrings as my legs are flying underneath me - then I know I am holding the sprint position."*

*— Desai Williams*

### **How does flexibility impact on speed?**

The level of flexibility in the lower core, hip and legs, is important in determining running speed. Being able to fully extend your hip, knee and ankle joints allows you to keep your foot on the ground for a longer period of time during the propulsive phase.

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*To develop correct ankle form — full extension is trained through hopping - skipping drills and full-speed sprinting. (i.e. 'A - B skips,' available through Athletics Canada, Ottawa, Canada.)*

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### **What is the relationship of flexibility and strength to technique?**

A good example illustrating this relationship is *knee-recovery*. The level of quadiceps flexibility determines the ability to bring the ankle of the recovery leg past the knee of the driving leg at a height where the *recovery leg* ankle is actually above the *driving leg* knee.

You will see that Ben's knee-recovery is excellent throughout a race. Most sprinters do not have excellent knee-recovery at any point in a race. In some, recovery breaks down in the latter stages of a race. This ability is not dependent only on flexibility and suppleness but also on calf and core strength.

### **What is the desired action of the foot and ankle?**

During maximum speed runs the foot extends fully. To develop correct ankle form — full extension is trained through bounding drills, and full-speed sprinting. Bounding drills would include: skip bounding, heel bounding, triplings.

A critical by-product of bounding drills and actual sprinting is the development of calf-strength. Some bounding and hopping is done with knees locked to preferentially reinforce the development of foot power.

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### How is video used in technique analysis?

To analyze technique you use both live observation and video. Sometimes I find that it is easier to see a disruption in technique with the naked eye than with video. With the naked eye the athlete's movement is less 'even' — to the point where you can usually see disruptions in technique. Video of course allows a given movement to be seen as many times as required.

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*To analyze technique you use both live observation and video.*

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Photo Credit: Claus Andersen

Angella Issajenko, Angela Bailey, Molly Kilingbeck illustrate superb sprinting technique:

CHECK FOR:

- relaxed shoulders?
- relaxed face?
- hand/arm swings to level of face?
- full rear leg extension?
- sprint position?



Photo Credit: Tony Duffy - All Sport Photographic LTD.

Angela Issajenko illustrating the most elusive of all performance characteristics:  
*'movement flow'*

## CHAPTER 3

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# TRAINING PRINCIPLES

*"Less is More"*

*"You have to be prepared to change the program at any time, based on how the athlete feels and on what you see."*

*"In a given workout, if you're anticipating a certain percentage of maximum performance from the athlete but suddenly he or she 'booms off' a personal best, you've got to react to that by cutting a workout off before 'what's on paper' is finished. That is precisely why I am reluctant to hand out recipes and cookbooks."*

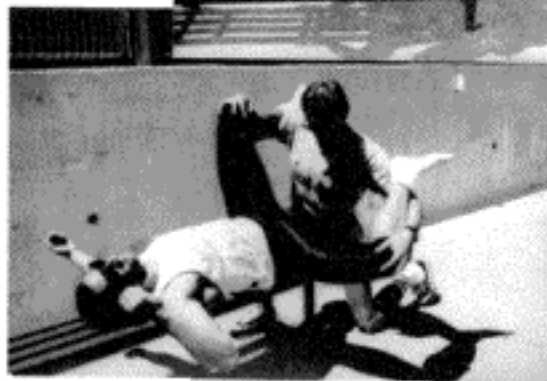
*Charlie Francis*



Waldemar Matuszewski, Regeneration Specialist  
treating two athletes at a training camp in Spain in 1987.



With hurdler/sprinter Mark McKoy



Groin stretch/muscle tonus reset



Hamstring/buttock/lower  
back muscle tonus reset

With Canadian 800m champion Camille Cato

Counter rotate hip and shoulder girdle =  
1. torso muscle reset + 2. manipulation  
of sacro-iliac joint



Calf/buttock/lower back muscle tonus reset



Front hip/front thigh/calf muscle tonus reset

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**Do you apply training principles differently according to the level of the sprinter?**

**Q & A**

I judge each individual athlete's needs and try to prescribe the most appropriate training. The basic menu of training principles is the same.

Once, however an athlete is beyond a certain level of performance - such as top national or international level - there are no rules or recipes, only general training principles.

## **CENTRAL NERVOUS SYSTEM (CNS) Work**

### **Central Nervous System Fatigue**

Due to the extremely high rate of motor neuron firing at top running speeds it is of paramount importance that the Central Nervous System (CNS) performs optimally. Optimal functioning of CNS requires the following characteristics:

1. CNS has to be fully regenerated so that the chemical environment required for optimal transmission of nervous signals is intact.
2. Motor pathways, characteristic of optimal technique and efficient routing of motor signals must be in place.

It is necessary to understand the difference between CNS fatigue and peripheral muscular fatigue. CNS fatigue is reached when the by-products of high intensity exercise build up to the point where the CNS impulses necessary to voluntarily contract muscle fibre are handicapped. Total muscular fatigue is typified by the inability to contract the muscle *even if externally stimulated by EMS.*

Appropriate training creates chemical changes which advance the capacity to do both CNS work and muscular endurance work under conditions of correct technique, before fatigue is reached.

### **CNS fatigue vs Muscular Fatigue**

Central Nervous System (CNS) overtraining is caused by high intensity work occurring (i) too frequently in the training cycle (ii) in too high a volume in a single training session or (iii) by the attempt to introduce high intensity work too rapidly into the program when residual fatigue still exists (i.e. incomplete regeneration).

### **Symptoms of CNS Fatigue**

Symptoms of CNS fatigue include loss of performance or technique (with onset of fatigue in sprinting the foot stays on the ground perceptibly longer during the support phase), frequent cramps, involuntary trembling or shaking of the muscles after a workout, flickering eyelids, loss of concentration, sleeplessness, and general malaise.

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*It takes 2.5 x longer to recover/regenerate fully after maximum intensity white fibre dominant work than from moderate to low intensity red fiber dominant work.*

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Some examples of high stress, CNS focused work are the following:

- sprints at maximum speed or 100% intensity (30 metre, 60 metre, 80-120 metre)
- heavy weights allowing only a few repetitions (i.e. 2-5 repetitions)
- bounding
- stair running
- explosive jumping, hopping, skipping, bounding routines (plyometrics)
- medicine ball work

#### **What is your functional definition of CNS related work?**

CNS work and power work are synonymous. Anytime the athlete is focusing on maximum speed and explosion or explosiveness the CNS is being taxed.

Properly executed (intense) medicine ball work, starts, acceleration work, and weight work using heavy loads all represent different types of CNS work.

The prescription and monitoring of CNS work must be very precise. For any workout you have a certain volume of CNS related work in mind, but you adjust this volume in accordance with the apparent energy status of the athletes on arriving at the workout as it is revealed during warm-up, and as it changes during the actual performance of CNS related work. You stop when a personal best (PB) or a near PB is performed or when intensity or technique visibly degrades.

Complete recovery from CNS work is critical and will require at least 48 hours before a similar CNS work session is repeated. During this period the athlete accesses massage, contrast baths, calcium supplementation, as well as other forms of regeneration.

There is no hard rule governing recovery time between maximal CNS related efforts. We know the minimal time of 48 hours results in the highest allowable frequency of maximal speed work of three times per week. But recovery may be required far beyond the initial 48 hour period. At the highest levels of sport there is a quantum increase in CNS output for every increment of improvement. The difference between a performance at 95% effort and at 100% (i.e. at World Record level) effort is that a 95% effort might require a recovery period of only 48 hours while a 100% effort might require up to 10 days.

The ability to accurately diagnose CNS fatigue and to adjust high intensity workloads accordingly is the central element in high level coaching. Coaches rise or fall by their capacity to adjust once greatness is demonstrated by their athletes. The failure to recognize and adjust to the superior output will end (limit) the athletes capacity to exceed or even to equal that same level of output again.

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***CNS or Central Nervous System work and power work are synonymous. Any time the athlete is focusing on maximum speed and explosion or explosiveness the CNS is being taxed.***

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***You stop (CNS or power work) when a personal best (PB) or a near PB is performed or when intensity or technique visibly degrade.***

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***The difference between a performance at 95% effort and at 100% effort (i.e. at world record level or PB level) is that a 95% effort might require a recovery period of only 48 hours while 100% effort might require up to 10 days.***

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**In one of the workouts which we observed Ben finished with a high volume-heavy weight workout but Angella did very little. How do you interpret this from a CNS point of view?**

On a given day there is only so much CNS energy to expend. Whether you access the CNS energy pool via the arms, or the legs, or both, it doesn't matter, when it's drained, it's drained.

In that particular workout Ben had just come from a tempo workout after which his CNS energy pool was left largely intact. Tempo running does not have much of a CNS demand because it is performed at 75% intensity — or even lower. It is similar to performing body-building weight training methods at 65%-80% loads. Low intensity methods leave the CNS relatively intact. Angella by contrast had just come from a speed endurance workout where she had done two stunning personal bests, in the 80 metres and in the 100 metres out of the blocks. Her time was very close to the world record so you can understand the CNS energy she had expended. She really did not have enough left to be able to do much in the weight room.

On the other hand when Angella has had a workout consisting of 95% intensity runs reinforcing 'smooth running' she can go in the weight room and really 'blow them up'. She will do up to 200 pounds in the bench press, 195 pound power cleans, and 455 pound one-half squats.

**What was your personal experience as an athlete which helped you understand what CNS related work was and how to manipulate it?**

I remember back when I had a severe quadriceps rupture (front thigh) and was struggling to find different training scenarios in which to continue working, when this shot putter by the name of T.C. Jones took me down to the weight room. I had never really lifted weights much; my bench press capability was 180 pounds.

At the time my running was limited to tempo work so that I was able to do weight work. I did this by going up to maximum weights and finishing a workout by going back down to a burnout set at moderate loads. My bench press went up an average of 15 pounds a week. I was lifting three times per week and my bench press went up from 180 to 320 pounds linearly — like wham — wham — wham! In the meantime I was recovering from my injury and I moved back into sprint-speed training. The high intensity speed work immediately detracted from my ability to lift weights at the same high level.

That experience taught me a lesson. Obviously the CNS work I was doing on the track was knocking the hell out of my heavy weight work. If on the other hand I did only a tempo workout I was totally refreshed and ready for the weights and could 'really run them up.'

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***Low intensity training methods leave the CNS relatively intact.***

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***Obviously the heavy weight work could not be carried out at the same level because of the high intensity CNS work which had previously been performed.***

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## How do you differentiate CNS fatigue from peripheral muscular fatigue?

It's important to understand that during physical work the CNS fatigues first and causes the body to shut down before the peripheral musculature is totally exhausted. The organism perceives exhaustion before absolute exhaustion occurs. This differential between perceived exhaustion and actual exhaustion is designed to help the organism survive.

In sport the highest possible movement speeds or the heaviest weights deplete the central nervous system energy pool most quickly. Hence the need to manage training elements which cause CNS fatigue correctly. (Refer to chapter 9, figure 5).

### What can be done to improve CNS output?

We feel that we can get up to 40% more CNS-power training time related to the performance of high intensity training by incorporating properly executed massage and regeneration.

*We feel that we can get up to 40% more CNS-power training time related to the performance of high intensity training by incorporating properly executed massage and regeneration.*

## Medicine Ball Work

### What types of medicine ball work do you do?

Medicine ball work is used with the development of power and power endurance capabilities over a 15-30 second time period as the desired outcome. The exercises range from pure arm and shoulder work, to the use of arms and legs to focus on core, to pure leg work. Athletes will sometimes do 6-10 exercises totalling up to 800-1,200 throws (legs and arms) in a given workout.

#### Arms to Core

##### Technique Arm and Shoulder

- overhead throws (to partners)
- chest throws (to partner)
- pass arounds to left
- pass arounds to right
- throw arounds to left
- throw arounds to right
- Catch - Roll Back - Roll forward and throw.
  - from centre
  - from right side
  - from left side

##### Legs to Core

- leg throws (hold ball between ankles)

##### Arms and Legs to Core

- medicine ball accelerations - throw ball out in front from crouch position

##### Athlete Position

- athlete standing
- athlete seated or
- athlete kneeling
- athlete standing
  - a. (left sides facing)
  - b. (right sides facing)
- athlete seated to catch and rolling on to back



Molly Killingbeck performing 'Medicine ball sit-ups' (training focus is core power)



Photo Credit: All-Sport Photography LTD.



Angela Issajenko performing medicine ball accelerations



Moly Killingbeck performing side-to-side medicine ball work  
(training focus is power development during core rotation)



Dr. Sue Wilson 'feeding' Moly in another version of medicine ball sit-ups  
(training focus is  
1. arm & shoulder extension, 2. abdominal power)



Katie Anderson, Pan Am Junior medalist and Canadian Junior Champion and Angela Phipps, Commonwealth Gold medal 4x100 relay — performing a variation of side-to-side medicine ball work.

Photo Credit: Grey Mortimer—All Sport Photographic LTD.

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## Training Principles

**Many observers of your workouts are surprised by what appears to be a low volume of work.**

Volume must be balanced against intensity. Most observers are unable to discern the quality of the work they see. 20 x 200 metres in 28 seconds cannot compare to 2 x 200 metres in 19.8 seconds. High volume training will never develop the specific capacity to generate a high work output in a short time (power). It was the low volume, high intensity training that allowed Angella and Ben to become world record holders. If you have a Ferrari, you don't plough fields with it.

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***If you have a Ferrari, you don't plough fields with it!***

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**Define the training element you refer to as speed development.**

Pure speed development runs refer to efforts of under seven seconds duration — what is called alactic energy system work. All athletes can achieve their top speed within seven seconds and lactic acid build up can be avoided. Speed work must only be done when the athlete is completely fresh and complete recovery between runs is required.

**How significant are race times as a predictor of future performances?**

I was able to predict Ben's world records with regularity — by using predicted performances from training, not race times. The right combination of track, wind direction, and weather may not be present to allow your athlete to record the performance that his/her training would predict. The capacity is there whether officially recorded or not. Therefore, in preparing the next program, it is more relevant to build on predicted performance than on actual race times.

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***Don't go for more when that can lead to ending up with less!***

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**Do you use Proprioceptive-neural-facilitation or PNF stretching in your training?**

Tight athletes should avoid PNF work. Persistent tightness is a sign of poor preparation and/or poor management of regeneration in the training program. Once the underlying training and regeneration problems are identified and corrected, PNF stretching can be introduced, initially at the end of the workout. When properly prepared, an athlete can use PNF and Ballistic stretching to great advantage in the warm up. This type of stretching is particularly effective prior to speed work.



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## Prescribing Training

### On what basis do you adjust workloads from workout to workout?

If the previous workout has been spectacular, I will pull back and force an easier workout as a matter of principle. The athlete usually wants to build on a spectacular workout and train even harder because they are so highly motivated. As this can lead to overtraining and injury, it is always better to err on the light side — do too little rather than too much.

Even within a given workout, if the athlete performs a personal best on the third repetition of a prescribed five repetitions set — 30 metre starts for example — the last two repetitions are not performed. We move on to the next training element in the workout.

Different athletes have different recovery rates and the differences increase exponentially as performance improves. You must take a conservative approach until you know the recovery rate of each athlete for each type of work. Learn to back off when the athlete has done something significant. Don't go for more when that can lead to ending up with less.

An example of 'backing off' occurred in a workout prior to Angella's world record 6.06 seconds for 50 metres in Ottawa on January 29, 1987. On the Wednesday January 27, just after returning from a 10.8 second 100 metres in Australia, her planned workout consisted of 4 x 30 metres from a standing start, 4 x 30 metres from blocks, and 2 x 60 metres. She set a personal best on her third standing 30 metre run, so the fourth rep wasn't done. The last repetition was also dropped from the block starts and only one 60 metres run was done because of the high quality.

### How do you restrain an athlete when he/she is motivated to run faster than the situation dictates?

An athlete can be run into the wind. This shortens stride length to protect the hamstring muscles. I have done this with Ben after exceptional performances. Also, the coach can put the stopwatch away so the athlete won't press to achieve a specific time.

90% of my time is spent holding athletes back to prevent overtraining and only 10% is spent motivating them to do more work.

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*80-90% of the time with mature athletes is spent holding them back to prevent overtraining and only 10% spent to motivate them to do additional work which is not as enjoyable or familiar.*

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*It is always better to err on the light side — do too little rather than too much!*

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## Training Aids

### What training aids do you use to enhance speed development?

Elastic power is the main determinant of acceleration and top speed. The momentary stretch of pre-flexed muscle at foot strike activates 'stretch receptors' which recruit additional muscle fibres resulting in more force. Elastic power is specifically enhanced during correct sprint action, with and without controlled resistance. Improvements are manifested primarily by higher frequency foot strikes due to reduced ground contact times.

To generate this resistance, we originally used a device called the Accelerator, a cumbersome unit with a tensioned spool of nylon cable. After it went out of production, we discovered a replacement called the Isorobic Exerciser from San José, California. It is a simpler, more effective device that is light and easy to use.

The Isorobic Exerciser is employed following all the principles of normal speed work. Runs should be timed with and without resistance and tension set so that the resisted runs are approximately 20% slower. (Elastic response is diminished if the speed is retarded too much.) The athlete must maintain correct technique and remain completely relaxed during this training to maintain the correct balance between stride length and stride frequency.

Isorobic workouts should have a maximum volume of 600 metres per session. A sample workout could contain 2 sets of 4 x 30 metres block starts, followed by 6 x 60 metres from a standing start (a total of 600 metres).

Isorobic work can enhance normal speed sessions as well. For example, a resisted start over 10 metres is followed by four normal starts. Stimulated by the resisted start, the athlete will fly out with much more force on the subsequent unresisted ones. The initial drive can become so forceful that the athlete will stumble the first few tries. This is because the centre of mass is driven further forward and the athlete must compensate by vigorously pumping the arms.

We also use plyometric work with boxes up to 24 inches in height. Jumps from higher boxes increase contact time with floor and therefore lessen elastic response. To avoid injury, we never do single leg jumps.

Electronic Muscle Stimulation (EMS) stimulates fast-twitch muscle fibres preferentially and is dealt with extensively in a separate chapter.

"Overspeed" training methods (i.e.: downhill running, towing devices) are dangerous due to altered running mechanics and overstretching of muscles, and are based on the fallacy that stride length and stride frequency must be enhanced simultaneously. We have used no overspeed devices with the exception of running with the wind.

The importance of reduced contact time is demonstrated through Ben Johnson's career. From 1981 to 1988 his average stride length remained constant (46.6 strides per 100 metres) yet his time improved from 10.25 seconds to 9.79 seconds solely due to increased stride frequency.

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*Stimulated by (isorobic) resisted start, the athlete will fly out with much more force on the subsequent unresisted starts.*

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(see page 206)  
**Isorobic Exerciser**

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*Persistent tightness is a sign of a poorly prepared athlete. Such tightness usually is the result of overloading and/or poor management of regeneration in the training program.*

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### Describe your warm-up routine.

In both training and competition a consistent warm-up is important to ensure good performance and safety. Pre-race warm-ups should take 35-50 minutes — at least.

1. The athlete should jog slowly until a light sweat develops - distances range from 800 to 1500 metres.
2. Gentle stretching can then begin. Hard bouncing stretches should be avoided. Stretching should always be combined with calisthenics, i.e.: push-ups, sit-ups, in order to increase blood flow and muscle temperature during this phase.
3. Knee lift exercises can now be done.
4. Relaxed strides, gradually becoming faster are next on the agenda. The athletes should be discouraged from matching speeds with each other during the warm-ups as each individual responds differently to the warm-up.
5. Each athlete must standardize his or her own warm-up regardless of the location and level of performance required - school preliminaries or Olympic Games.

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**Pre-race warm-ups should take 35-50 minutes — at least.**

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## Recovery

### Does recovery vary from training phase to training phase?

If the athlete has a spectacular workout or race performance, I will schedule a recovery cycle which may last up to ten days. The athlete wants to keep going at a high level because they are highly motivated by a spectacular performance, but it's important to force easy workouts. I used to make the mistake of using good results and the resulting high motivation levels as a stimulus to increase the training load but I have learned to be much more conservative. I have learned to back off when the athlete has done something significant.

During a recovery cycle the athlete shouldn't go above 95% of maximum velocity, the tempo work is held at a consistent volume, and lots of massage is applied. Different athletes have different recovery rates and different nervous system responses to competition. Also, in a recovery phase I will give more rest between repetitions. For example, during two sets of 4 x 60 metres there is 10 minutes of rest between 60 metre repeats and 25 minutes between sets.

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#### Warm-up:

*In major competitions such as the Olympics allowance must be made for the time spent waiting in the 'call room' before the race — generally 10-20 minutes.*

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*I used to make the mistake of using good results and the resulting high motivation levels as an opportunity to increase the training load but I have learned to be much more conservative. I have learned to back off when the athlete has done something significant! This is a classic example where 'less equals more.'*

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## Training Factors

### What training adjustments do you make to minimize or avoid injury?

The massive amount of time needed to rehabilitate an athlete from injury can often be avoided by thinking ahead and minimizing one's errors.

Since the hamstrings operate at the highest velocity (88 Kilometres per hour) of any muscle group in the body they are most sensitive to injury if high intensity training is attempted with poor technique or during conditions of incomplete regeneration or over-training.

The ankle and surrounding area including the foot, achilles tendon, and calf are major contributors in the acceleration (drive) phase of sprinting and cannot be neglected. We try to keep the entire area warm by wearing extra thick socks and leg warmers, particularly during the winter indoor season.

Ballet dancers do the same thing for obvious reasons. Lower leg and ankle problems can be avoided by warming-up in flats, keeping ankles warm, checking running surfaces for consistency and minimizing 'dramatic' increases in loads and intensities of runs. Many times the addition of more tempo (low intensity) runs and the elimination of hops or bounding for a period of time will solve minor ailments when they occur.

#### **What is the effect of tempo runs?**

Tempo runs (aerobic/endurance work) aid and facilitate recovery while minimizing the chance of injury. Extensive tempo runs (at 60-80% of maximum) not only improve recovery but over time enhance the capillarization of the muscle, leading to an increased heating of motor neurons in the muscle. This heating lowers the electrical resistance in the neural pathways within muscle, thus improving the muscle's contraction speed.

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*Extensive tempo runs (at 60-80% of maximum) not only improve recovery but over time enhance the capillarization of the muscle, leading to an increased heating of motor neurons in the muscle. This lowers the electrical resistance in the neural pathways within muscle, thus improving the muscle's contraction speed.*

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### **Muscle Tone**

#### **How would you describe the level of muscle tone required for competition?**

You want a different type of muscle tone during the first round of heats than in the second and following rounds leading up to the finals. This is particularly the case for Olympic Games and World Championships where there are many competitors and hence many heats. The first round can be considered as part of the warm-up where athletes go through the motions, run a relatively relaxed race and come in with low tonus. The first heat sets the muscle tonus of the athlete up for the second round and so on. The combination of the warm-up and the heats elevate the muscle tonus in a graded fashion so that the athlete comes to the final with the muscle tonus elevated to the correct level.

Any massage which is done between heats is superficial and can be considered as a tonus-adjustment. Any combination of at least two of the athlete, Waldemar-The Regeneration Specialist, or myself will make the judgement of tonus status (See Chapter 5 - Recovery/Regeneration) at any given time.

Each warm-up and qualifying heat increases the muscle tone. The regeneration specialist's job in a multi-round meet is a tricky one: If the tone is too high for the early heats - there won't be enough free fibre left to contract for an optimal run in the finals. But if the tone is too low, the athlete won't be able to mobilize enough muscle fibre to make it through the qualifying heats and into the finals. Even worse, a runner who pushes too hard with too low muscle tone risks injury. Ben was so fast that he could tolerate some margin of error in judging the optimal muscle tone. Of course, a marginal athlete must have optimal tone for the first heat — or there will be no second heat!

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*Ben was so fast that he could tolerate some margin of error in judging the optimal muscle tone. Of course, a marginal athlete must have optimal muscle tone for the first heat — or there will be no second heat!*

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## Managing Different Training Elements

**How do you manage the training responses that will result from the introduction of different training elements?**

Our athletes have minimal stiffness from bounding, jumps training, heavy weight training, speed training and tempo training because we are always doing some aspect of all types of training. We never do a bunch of one type of training and then move to a bunch of a different type of training. Such a practice will inevitably result in stiffness and will promote injury.

### Communication

**You have the reputation of being autocratic. However, during the training sessions we observed, it appeared that the athletes were dictating to you rather than you to them?**

Let's go back to the situation - I'm giving the athletes feedback on their performance and making suggestions about training content. My perception of a workout which occurs with swimming athletes in a swimming pool for instance is that the workout is very orderly and the athletes largely do what they are told. It's quite interesting because the perception of my workouts is the same. Somehow I am perceived as a dictator who is telling the athletes what to do - making them work harder. This is simply not the way I coach. All that approach produces is very obedient but mediocre athletes. The athletes must decide if they are prepared and motivated to perform a training element at 92% effort or 98% effort. Ultimately they must take responsibility for their own training.

### Reality of Training

**How do you adjust your training program to the day to day realities and pressures that the athletes face?**

I never know what I'm going to face on a given day. The athlete tells me "I've got a doctor's appointment - I have to leave practice early," or "My father is coming to pick me up in 20 minutes."

During the actual workout when there are 100 people running around the weight room, and all the machines are occupied by body-builders - you can't put 20 athletes on a circuit and have them move from station to station rapidly. We don't own the machines, students and the public too have access to our facility, so when an outsider takes a machine there is nothing we can do about it - we just have to adjust. If an athlete is talking to her boyfriend or girlfriend - you can't interject freely because you might irritate the athlete. These conditions represent reality. You just can't be so rigid that you can't adapt to the real world. You do the most that you can within the constraints you are faced with.

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*Somehow I am perceived as a dictator who is telling the athletes what to do - making them work harder.*

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*The autocratic approach produces very obedient but mediocre athletes*

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*You just can't be so rigid that you can't adapt to the real world.*

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Further there are all kinds of adaptation necessary. Angella will have to adjust her workouts so she can do all kinds of starts for this multi-frame film project that the Ontario Science Centre is producing. Angella was also the mother of a baby girl and had to adjust training around family responsibilities. Japanese television may be coming in to spend the day with Ben, so you adjust his workout to fit the shooting schedule. You can't just say 'Nobody can ever come in here,' or 'Nobody can do this or that,' because you would be cutting the athlete off from possible financial opportunities. You have to plan your program in such a way that you can accommodate all these outside pressures because in the long run the exposure that the athlete gains and the realization of financial opportunities will help keep the athlete in sport.

## Body Fat

**How does the body fat of your female and male athletes fluctuate over a training year?**

Barring an extended injury period in which some athletes will gain weight, the athlete's body weight will fluctuate only five pounds or so. Males carry less body fat than females as a general statement but some females such as Molly Killingbeck will carry less fat than Angella Issajenko or Cheryl Thibedeau.

The males will get down into the 5% body fat range and the females the 10% range. We don't actually test for percentage body fat except as a curiosity once every year or two years. You can see from week to week if the athlete's weight/body shape is changing - I do not need fat calipers to tell me what I see.

## Mirrors

**Do you use mirrors in training?**

We use mirrors during strength training and during movements such as power-cleans. I think mirrors help athletes to observe changes in body somatotype, reinforce proper lifting technique, and monitor items such as the face and shoulders remaining relaxed during power-related movements (for example, strength training).

Mirrors also help athletes to detect and correct changes in bi-lateral strength and posture.

A key additional use of mirrors involves technique - the imprinting of correct arm movements during sprinting.

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*We don't actually test for percentage body fat except as a curiosity once every year or so. You can see from week to week if the athlete's weight/body shape is changing. I do not need fat calipers to tell me what I see.*

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*I think mirrors help athletes to observe changes in body somatotype, reinforce proper lifting technique, and monitor items such as the face and shoulders remaining relaxed during power-related movements (for example strength training).*

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## Training Camps

**How does the use of off-shore training camps differ for the Canadian athlete versus the European athlete?**

Athletes in European countries are in training camps most of the time. The Italian team has an allowance which provides for 200 days a year in training camps.

In Canada, the carded athlete has an average of one thousand dollars allocated to training camps. This amount of money provides one airline ticket and maybe eight days of training camp a year per athlete. I have had to arrange additional funding of about \$100,000 through outside sources to provide something in the range of 45-50 days of training camps for our elite athletes. In 1984 we had 16 weeks or 80 days of training camps.

**What is the purpose of training camps?**

Training camps provide regular opportunities to intensify training and remove the athlete temporarily from the distractions of the home training environment. In addition, you have the higher temperatures of Florida or Caribbean camps with the attendant access to environmental variety in the form of grass, sand, water, which help to regenerate the legs and joints from the hard surfaces and tight curves involved in training indoors in winter. Many injuries come about from constantly running curves indoors. There is a point in indoor training where the curves are too sharp to allow speed endurance work to be run fast enough. This is a situation where injuries can develop.

## Training Approach

In developing a sprint program, stamina (i.e. general or cardiovascular fitness), should be emphasized for two reasons.

1. It is sound logic to develop a strong cardio-vascular system and improve capillarization (increase in number of blood capillaries) of the muscles to prevent injury. Increased capillarization results in: improved blood flow to the muscle which in turn, equals improved access to energy substrates and oxygen plus improved rate of metabolite removal; elevated temperature of muscle neurons results in lower bio-electrical resistance and faster contraction times which in turn creates a higher work threshold.
2. It is also logical to try for improvement first in the area where it can be obtained most easily; for example a beginner might improve 2/10ths of a second by focusing on the start or 2.5 seconds over 100 metres by focusing on speed endurance.



Mark McKoy and Katie Anderson performing A & B skips (see page 22 for A-B skip book reference).



Photo Credit: Greg Mortimer—All Sport Photography LTD.

## SUMMARY

### Calisthenics

1. A sprinter must have full control of his body and should handle his body-weight easily. Helpful exercises include: sit-ups, push-ups, knee bends, pull-ups, burpees\*. (\*A burpee consists of a crouch, leg extension, spring into the air, crouch).
2. A series of these exercises can be combined into a "circuit." Circuit training helps develop both body control and stamina.

### Speed Development

1. Emphasis on quality, not quantity.
2. Full or near full effort over short distances (30 and 60 metres) from crouch start or flying start.
3. Each sprint session must be followed by a complete recovery.
4. When the quality of the runs deteriorates speed work must cease.

#### Sample Runs:

Distance	Effort	Repetitions
30 metre	maximum	6-8
50 metre	maximum	5-6
60 metre	maximum	4-6
80 metre	near maximum	3-4

Watch for face and shoulder relaxation in combination with correct arm action.

Speed work should be limited to twice a week and never two days in a row.

### Tempo Training

(Distances range from 100-400 metres. Intensity is 65-75% of maximum velocity)

1. Tempo work should be done at least three times per week.
  2. Unlike speed work, however, in tempo work the emphasis is on quantity, not quality.
  3. Smooth running is reinforced.
  4. For younger runners, generally below age 16, single repetition distances should be kept below 200 metres.
  5. A wide variety of exercises should be used.
- Example tempo workout: see Tuesday's workout on the following page for example Tempo Workout.



Photo Credit: All Sport Photographic LTD.

Tracy Smith – Canadian record holder in high jump performing A-B skips.

Training focus is:

1. Power development in whole body movements:
  - abdomen
  - hips
  - knees
  - ankles
2. Calf and lower leg strength/muscle development.
3. Whole body rhythmic movement – co-ordinating arms and legs.

Training rhythm relates to developing movement flow in actual sprinting.



## Special Endurance

1. Fast work simulating competition speeds over distances of 150 to 300 metres develops endurance at speed.
2. The usual number of repetitions is two.
3. The distances covered in special endurance work should decrease as the date of the competition approaches. In the 2 weeks immediately before major competitions only one repetition should be done in a workout.
4. Special endurance work should be done once a week.

### Sample Training Micro-cycle for Well Conditioned Runners Immediately Prior to Competition Period (Winter)

**Monday:** Following a full warm-up, change into spikes for 2 x 50m strides, 2 to 4 x 30m relaxed starts (no blocks), 4 to 8 x 30m fast starts with gun or hand clap, 2 to 4 x 60m fast runs from blocks. Full rest must be taken between reps. Do bounding and jumping exercises for strength, weights, and then jog down.

**Tuesday:** Warm-up. Use training flats for tempo work: (+ symbol represents a 50 metre walk for recovery between repetitions)  
1st set 100 + 100 + 100 (metres)  
2nd set 100 + 200 + 100 + 100 (metres)  
3rd set 100 + 100 + 200 + 200 (metres)  
4th set 100 + 200 + 100 + 100 (metres)  
5th set 100 + 100 + 100 (metres)  
relaxed runs  
(walk 100m between sets)

**Wednesday:** Warm-up. Spikes: 2 x 50m strides, 2 to 4 relaxed starts, 2 to 4 fast starts over 30m. Special Endurance runs 2 to 3 reps over 200-weights.

**Thursday:** Warm-up. Flats: repeat Tuesday or 8 x 200m relaxed, 200m walk between runs. Use this as a recovery day — very easy — jog down.

**Friday:** Warm-up. Spikes: 2 x 50m strides, 2 to 4 relaxed starts, 6 to 8 x 30m fast starts, 2 x 60m from blocks, high speed runs — in spikes but at controlled speed — not all out runs 2 x (4 x 60m smooth) weights.  
(walk equal distance between each repetition)

When competing on Saturday you would cancel the Friday workout, Thursday's training remains the same.



Desai Williams performing A-B skips.  
Periodization focus is: year round training activities



Photo Credit: All-Sport Photography LTD.





## CHAPTER 4

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# Strength Training

*"If it looks right — it flies right!"*  
— C. Francis



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*Dr. Tudor Bompa's sport experience in his native Romania includes having coached athletes to medal performances in European and World championships. Dr. Bompa teaches at York University in Toronto, and continues to consult to elite coaches from around the world. He has played a leading role in developing the planning and periodization skills of Canadian coaches. A key contribution to sport by Dr. Bompa relating to the science of performance is set forth in his book 'Theory and Methodology of Training.' His relationship with Charlie Francis spanned 7 years.*

## **INTRODUCTION**

**by Dr. Tudor Bompa.**

### **Single Repetitions**

Single repetition work either concentric or eccentric, represents the essence of the 'maximum strength or maximum weight' method. For beginners or athletes with inadequate preparation in strength training, the injury potential of single repetition work is high. Single repetition work, therefore, should be prescribed only for relatively mature athletes.

Appropriate strength characteristics which must be in place include:

- the required body somatotype - the muscle development is proportional and consistent with sprinting needs.
- strength balances are appropriate i.e., in sprinting the ham/quad ratio must be at least 1:1 and even 1.2-1.3:1 for elite sprinters when tested at high speed.

### **Testing**

Single repetitions are performed periodically to establish absolute strength capacity and to identify the benchmark of 100% load. Loading percentages are then converted into actual training loads.

In the period of 1984-85, maximum - absolute strength (100% load via a single repetition) was tested at the end of every three week maximum strength cycle. More recently in the period of 1986-88 it was tested less frequently but would average 2-4 times per year.

Charlie periodically monitors the single, double or triple repetition strength of his athletes in key lifts such as bench press or 1/2 squats. Given that Charlie's athletes modify strength training content and load based on how they feel, this information is necessary for it to allow him to judge the relevance of the loads which the athletes are using in a given strength workout.

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## Conversion Phase

The conversion of strength to power is not a rigid concept. The purpose of a conversion phase is to transform maximum strength into power, explosive power or power endurance. However, the actual means by which this is accomplished will vary and will differ based on athletes' individual needs.

A conversion phase for strength is not as necessary in sprinting due to the high running intensities used constantly in training. Conversion then of general body-building strength to power is not represented by a distinct phase as in most sports.

Some comments relating to strength conversion would be:

1. Sprinting performance is inherently plyometric - the stretch-shortening cycle is involved with each stride (i.e., stretch during the foot-plant and shortening during the propulsive plantar flexion phase). Power conversion is therefore occurring constantly.
2. By performing free body bounding - hopping types of exercises or by performing medicine ball routines - sprinters convert both upper and lower body muscle cross-section strength into power.
3. Conversion involves more than just lowering the percentage load and increasing the speed of contraction.

As a result there is not a traditional or standard approach that can be applied to every athlete. A key to sprinting speed is the rapid 'pistoning of the arms' relating to leg speeds of up to five strides per second. An important strength exercise which is used to develop this upper body capability is a rowing movement performed in either a bent-over position or in an upright seated position. This exercise tends to mirror the elbow flexion and shoulder extension movements of sprinting. Ben Johnson began to focus heavily on his upper body development in 1983. Some other of Charlie's athletes have focused on upper body strength only more recently. The long term differences in somatotype development of the upper body in sprinters can be seen by comparing Ben Johnson to Carl Lewis (see page 8).

## Periodization/Planning

Charlie's program involves maximum strength phases of 7-9 weeks in duration. His elite sprinters never get away for extended periods from maximum strength work involving sets of 3-5 repetitions for bench press and 1/2 squat and 5-10 repetitions for power cleans.

The first maximum strength cycle in the training year occurs prior to the indoor season. Often the latter part of the maximum strength phase coincides with races which are run in January. Since most of these races are of secondary importance the maximum strength phase is not affected.

The second maximum strength cycle would occur prior to the outdoor season.

The current situation for most of Charlie's mature-elite athletes is such that their skills at reading their immediate physical status in addition to their training experience dictates their ability to prescribe much of their own strength training on a day-to-day basis.

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*A conversion phase for strength is not as necessary in sprinting due to the high running intensities used constantly in training. Conversion then of general body-building strength to power is not represented by a distinct phase as in most sports.*

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*'Body-building' or 'muscle cross-section' methods tend to involve moderate loads and slow exercise speeds. Power methods, by contrast involve maximum speed with both low load (i.e. medicine balls) and high loads (i.e. 95-100% load) for doubles or triples at bench press or 1/2 squats.*

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## Describe the evolution of your approach to strength training?

Endurance work is kept to a minimum as a matter of principle due to its' non-specificity to sprinting. I was heavily influenced by the strength training advice from Dr. Tudor Bompá who was an elite rowing coach from Romania and is now teaching at York University.

By 1985 I consciously reduced the volume of strength work to reinforce high intensity – high percentage loads. This decision was based on 3 assumptions:

1. The need for body building methods was reduced as the desired muscle mass profiles/body somatotype were in place.
2. High intensity – high load lifting would now shift the focus to gains in power while maintaining/fine-tuning muscle mass as a by-product of this work.
3. The CNS energy expenditures due to high intensity strength training, needed to be very carefully managed, particularly during 'consolidation training phases,' to leave sufficient CNS energy for high quality/high intensity sprint training.

Most of the athletes by 1985 were at least 5 years strength trained with the muscle cross-section/body somatotype needs already in place i.e. general body-building type strength training is being replaced with specific high-intensity power related strength training.

## How do the strength levels of your male and female sprinters compare?

My female sprinters are 90-95% as strong as my male sprinters in terms of lower body strength relative to body weight. In terms of upper body strength females are generally 60-65% as strong. It is noteworthy that female sprinters in my club are capable of power cleaning loads equal to at least their own body weight for 3-5 repetitions. This level of strength indicates that traditional views tend to underestimate the strength capability of females.

## Strength

### What constitutes Central Nervous System (CNS) training in weight work?

The degree to which high loads and low repetitions are used will determine the loading on the CNS. Repetitions are the key factor. Loads that permit a high number of repetitions (more than 8) will result in cross-section gains in muscle, but loads which permit only a small number of repetitions (2-5) challenge the CNS and are accompanied by gains in power with little or no change in muscle cross-section.

### Given that plyometrics are a form of CNS training, how do you manage their use?

It depends on how many reps are used and how often. A low number of very explosive hops or bounds will have a very different effect than a series (10-20 second duration) of plyometric work. You have to be very careful. If (x) number of repetitions is good then (2 x) repetitions is not necessarily better and in fact could be a lot worse.

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## Q & A

with Charlie Francis

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*Most of the athletes by 1985 were at least 5 years strength trained with the muscle cross-section/body somatotype needs already in place i.e. general body-building type strength training is being replaced with specific high-intensity power related strength training.*

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**Female Strength:**  
*It is noteworthy that female sprinters in my club are capable of power cleaning loads equal to at least their own body weight for 3-5 repetitions. This level of strength indicates that traditional views tend to underestimate the strength capability of females.*

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**More** (more training) often leads to **Less** (less than expected performance gain and/or injury). All CNS work should be very high quality work in terms of effort and technique. Any CNS training done with less than the highest quality can reinforce neuro-muscular patterns which are counter productive.

**To what degree do you apply a conversion phase to the strength work?**

I would question the value of a traditional conversion phase where you go back down from a higher weight and then try to increase the number of repetitions and the speed at which you are performing the lifts. I would simply leave the repetitions low and the load high year round.

My understanding of the purpose of using lower loads and higher repetitions is that you expect to get a conversion of strength to power by using a higher rate of movement. How that relates to sprinting where the limb speeds are far beyond anything you can produce in the weight room is beyond my understanding. The actual applicability of traditional conversion work to sprinters then becomes relatively small. This low specificity is clearly evident, when you realize that if you lower the weight to enable a 10% faster lifting movement it still represents only a small fraction of the actual limb velocity of the sprint. What you should be trying to do is maintain strength while maximally challenging the CNS.

To illustrate this point Ben's foot moves to from 0 to 80 kilometres per hour and back again to 0 during a stride. This equates to approximately 20 metres per second. The average speed during a squat movement is 0.5 metres per second. You can see that even to double the speed of the squat to 1.0 metre per second has little relevance to the actual limb speeds during sprinting. Furthermore, trying to increase the speed of squat work heightens the risk of injury.

As an example, when Ben is performing 2 sets of 5 repetitions in either bench press or squat he is moving a heavy weight as fast as he can. The CNS stimulation/activation is optimal. He is maximally involving his nervous system via maximum recruitment of motor neurons. He is challenging his organism. However the actual lifting speed of a maximal weight is moderate to slow.

**Given the multiple roles of hamstrings as flexors of the knee and as extensors of the hip, how should they be trained?**

The role of the hamstrings as extensors of the hip is most important. Most coaches focus more attention on performing thigh curls using the hamstring as a knee flexor for the purpose of balancing out the strength between hamstrings and quadriceps. But I think the hip extension aspect is where most hamstring related strength work should be focused. To accomplish this electronic muscle stimulation, pulleys and cables, reverse leg presses and other methods should be used. Power cleans and one-half squats also play a role in developing optimum hip extension capability. Correct technique in power cleans is critical to achieve the desired training effect.

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*More (more training) often leads to Less (less than expected performance gain and/or injury).*

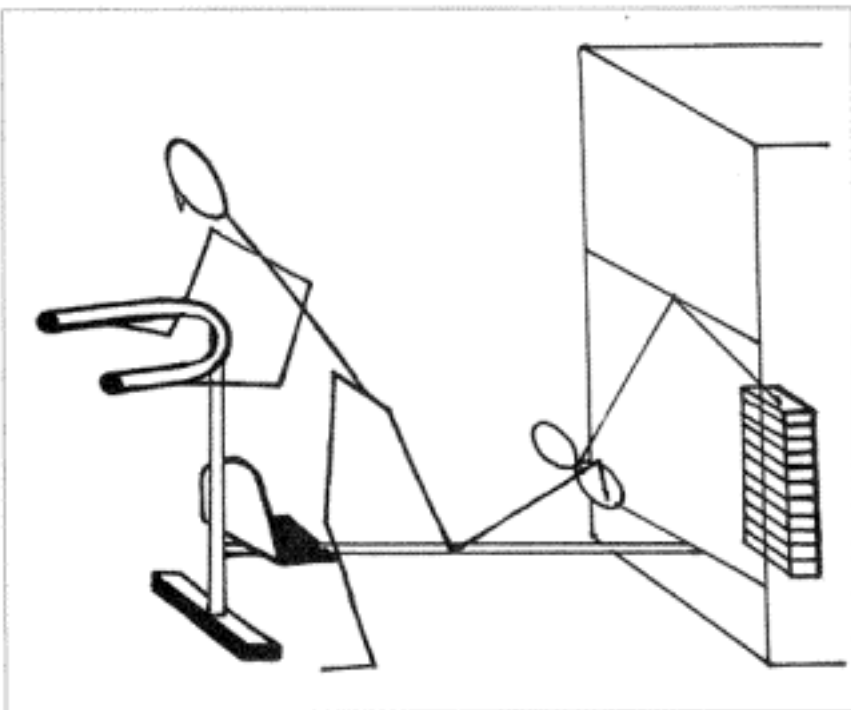
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*But I think the hip extension aspect is where most hamstring related strength work should be focused. To accomplish this electronic muscle stimulation, pulleys and cables, reverse leg presses and other methods should be used. Power cleans and one-half squats also play a role in developing optimum hip extension capability. Correct technique in power cleans is critical to achieve the desired training effect.*

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## REVERSE LEG PRESS (HAMSTRINGS AND GLUTEUS)



*The #1 training priority of the hamstrings and the movement which generates running and skating speed is hip extension. Remember: the ratio of power output of the hip: ankle = 7:1*

**Figure 4-1 Reverse leg Press ( Hamstring & Glutes)**

NOTE: A commonly available device for this movement is the 'leg press' station of the 'Universal' weight training machine.

The #1 priority of the hamstrings and the movement which generates running (and skating speed for that matter) is hip extension - performed as shown. Remember: the ratio of power output of the HIP: ANKLE = 7:1

Most coaches wrongly reinforce the hamstring curls (knee flexion) and the #2 priority function of the hamstrings.

Cybex testing shows that as the velocity of limb speed increases for both extensors and flexors, the strength ratio changes in favor of the hamstrings.

### **Does the training of the quadriceps differ from the training of the hamstring?**

Absolutely! In fact there are two issues related to the training of the upper leg, which are not well dealt with in training theory - even today.

First, the hamstrings have traditionally been trained only as knee flexors, and exercises related to this function, such as thigh curls, abound. But, the hamstring must also be trained as a hip extensor. In fact, this is the key hamstring function in sprinting.

A second and little known difference between the quadriceps and hamstrings is the difference in fibre-type. The quadriceps key role in walking and in sprinting is to extend the knee in preparation for ground contact and to support it during the contact phase. Consistent with this function is a higher proportion of red muscle fibre. The hamstrings, by contrast, function to 'sweep the ground'



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during the contact phase and complete the follow-through via hip extension. The hamstring is one of the most powerful and fast acting muscles in the body and consequently has a higher proportion of white muscle fibre. This fact is borne out during high speed-strength testing of the quadriceps and hamstrings.

Given these realities the training of the upper leg does then have some differences:

1. During the long-term development of an athlete, maximum speed-power related work is very necessary - even for young athletes -to promote the development of white fibre characteristics in transitional fibre and to further develop the power characteristics of the existing white and red fibre in both quadriceps and hamstrings.
2. The quadriceps are trained largely as a by-product of the 1/2 squat while the hip-extending function of the hamstrings is trained via reverse leg press. Thigh curls or hamstring curls are also done but the volume of work for these exercises would be significantly lower than the volume of work done via rear leg extension exercises.
3. Remember that sets of 5-6 repetitions which are applied in our strength training are directed at minimizing cross-section gains. This serves to maintain existing cross-section levels while developing power capabilities. The final phase in converting strength to power consists of actual short distance power-related sprints.

**Athlete Comments:**

1. 50-60 metre indoor races during winter allow a higher volume of training based on the reality that maximum strength work is very complementary to the strength demands of accelerating over 50 metres.
2. For 100 metre outdoor races during summer the volume of maximum strength work has to be reduced to allow for the development of speed endurance.

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**Athlete Comments:**

1. *50-60 metre indoor races during winter allow a higher volume of strength training based on the reality that maximum strength work is very complementary to the strength demands of accelerating over a maximum of 50 metres.*
  2. *For 100 metre outdoor races during summer the volume of maximum strength work has to be reduced to allow for the development of speed endurance.*
-

### What is the place of body-building methods in the training of elite sprinters?

Very minimal for the elite sprinter. The required musculature and the sprinter's somatotype are already in place. Body building methods require sets of 8-15 repetitions at 60-70% loads. In terms of speed-power development, it is a great mistake to do large numbers of repetitions at medium loads ie. 'Body building' methods.

During an injury period in 1988 Ben performed: 2 x 10 - 352 bench presses, 2 x 10 - 330 incline press to maintain CNS reserves.

Our elite sprinters do only 3-6 selected lifts or exercises at near maximal loads. All other weight training should be of the fast circuit type and included in the circuit training component. One of the major reasons for utilizing circuit training is to provide for variety.

### How much did Ben's lifts change from 1986-87 to 1987-88?

Ben's strength had increased by approximately 10% over that period-1986 to 1988. His 1/2 squat was up from 540 lb. to 600 lb.. and his bench press had improved from 3 x 290-300 lb.. in 1986-87 to 3 x 330-340 and 2 x 407 lb.. in 1987-88.

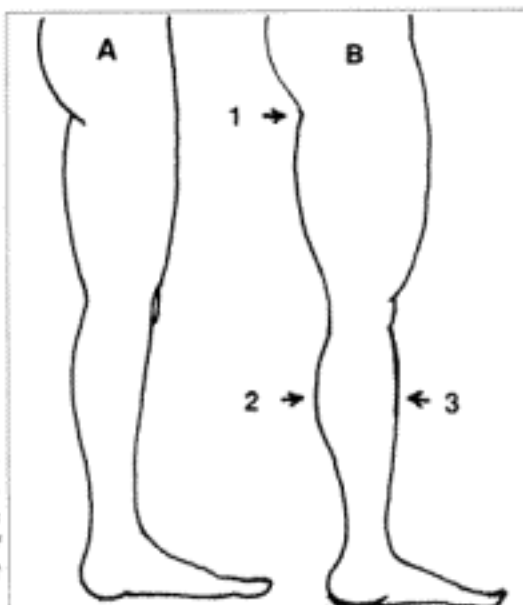
### Do these strength gains lead performance gains or do they follow them?

It is impossible to say definitively. But remember that during an actual race in which a personal-best is achieved you never know for certain which of the factors of strength, power, speed, speed endurance, acceleration or the quality of the start was the determining factor. You simply try to peak each of these factors at as high a level as possible to allow the athlete the opportunity to put together a new personal-best performance. You are trying to create a larger energy 'envelope' to be tapped during a given sprint.

### On what basis do you prescribe strength for a developing athlete?

On how the athlete looks-their somatotype! This diagram will show what I mean:

**Figure 4.2**  
A pronounced gluteal fold gives clear evidence that the athlete is not well trained in the key hamstring (rear thigh) function of hip extension \* remember this is the primary source of imparting force against ground during a stride.



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*In terms of speed-power development, it is a great mistake to do large numbers of repetitions at medium loads.*

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*'If it looks right - it flies right!'*

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#### Key:

- 1- Gluteal Fold
- 2- Gastrocnemius and Soleus
- 3- Anterior Tibialis

A- Before  
B- After

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## Strength Inventory For A Developing Sprinter

1. You develop an athlete inventory against which you monitor and judge an individual athlete's progress. The overall development of musculature leading to a 'sprinter's somatotype' for that athlete is as yet incomplete.
2. The indentation at the point of the hamstring — gluteal junction shows further gluteal development is required. This calls for hamstring — hip extension work via rear leg extensions. The hamstring development depicted in Figure 4.2-A (Before) is usually the result of an emphasis on knee flexion-related strength work without sufficient attention to the hamstring's role as a hip extensor.
3. The central core is a priority area of strength/muscle mass development. Bi-lateral (side-to-side) strength balance as well as extensor — flexor strength balance are underlying training goals. Abdominal and upper back work develops the ability of the core to stabilize the body so that the increased leg and gluteal strength can be successfully translated into performance gains.
4. The calves will develop as a result of actual sprint training, bounding and hopping movements.
5. EMS work is begun targetting the feet, quadriceps, hamstrings, lower back, gluteals, and abdominals. The intended impact of EMS work is on white and transitional fibre. (See Chapter 9 - Electronic Muscle Stimulation - EMS)

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*Abdominal and upper back work develops the ability of the core to stabilize the body so that the increased leg and gluteal strength can be successfully translated into performance gains.*

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## Strength Inventory For An Elite Sprinter

1. **Hamstring** development is maintained predominantly through rear leg extension and EMS work. NOTE : It can be seen from the diagram that the junction of the gluteals and the hamstrings now appears as it should. There is no indentation at the gluteal - hamstring junction - the hamstring 'flows' into the gluteal. This indicates high hip-extension strength capability. (See Figure 4.2-B After)
2. **Quadriceps** development is maintained mainly through 1/2 squats and power cleans, with a relatively smaller contribution being made by knee extension exercises. EMS is used by most, but not all, athletes in developing and maintaining power capabilities and depends on their tolerance for such work. Plyometric (explosive, stretch-shortening cycle) work and actual sprint training play important roles in building and maintaining quadriceps strength.
3. **Gluteal** development is maintained as a by-product of hip raises, 1/2 squats and power cleans.
4. **Lower back-spinal erector** strength of the elite sprinter is significantly more developed than that of the developing sprinter. Ben Johnson had spinal erectors the size of a man's

forearm. Part of the development and maintenance of spinal erectors is due in part to the high volume of high speed work. The attendant forces involved in performing at such speeds are tremendous. The forces involved in the start, during accelerations, and in sprinting in general, are translated from the feet to the top of the head. The spinal erectors therefore play a key role in stabilizing the torso to allow such forces to be generated and tolerated successfully.

EMS is applied to the lower back by most of my athletes to maintain muscle cross section in addition to developing power characteristics in what is essentially a predominantly red-fibre posture related, muscle group. Power cleans and 1/2 squats also play a role in developing and maintaining spinal erector strength.

5. **Calf** musculature and strength development is maintained via actual sprinting with the exception that EMS is rarely applied to calves except in injury-rehabilitation modes. Note 1. 500 watts of power generated at the ankle vs 3500 watts at the hip. Note 2. Calves must not be over developed as excessive size can overweight the end of the leg-lever and slow leg movement.
6. **Foot** strength, directed at arch maintenance and plantar-flexion capability is maintained through a combination of regular EMS application, bounding, A and B skips, hopping, jumping, and actual sprinting.
7. **Abdominals** - Given the significant size and strength of the spinal erectors it is of critical importance that abdominal strength be developed and maintained at a level which allows effective counter-balancing of spinal erector strength.
8. No particular work is done to focus on **abductors and adductors of the thigh**: thigh abductor-adductor strength is a by-product of such movements as medicine ball leg throws which require the medicine ball to be held between the ankles.

In the Chiropractic section of the Recovery/Regeneration chapter, Morris Zubkewich also affirms that a key area requiring monitoring and treatment is the balance of strength between the spinal erector and abdominal muscle groups. Imbalances here usually create a hyperlordotic curve in the lower back with the result that the iliopsoas will go into muscle spasm in an effort to protect the lower core from injury.

Much of the required flexion-torsion type abdominal work consists of all types of plyometric power-related medicine ball work, in addition to EMS work. Again, it is a fact that the demands of sprinting require the abdominals to be able to function, and provide stabilization in explosive contractile sequences matching the needs of performing up to five strides per second.

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*The forces involved in the start, during accelerations, and in sprinting in general, are translated from the feet to the top of the head. The spinal erectors therefore play a key role in stabilizing the torso to allow such forces to be generated at the hip, knee and ankle and tolerated successfully.*

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*Calves must not be over developed as excessive size can overweight the end of the leg - lever and slow leg movement.*

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*Again, it is a fact that the demands of sprinting require the abdominals to be able to function and provide stabilization in explosive contractile sequences matching the needs of performing up to five strides per second.*

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Side sit-ups and medicine ball work are the two key ways in which rectus, transverse, and oblique abdominals and quadratus lumborum strength are developed.

### **The Sprint Position**

The ability to implement and hold 'The Sprint Position' is the ultimate goal of sprint/strength training.

1. Due to poor postural habits, insufficient core strength and/or limb strength, young athletes are not able to get into the sprint position at all.
2. Long-term training is designed to enable a young sprinter to get into the sprint position, at first sporadically, but eventually to be able to hold the sprint position for longer periods of time. In fact only a handful of sprinters in the world can hold the sprint position for an entire race.
3. There are many factors which will cause the sprint position to breakdown even with elite sprinters:
  - insufficient relative core strength; endurance;
  - bodyweight to strength ratios which are insufficient relative to: speed, limb strength, and power
  - unbalanced extensor-flexor muscle strength (specifically spinal erectors vs abdominal strength);
  - unbalanced peripheral core musculature (external obliques - quadratus lumborum) resulting in suboptimal torsional stabilization;
  - spasmed core musculature (chronic and/or acute);
  - core musculature which is trained for cross-section but relatively untrained for power or CNS capability;
  - insufficient leg strength and/or power;
  - inappropriate focus indicated by being distracted by other sprinters or distracted by the anticipated consequences of the performance
  - struggling 'to get there' rather than running properly 'from where you are' and let the race 'happen'.
4. In training 'the sprint position' in young sprinters:
  - minimal sprint technique or sprint drills are used until core strength and core posture are in place. Obviously both types of training occur simultaneously but the emphasis is directed to preparation for actual sprint training. The major monitoring cue will be observing how effectively the young sprinter is handling a sprint specific drill or short sprinting segment.

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*Long-term training is designed to enable a young sprinter to get into the 'sprint position,' at first sporadically, but eventually to be able to hold the 'sprint position' for longer periods of time. In fact only a handful of sprinters in the world can hold the sprint position for an entire race.*

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**Elaborate on the core strength work which you do in conjunction with tempo training.**

We usually do push-ups, and abdominal work on days when the emphasis is on tempo, or on days when power work is not emphasized.

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Some medicine ball work is done almost every day with the volume being reduced on *power days*. Our medicine ball work consists of chest passes, overhead passes, side passes, right-side and left-side underhand passes, passes around the body to left and to right sides in addition to other rotation throws, roll back throws, roll forward throws, acceleration throws. There is an almost endless variety of this kind of work. (See pages 32 and 33 for related photographs). What you are doing with this kind of work, in addition to developing comprehensive core strength and core power, is learning total body control. You learn to control the body in every way imaginable, with or without additional loads. We emphasize this kind of work with young developing athletes and it is quite interesting to observe the effects. It develops core strength and it provides variety to training, and is one of the training elements in which young athletes can show rapid improvement.

Specific core fitness has to be developed before it is possible to develop speed. If you try to develop speed you find that the shoulders and abdominals fatigue too quickly with the result that technique degrades. It has been demonstrated that this kind of core related strength work has had a positive impact even on 800 metre running performance. Core strength and power abilities can be considered the foundation on which you build technique.

#### **Describe your approach to upper core strength.**

There are three main strength factors which need to be dealt with in upper core:

1. **Shoulder extension-flexion strength**, which determines the ability to piston the arms. Acceleration in the 100 metre sprint begins with the arm-shoulder action.
2. **Upper back strength** — in combination with postural habits — determines the ability of the athlete to get into the sprinting position. If the upper back is relatively weak and/or the upper core posture is poor, the athlete is unable to get into the 'sprint position' let alone hold it over the entire 100 metres.
3. **Intercostals** are key breathing muscles and function in combination with the diaphragm and the abdominals. There is a postural link here as well in that the intercostals and diaphragm are compressed by a position of poor posture and cannot contribute fully to the breathing action. Efficient breathing has an effect on the acceleration ability of the athlete as acceleration is enhanced during the exhalation phase of breathing. (Refer also to page 17.)

The types of training activities which we use to impact on these three factors are:

1. **Shoulder Development:** There is no fixed routine directed at arm action. However, seated rowing is used in combination with bench presses, seated behind the neck military presses, and incline presses to build the required muscle cross-section. Medicine ball throws - some in conjunction with abdominal work - in addition to actual sprinting, contribute the required power characteristics to upper body/arm

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*Core strength and power abilities can be considered the foundation on which you build technique.*

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movements. In the rest periods between tempo repeats we also do variations of push ups for muscle cross-section maintenance and strength endurance.

2. **Upper Back:** Again there is no strength recipe which is applied to this area but cross-section gains would be achieved though the same exercises as in number 1. Particularly useful for upper back development and maintenance are seated - rowing and seated-behind-the-neck military presses. Not all athletes do all exercises. The female athletes tend to use behind the neck pulldowns, and bench presses while the males tend to do a greater number of weight exercises directed at upper core strength.
3. **Intercostals** (between ribs): The development of intercostal musculature is by and large a by-product of the above strength work. The intercostals are stretched and used in a core support role in exercises such as seated-behind-the-neck military presses. And of course the sprint training itself, particularly the speed and acceleration work, impacts on intercostal strength.

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*The 'Cross-Over Effect' underlies general training. The entire body benefits from work which is done by any individual body part. The whole organism is strengthened. In every form of training with the exception of EMS, there is a cross-over training effect on the entire body.*

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Remember — The 'Cross-Over Effect' underlies general training. The entire body benefits from work which is done by any *individual* body part. The whole organism is strengthened. In every form of training with perhaps the exception of EMS, there is a cross-over training effect on the entire body.

#### How do you balance volume versus intensity in strength training?

Strength training is based on the same principles as speed training. The traditional concept of applying high volumes of training to an elite sprinter is not very useful or specific. I am concerned always with the volume of high quality work. The intensity of the work varies of course but even strength endurance work directed at the core must be of high quality or it is not worth doing. I will always sacrifice high volumes of low quality work in favor of a low volume of high quality work.

	Period I	Period II	Period III
Competition Emphasis	Indoor Competition Period	Outdoor Competition Period	Main Outdoor Competition Period
Main Training Distance	0 - 60m	30 - 120m	60 - 200m
Racing Distance	50 - 60m	100m	100m
Expected Strength Gain	5 - 6%	2 - 4%	0 - 2%
	Maximum Gains	Moderate Gains	Minimal Gain Strength Maintenance

- Notes:
1. Reduced emphasis on strength gains via muscle cross section as season progresses.
  2. Strength maintenance critical as speed strength is lost (detrained) quickly.
  3. Strength training must be very efficiently planned as maximum time and CNS energy pool is spent on technique expression particularly before indoor and outdoor peaks.

## How do you set strength goals?

At the elite level strength work and strength goals are largely athlete controlled. You monitor the athlete's performance in the light of what goes on on the track. On three occasions during the winter of 1987-88, we had to back off the weights for approximately one week with certain athletes: they were still making strength gains but at the same time their speed performance was plateauing. You want to see clear cause and effect relationships wherever possible. When you get a one week plateau in any training element, you must change the program. Inordinate stiffness can also indicate a need to back off strength training. Speed strength must be maintained year round, as it can be lost quickly.

### Details of Athlete Strength Programs

single sessions excerpted from pre-competition period - 1988

\* denotes an exercise given top priority by the athlete

#### Angella Issajenko (approximate body weight 140 lbs) (pre-competition period)

1/2 Squats*	1 rep x 355 lbs 10 reps x 205 lbs 10 reps x 215 lbs 10 reps x 225 lbs
Bench Press	1 x 205 lbs 10 x 145 lbs
Power Cleans*	3 sets x 10 reps x 115 lbs 1 set x 7 reps x 125 lbs
Reverse Leg Press	2-4 reps x 330 lbs (maximum)

#### Cheryl Thibedeau (approximate body weight 140 lbs) (pre-competition period)

1/2 Squats*	5 sets x 8 reps x 255 lbs
Bench Press	1 rep x 185 lbs 4 sets x 4 reps x 155 lbs
Power Cleans	(omitted because of back problems)
Reverse Leg Press*	8 reps x 198 lbs 6 reps x 220 lbs 6 reps x 242 lbs
Behind Neck Pulldowns	2 sets x 6 reps x 50 kg

NOTE: As a general principle Cheryl will alternate leg exercises one night with arm exercises the next night. Weight training workouts are modified or eliminated on the basis of the fatigue status resulting from prior technical/sprinting work.

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*Speed strength must be maintained year round, as it can be lost quickly.*

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Ben Johnson - 1987  
Technical focus: Complete extension from head to toe



Photo Credit: All Sport Photographic LTD.



**Molly Killingbeck (approximate body weight 130 lbs)  
(Competition period)**

1/2 Squats*	3 sets x 3-5 reps x 185 lbs
Bench Press	5 sets x 5 reps x 125 lbs 3 sets x 3 reps x 155 lbs
Power Cleans*	3 sets x 3-5 reps x 110-115 lbs
Reverse Leg Press	3 sets x 6-8 reps x 120 lbs
Behind the Neck Pulldowns	3 sets x 3 reps x 60 lbs
Tricep dips (with body weight only)	3 sets x 10 reps

**Mark McKoy (approximate body weight 170 lbs)  
(Competition period)**

1/2 Squats*	5 reps x 410 lbs 1 rep x 460 lbs
Bench Press*	3 reps x 265 lbs 1 rep x 275 lbs
Power Cleans	5 reps x 225 lbs 1 rep x 265 lbs 1 rep x 285 lbs (personal best)
Incline Press	1 rep x 250 lbs
Behind the Neck Military Press	3 sets x 5 reps x 135 lbs
Seated Rowing	3 sets x 5-10 reps x 135 lbs

NOTES: Mark's weight training is largely based on power related maximum strength work. Upper body work is done up to three days before competition. Leg strength and power is maintained via low repetition work with singles, doubles and triples (i.e., 3 reps x 90-95% of maximum weight).

Monday	Wednesday	Friday
X	X	X AM upper body
X	X	X PM lower body

**Ben Johnson (approximate body weight 175 lbs)  
(Competition period)**

1/2 Squat	5 reps x 450 lbs 1 rep x 480 lbs 4 reps x 600 lbs maximum
Bench Press	3 reps x 325 lbs 1 rep x 375 lbs 6 reps x 350 lbs** 3 reps x 365 lbs
Incline Press	2 reps x 330 lbs

\*\*[performed three days before setting 9.83 world record in Rome 1987]



Mark McKoy performing 315 lb. bench presses at a training camp in Spain in 1987. This is an indication of the upper body strength required to be a 10.19 second, 100 metre sprinter and the number 3 hurdler in the world in 1987.

Photo Credit: All Sport Photographic LTD.

## CHAPTER 5

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# Recovery/Regeneration

*"An athlete who is receiving regular regeneration methods & treatments is able to increase the volume of high quality - high intensity work by as much as 40%."*

*"If a high level athlete is stiff and sore and has unrelieved muscle spasm you have to wonder what you are going to accomplish by training an athlete in that state."*

Charlie Francis

Waldemar Matuszewski, Regeneration Specialist  
— performing a stretching sequence



1. Lower back/hips/thighs



5. Chest/shoulders



2. Groin/medial thighs



4. Lower back/hamstrings



3. Torsion stretch involving hip & shoulder girdles

*Photo Credit: Greg Mortimer/All-Sport Photographic LTD.*

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## What personnel implement your recovery - regeneration program?

## Q & A

I think it's important to differentiate between the recovery and regeneration work that can be performed at the training or competition site by the coach and the massage/regeneration specialist and the services which the athlete can obtain under the government health insurance plans such as access to chiropractors and doctors. The day-to-day monitoring and implementation of recovery-regeneration is performed by the athlete, coach and regeneration specialist. This process involves massage, saunas, whirlpools, showers, baths, and electronic muscle stimulation (EMS). A chiropractor is used for periodic skeletal adjustments and soft tissue work during injury/pain periods and periodically for injury prevention, while doctors are used for periodic (3 or 4 times a year) monitoring and during injury/sickness periods.

## How did you incorporate massage into the training of your athletes?

It was a priority from the beginning. Whatever budget I had left over after meeting training expenses I immediately spent on physiotherapy and regeneration. Initially I had to do the massage myself, as much as I could, for over 30 athletes. I would spend 10-15 hours per week during training periods and much more time during competition periods.

## How did you learn the techniques of massage?

Basically I learned massage by doing it. I picked up various techniques from Percy Duncan, my coach, and from Gerard Mach, the head coach, as well from Heinz Piotrowski who was with the National Team. More recently, Mike Dincu and Waldemar Matuszewski were sources of sophisticated East European massage techniques.

## How important is massage in a training program?

Massage is very important in speeding up recovery time and improving flexibility. The malleability or tonus of the muscles determines what sort of leg speed you can put out and this of course is a key determinant of performance. If your muscles are as stiff as wood, you're certainly not going to run well and it will be only a matter of time before injury occurs.

Massaging an athlete also gives the coach an opportunity to see how the athlete is really doing. You talk to the athlete and ask, "How are you today?" And he says, "Great!" You feel his legs and they're like wood. Athletes tend to be over-motivated; they want to work harder than they should.

## What are some key guidelines regarding the use of massage?

Before competition you use a very light, slapping type of massage. You don't go deep into the muscles, with the result that the athlete feels fresh and awake. You wouldn't do deep rubs within, say, 48-72 hours of the competition unless it was a very insignificant meet, because with deep massage you lower the tone of the muscle too far. To use an inappropriate type of massage or to have an unskilled

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*The day-to-day monitoring and implementation of recovery-regeneration is performed by the athlete, coach and regeneration specialist. This process involves massage, saunas, whirlpools, showers, baths, and electronic muscle stimulation (EMS).*

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*You wouldn't do deep rubs within, say, 48-72 hours of the competition unless it was a very insignificant meet because with deep massage you lower the tone of the muscle too far.*

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person doing the massage can undo much of the training effect you have accomplished during your final preparation for a key competition. You want to remove any lumping of the muscle, but you have to have this done long enough before the meet so that the athlete can recover from the treatment. In a calf muscle it is possible for an athlete to have a lump or spasm large enough that 35 percent of his or her muscle may be nonfunctional. The spasmed muscle is not able to contribute to movement and there is the potential for a muscle pull — above or below the spasmed area. You have to take out that lumping or the athlete loses a tremendous amount of power.

The lump is in reality a localized grouping of muscle fibres which are in spasm. If muscle is already contracted or spasmed, it can't contract any further. There is no half way. Each muscle fibre is either contracted or not contracted, and the overall muscle tone represents the proportion of contracted to non-contracted muscle fibres. Within reason, generally the lower the tone, the faster the muscle can contract and the stronger it is. That's why you cut down on your training workload before the meet. However, if the muscle tone was completely down, there wouldn't be any sharpness and rebound-reflex (stretch-reflex) activity on which the sprinter so heavily depends.

**So you're always checking the consistency of the muscle - whether there are hard spots or whether the muscle is consistently toned correctly or spasmed?**

I learned from Percy Duncan what to look for in a muscle. For example, if an entire muscle is a little bit tight or an entire muscle is a little bit loose it's not so bad. When you start finding localized areas within the muscle which are tight, then you've got problems.

If there is a tight spot the muscle must be evened out and the 'tight spot' removed because a muscle pull will occur above or below the tight spot. When there is a lump, the area above and below must work harder because less muscle is being asked to do the same amount of work. This is a recipe for injury.

**In 1981 you retained a professional massage therapist from Romania, Mike Dincu. What did that service cost?**

I was paying him about \$10,000 a year. It was the lion's share of what I had left in the training centre budget. Mike initially was coming in twice a week and then later in 1984 when I had Special Grants, Mike worked with the athletes four times per week. So I was spending much more by this time — \$20,000 in 1984 with the support I received from Sport Canada under the special preparation program for A and B card athletes. Even so I was dependent on Mike to volunteer a great deal of additional time — including all the time we spent in Europe.

**Was 1984 the first time Sport Canada directly or indirectly recognized massage as a legitimate element of training?**

Yes. Prior to that I spent the money on massage and worried how I was going to finance other items such as assistant coaches later. From the very beginning I knew that massage was clearly the number one priority and established that element first.



Photo Credit: All Sport Photographic LTD.

Charlie performing a front hipfront thigh muscle tonus reset during a training session.

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***As a coach don't talk about technique — do it! Then you may know it! — maybe even understand it.***

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***From the very beginning I knew that massage was clearly the number one priority and established that element first.***

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When it came to the other half of the money, the additional \$10,000 needed to pay for massage in 1984, that really represented recognition by Sport Canada. The project was recognized because this special support was granted on an itemized basis. Not only did \$10,000 come into the Centre budget for massage but in fact additional monies were made available exclusive to the Centre for other athletes who were training in the United States. They too began to receive support money to allow at least 2 to 4 massage sessions per week.

**What was the difference between the level of massage skill you were able to provide and the level of skill Mike Dincu was able to provide?**

Mike had a repertoire of different types of massage which he would use under different circumstances: a more relaxing, stroking massage in the evening and a more stimulating one in the daytime depending on how close we were to the competition. Furthermore, the techniques used before and after competition are different and they depend on the levels of stiffness, soreness, and on how the athlete is feeling.

I picked up a lot of information from Mike. I paid as much attention as I could to the techniques he was using and then applied as many of them as I could myself. Mike had only two hands and simply wasn't able to work with every athlete exactly when he or she needed it, so I pitched in.

**Waldemar Matuszewski joined you in 1986. What difference did he make?**

Waldemar had been chief of physiotherapy and regeneration at the Polish National Olympic Centre. He brought immense skill and authority to the job. Waldemar could loosen muscles through massage without making the athlete sore and without bruising any tissue. With Waldemar we were able to access the whole process of regeneration and this goes far beyond the techniques of massage.

**Describe the techniques Waldemar used.**

He used techniques such as vibrating his finger on one of the 500 points in the body, all of which he knew intimately. These points are either motor points or acupuncture points. He will use a small electro-stimulator for the same purpose as well. Waldemar refers to this technique as electro-acupuncture. Waldemar is capable of and uses many different techniques depending on the situation. He can judge the status of a muscle within seconds of having run his fingers over it.

**Waldemar used 'shaking' or Trager massage — could you elaborate on his use of these techniques?**

Well, there are two different types of shaking. There is the localized shaking of the muscles themselves to stimulate them, and the shaking of the joints in order to restore the joint spaces to normal alignment. For example, to stretch the joint spaces and to restore them to normal he will hold the feet off the mat and start shaking and stretching outwards as he is pulling on the ankles. This impacts on the joints of the knees, the hips, and to a lesser degree, on the lower back.

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*Mike had a repertoire of different types of massage which he would use under different circumstances: a more relaxing, stroking massage in the evening and a more stimulating one in the daytime depending on how close we were to the competition. Furthermore, the techniques used before and after competition are different and they depend on the levels of stiffness, soreness, and on how the athlete is feeling.*

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### **Did Waldemar use acupressure techniques?**

Yes, but the point is... what is acupressure? Generally speaking it is simply a form of massage which involves the application of pressure over acupuncture sites. Sometimes you hear of acupressure therapists who take their elbow and stick it into an area of muscle. It's like taking a sledge hammer to smash a fly. With improper technique you are bruising soft tissue and raising CPK levels in the muscles in an attempt to get at a localized area of muscle spasm. You can irritate the muscle and possibly cause damage. When you see high Creatine Phosphate Kinase CPK levels in the blood tests which indicate tissue damage or breakdown, you know you are going a little overboard. Large areas of muscle are better treated with electro-stimulation.

### **How much time would Waldemar spend on massaging an athlete?**

When Waldemar began to work with us full-time, the athletes had many more hours of access—significantly expanded access—particularly in training camps. Mike Dincu, our previous regeneration therapist, had to retain an outside job and couldn't always travel with us, but Waldemar traveled with us everywhere. During training camps he provided 6 hours or more of massage per day. That's very important. It makes it possible for athletes to carry out higher quality workouts, which in turn result in higher quality performances.

### **Can you describe the difficulties you have had in getting your massage therapist admitted to competition sites?**

In 1982 we weren't able to bring Mike Dincu at all to the Commonwealth Games; we were not able to get him accredited by the Sport Medicine Committee that made the decisions on accreditation. The result was that he was not able to be there at a time when it was critical. We asked the medical support staff at the games site, where was the massage service? They indicated that their people would provide it, but it soon became clear that they were not skilled. The athletes stopped going in for treatment because it was apparent that the staff were not competent.

A confrontation occurred between Gerard Mach and the members of the Physiotherapists' Group. "Now you tell me how the athletes are going to receive the massage treatment they need and who will do it?" asked Gerard. So they brought out a jug of oil, a pile of towels, and a table and gave them to me and said, "Go." I worked from 6 p.m. to 1 a.m. every day doing massages at that competition.

Mike Dincu once said that there is a difference between knowing and doing. I had a classic interaction with a coach who said, "Oh, I wish I knew how to do all that massage stuff." I said, "Put your mind in neutral and rub." The only way to learn is to do it!

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*Sometimes you hear of acupressure therapists who take their elbow and stick it into an area of muscle. It's like taking a sledge hammer to smash a fly. With improper technique you are bruising soft tissue and raising CPK levels in the muscles in an attempt to get at a localized area of muscle spasm. You can irritate the muscle, and possibly cause damage. When you see high CPK levels in the blood tests which indicate tissue damage or breakdown, you know you are going a little overboard. Specific areas of muscle are often treated with electro-stimulation.*

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*Mike Dincu once said that there is a difference between knowing and doing. I had a classic interaction with a coach who said, "Oh, I wish I knew how to do all that massage stuff." I said, "Put your mind in neutral and rub." The only way to learn is to do it!*

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**Could you comment on the perception that chiropractic and massage are two performance/training disciplines which can help athletes stay well and avoid sickness or injury?**

When the Sport Medicine Council of Canada send a medical support team to Caracas for the Pan American Games, or wherever, they have people who have pills, air splints etc. They are prepared for sickness and injury. They sit in the stands and wait for somebody to fall down and then they try to fix them.

We would rather that the athlete didn't fall down in the first place. In fact, as increasingly skilled coaching results in the performance levels of our athletes rising and rising, then the incidence of injury and health problems should decrease, and the amount of emphasis that has to be put on super preparation increases. This is the sort of approach we want to see reflected in team selections of the medical staff. Their role is changing into preparation more so than rehabilitation and injury treatment and I don't think that's well recognized yet. They simply do not understand what sport, and particularly sport at the elite world level, is all about. It isn't just the sprinters we're talking about here.

We have a situation in Canada where we have a higher injury rate in our marathon runners than we have in our sprinters. The fact remains that because we have regeneration techniques that are effectively implemented at the sprint centre, our injury levels are very low and our training and competitive levels are very high. The Sport Medicine Council is not picking up on this fact.

**The Canadian Medical Profession has the highest status in the world in terms of treating sickness and injury. Is this reputation warranted?**

The Canadian Medical Profession is indeed highly regarded both in diagnosing symptoms and in providing the proper care coincident with that particular diagnosis. Where they need to develop more skill is in keeping finely-tuned athletes healthy and injury-free. In short they need skills in 'performance medicine' in addition to 'sickness medicine.'

**How many hours do you personally spend at a given competition performing massage?**

I can describe my own experience when I worked at the 1982 Commonwealth Games. I spent 8 hours a day on massage, 7 days a week, totalling 56 hours a week, for the duration of the Commonwealth Games. I never set foot outside the Commonwealth Village. I was either at the track for an event or I was back at the dormitory doing massage on my athletes.

**Could you comment on the role of chiropractic and massage therapy in the monitoring of an athlete?**

You don't wait for injury to occur. The athletes are being probed and screened constantly by Waldemar's hands, the chiropractor's hands or my own. Among us we are usually able to find potential injuries before they occur.

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**How much additional training time do you gain by having a regeneration therapist on your staff?**

The whole point here is that injury prevention is only part of the benefit. An athlete who is receiving regeneration treatments regularly can increase his or her work by as much as 40%—and not so much in terms of volume but rather in terms of the quality of high intensity work. This process entails the right kind of diet and the right kind of vitamins, and the right kind of massage, so that when they go out to compete they are ready to go. The result is that they can do what they have to do, when they have to do it.

**How would you characterize communication with your massage therapist?**

It's essential that there be complete communication and that I know exactly what is going on with the athletes so that I can assign the right kind of work at the right time. That means that I need a line of communication with the athlete and with people who are working with the athlete. I don't want to go into a training session or competition and find out about a problem that I was not aware of. Waldemar would update me after each practice as to the specific status of each athlete.

**What are the highs and lows in terms of frequency of massage among your athletes?**

Angella Issajenko would sometimes get up to 3 massages of varying types and length per day, possibly a massage before training, maybe one after training, and one in the evening. The massage varied depending on the status of her muscles. She would be checked before a race to see if there was any particular area that required attention and then, of course, massaged after the race to facilitate the removal of any waste products and to enhance recovery. Massage was not only incorporated into her warm-up procedure, but in addition, Angella would sometimes go in after a heat or often after her tempo work during a training session, for example, and receive stretching or massage. It must be understood that she was in control; she was reading and listening to her own body and decided when she needed massage — no one else.

Angella Issajenko, Ben Johnson, Desai Williams and Mark McKoy use massage the most with a weekly frequency of 5-8 times. The lowest usage by other athletes in the group would be 2-3 times per week. I may have suggested to them from time to time that they get a massage but for all intents and purposes they decided when they wanted or needed one.

**Can you expand on how massage impacts on the status of the muscle — the correct level of tightness or looseness in the muscle?**

I think you have to look at muscle tone. Generally, the higher the tone, the greater the number of muscle fibres that are contracted and the fewer the number of fibres still available to contract. Individual muscle fibres are either contracted or they're not contracted; there's no in-between. But in a bundle of muscle fibres there is a balance between what is contracted and what is not contracted and that

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contraction status is what you call tone. Within reason, generally, the lower the tone the more available power you have because you have more fibre available for contraction. In sprinting, you want the muscle tone very low initially and then bring it up over the course of your warm-up and through your heats. You can always bring the tone up but you can't always bring it down, so it's better to come in with muscle tone too low rather than too high.

#### **How does stretching fit into recovery/regeneration?**

PNF (proprio-neural facilitation) type stretching in combination with massage can be a very effective recovery combination. Stretching for the purpose of resetting muscle tonus to desired levels can shorten your recovery time significantly, by up to 3 or 4 hours. Most of the time we do PNF stretching before and after competition and practice. It can shorten recovery time because if the muscle is contracted and tight, it doesn't allow as much circulation as when it's restored to full length. The athletes are constantly restoring their muscles both in terms of tonus and in terms of bio-chemical status.

#### **Is there a place for traditional passive stretching?**

Yes, there is a place, but it depends on the situation. Generally when an athlete is chronically tight, passive stretching is preferred.

#### **What other interventions do you rely on to speed up recovery/regeneration?**

Most of our regeneration is accomplished by the hands-on work related to massage and chiropractic because hydrotherapy and other treatment modes are not always available everywhere we go. We generally train at a track without the kind of facilities required to perform hydrotherapy. When we are at training camps, however, then of course we can find these things. The athletes usually have access to showers and saunas to perform hot-cold contrast types of therapy. They might also be sent away from the training site to make use of these facilities on their own with instructions on what to do. But for Waldemar to have full control of the athletes' regeneration, a training camp setting was required.

#### **What sequences do you use for hot sauna/cold shower routines?**

There are various possibilities. Waldemar will vary the routine. For example, the time in the cold shower and the hot sauna might be varied from 2 to 4 cycles, finishing with the cold. Depending on the circumstances, for heat he might use a whirlpool instead of a sauna while for contrast he might use cold water pools instead of cold showers. The treatment times too will vary to some degree because in the whirlpool the water may be kept below the diaphragm. The proportion of the body which is submerged dictates treatment time.

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Angella Issajenko receiving massage from Waldemar during training directed at resetting muscle tonus.

Photo Credit: All Sport Photographic LTD.

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**You mentioned that your athletes sometimes made use of showers between heats or rounds. Are there any other techniques that they used during a competition?**

They used showers sometimes for recovery between rounds but would not use showers as part of a warm-up. The use of massage incorporated into the warm-up, or for muscle tonus adjustment between heats, is always a possibility.

**Your athletes have used hot wax treatments on occasion. What benefits do these treatments provide?**

Well, it was my position that if Waldemar thought it was of value, then that's what we did. He is the expert and I had faith in what he did. I didn't question that there was value in it. The feedback from the athletes was that it helps to break up adhesions and scar tissue in certain areas which have been previously injured. It was effective and the results clearly supported its use.

**When do the athletes use salt baths?**

Salt baths are used whenever athletes have any residual soreness or stiffness when they arrive at home. They generally use sea salt or Epsom salts. You have to be careful not to use sodium-chloride or table salt because it will produce a stimulating rather than a relaxing effect.

**When do your developing athletes begin to experiment with massage?**

They are given as much access to massage as can be arranged. For example, when we have a training camp we bring additional therapists with us. We had 60 athletes in Florida two years ago and we had a staff of 4 massage therapists. These were therapists in training (from the Kikkawa School in Ontario), and have worked with us for the last couple of years. We have an arrangement involving Waldemar whereby he is helping out the therapists with their training while they are helping us with our athletes. It turns out to be a cost effective way of increasing the exposure of our athletes to massage. However, the massage students work only with the development group of athletes. The top athletes always receive their massages from Waldemar.

**What motivated the school of massage to be affiliated with you?**

It is important to be involved in a 'master-apprentice' relationship at some point with any training. Students of sport massage need to practice with someone who's had the correct training for sport, and up to now that has been available only in Europe. A very constructive way of enhancing the training centres is, to send medical people in to work with Waldemar for a couple of weeks. They help out at the centre and they also learn. We think this is a win-win situation — our athletes benefit from the additional service while the apprentices receive the necessary training. An apprentice must of course, show an aptitude for massage; training alone will not necessarily result in a skilled therapist.

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**If Waldemar were unable to travel to a competition for whatever reason, would you still allow your athletes to compete?**

Generally, no. The risk is too high!

**Did you have your athletes massage each other?**

No, it is pointless! It's robbing Peter to pay Paul. An athlete gets a sore back working on another athlete's legs. Sometimes the athletes massage themselves. They can work on their own Achilles tendons, for example, because that doesn't tire them. But for an effective overall massage you need an outside person to remove the fatigue. It is not commonly recognized how much energy and specific strength is required to perform an effective massage.

**How does your perception versus the athlete's perception of recovery differ following a race?**

Sometimes it will take 24 to 36 hours before stiffness sets in; you can't always be sure. Even the next day, following a heavy workout, the athletes may appear to be alright. The stiffness and soreness may not start kicking in until the second day after the heavy workout. You're always trying to diagnose what the recovery status is. If you have a very high level athlete who still has some residual stiffness or soreness then you have to wonder what you're going to accomplish by working the athlete in that state.

You should not try to take the athlete back to maximum until two to three days following a race as the athlete will not have recovered fully before then. But, more importantly, you don't want the athlete to see that they can't run as well. You don't want to get them uptight and say, "Oh, gee, I was running so great two days ago, now look at me." When you want an athlete to perform some workout element at maximum intensity, the athlete must know that he or she is ready to perform at that level. There must be no fear or self-doubt whatsoever.

**What was your first exposure to chiropractic?**

As a coach, I started doing minor adjustments from the beginning. I was familiar with techniques of 'back cracking' — back adjustments and other minor adjustments. As an athlete, certain chiropractic maneuvers would help loosen me up on one hand and re-align me on the other. I felt that periodic adjustments helped me.

**What is the benefit of chiropractic treatment?**

It can have a very strong effect because when your body is in alignment you function optimally. There are, however, functional misalignments or individual structural idiosyncrasies which you don't necessarily want to tamper with. For example, Evelyn Ashford of the USA clearly leans over to the left on a semi-permanent basis. Cheryl Thibedeau has a similar situation. It is not necessary that you have all the bends or twists or whatever taken out of the athletes' backs. Sometimes you cure it - sometimes you don't. Cheryl received a lot of treatment at one time in her career. Well, you know the old story; the operation was a success but the patient died.

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Cheryl had all this treatment, the back was all straightened out but she could barely run. She would go into back spasms on the track and drop at the end of the race. Prior to that she had been running very well. Maybe it's better to leave well enough alone under certain circumstances with certain athletes. You have to be able to recognize when chiropractic can help and when it can't. It helps, of course, to have a very skilled chiropractor with sport experience. We had such a chiropractor in Morris Zubkewych in Toronto.

**Would some of the techniques that you experienced include the classic spinal and pelvic manipulations such as those involving the SI (Sacroiliac) joint?**

Yes, but obviously I myself am not going to use the force required to perform those manipulations. If it's beyond the point that I feel I can handle safely and effectively we would go to a chiropractor. I am very sensitive to knowing my limitations.

**What did Waldemar do in the way of manipulation?**

Waldemar does a little more manipulation than Mike Dincu did but, again, only to a point. He does PNF stretching and some of the positions the athlete is put in would appear as if a manipulation is being performed.

## **Examples of Athlete Specific Recovery/Regeneration Implementation**

### **BEN JOHNSON**

1. **Massage** — typical daily menu would include massage:
  - after warm-up
  - during the actual training session (if Ben felt the need)
  - after the training sessionMassage is particularly important on power days which emphasize speed/acceleration. Before an important competition Ben would receive up to 3 comprehensive massages focusing on fine-tuning muscle tonus. Areas of emphasis would be hamstrings/quadriceps, gluteals, lower back, shoulders/trapezius, and calves.
2. **Epsom salt baths** — an average of 2 times a week.
3. **Sauna** — 1 - 2 times a week with the drinking of mineral water after each sauna.
4. **Contrast Baths** — occasionally, sometimes in conjunction with sauna.
5. **Cold Water Effusion** — occasionally when facilities available. Cold water effusion consists of shaking or vibrating jets of cold water applied to the muscle bellies and to the soles of the feet.

### **CHERYL THIBEDEAU**

1. **Massage** — an average of 1-3 times a week. Areas of emphasis - lower back, gluteals.
2. **Epsom Salt Baths** — an average of 1-3 times a week (2 cups of salt/ 20-25 minute soak). Baths taken

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particularly when persistent or inordinate stiffness is felt or when stretching is 'more difficult' than usual.

3. **Sauna** — rarely.
4. **Contrast Baths** — usually daily, hot bath contrasted with cold shower (usually 2 cycles of hot and cold). Contrast baths are used when stretching is 'difficult' (ie. to relieve persistent muscle spasm).

### ANGELLA ISSAJENKO

1. **Massage** — up to 3 times a day. Frequency is increased with increase in workout frequency, particularly during training camps, and when travelling. Areas of emphasis: lower back, gluteals, hamstrings/ quadriceps and calves.
2. **Epsom salt baths** — 2-3 times a week.
3. **Sauna** — rarely, except when travelling. The sauna is used to counter travel related stress and is used in conjunction with a cold shower or pool.
4. **Contrast baths** — occasionally.

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*Baths taken particularly when persistent or inordinate stiffness is felt or when stretching is 'more difficult' than usual.*

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*The sauna is used to counter travel related stress and is used in conjunction with a cold shower or pool.*

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### MOLLY KILLINGBECK

1. **Massage** — average 2-3 times a week, 20-30 minutes each session. Usually post-workout but occasionally during warm-up if stretching is 'tougher than usual' or twinges in muscle are felt. Also, ice massage with frozen ice cups 2-3 times a week.
2. **Epsom salt baths** — regularly, 3-6 times a week to relieve muscle spasm and helps keep muscles loose. 20 minute soak (1 cup salts) followed by a cold water soak or shower.
3. **Sauna** — sauna followed by cold shower when travelling to control muscle tightness and spasm.
4. **Contrast baths** — hot/cold whirlpool, 5 minutes cold followed by 3 minutes hot. Sometimes contrast effect is achieved by alternating electric heating pad with 'ice-cup' massage.

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*Sometimes contrast effect is achieved by alternating an electric heating pad with 'ice-cup' massage.*

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### MARK MCKOY

1. **Massage** — 3-5 massages a week, particularly on days when speed work is being performed. Includes more PNF work than other athletes because he tends to be chronically tight.
2. **Epsom salt baths** — rarely.
3. **Sauna** — maximal usage would be 2 saunas in a 3 week time period. Avoids saunas during competitive period.
4. **Contrast baths** — rarely.

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*Includes more PNF work than other athletes because he tends to be chronically tight.*

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## The Role of Regeneration In Sport

by Waldemar Matuszewski

Regeneration & Rehabilitation Specialist, York High Performance Centre

Waldemar Matuszewski completed a Master's degree in Sport with a specialization in physiotherapy at the University of Warsaw in Poland: Academy of Physical Education. He has also received diplomas in Sport Rehabilitation and Therapeutics and in Sport Massage. Waldemar practised for several years at the Warsaw Rehabilitation Hospital where he gained experience in neurology, orthopedics and cardiology. During this time he conducted research on the use of electronic neuromuscular stimulation to promote recovery from various levels of nerve damage and paralysis and has written his doctoral dissertation on this subject. He has also conducted extensive research in sport relating to recovery-regeneration rates of athletes from training.

Waldemar was a professor at the University of Warsaw specializing in sport physical therapy before becoming head of physiotherapy and regeneration at the Polish National Olympic Centre. He was instrumental in setting up a network of regeneration and sport physiotherapy clinics across Poland in which both coaches and physiotherapists were trained. Waldemar was also head of Poland's medical rehabilitation program.

Since coming to Canada in 1985 he has consulted to and/or worked with athletes and coaches of the Canadian National Weightlifting Federation and the Canadian National Alpine Ski Team and has written articles for and presented at seminars organized by the Coaching Association of Canada. During the World Championships in Rome in 1987, where he helped pave the way for Ben Johnson's 9:83 second- 100 metre world record, Waldemar also ministered to Pavoni, the Italian national champion who had suffered a serious quadriceps pull. After only two days of treatments from Waldemar, Pavoni was able to compete in the heats and make it to the 100 and 200 metre finals.

Waldemar was Charlie Francis' full time regeneration specialist from 1986-88. Waldemar is the author of the upcoming book entitled, 'Eastern European Methods of Recovery and Regeneration.'

Regeneration therapies have enjoyed widespread use in Europe since the 18th century, but in North America similar therapies are only now becoming accepted and understood. In Europe, regeneration treatments and methods are administered as a matter of course not only in sport, but also in medicine, (pre and post-surgery).

Regeneration therapies play an important role in sports performance and a great deal more effort is warranted to further understand how these therapies should be applied to achieve the best results in maintaining and developing athlete efficiency. Gold, Silver and Bronze medals can only be achieved when intense training is fully supported by proper regeneration treatment.

"Regeneration Consultants" and therapies should be an integral part of the training team and regeneration techniques should be included in the periodization plans for all high-level competitors.

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During the World Championships in Rome in 1987, where he helped pave the way for Ben Johnson's 9:83 second- 100 metre world record, Waldemar also ministered to Pavoni, the Italian national champion who had suffered a serious quadriceps pull. After only two days of treatments from Waldemar, Pavoni was able to compete in the heats and make it to the 100 and 200 metre finals.

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**"Regeneration Consultants" and therapies should be an integral part of the training team and regeneration techniques should be included in the periodization plans for all high-level competitors.**

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Athletes who want to succeed at the world level have to train hard with the result that they are constantly on the verge of physiological and psychological injury. In order to withstand the requisite high levels of intense training safely, they must be afforded unlimited access to skilled regeneration treatment.

**In your view what was the reason for the success of Charlie's sprinters?**

The key to the success of Charlie Francis' athletes is that they were not only very talented and managed by a highly skilled coach, but they also were enabled to achieve complete recovery and regeneration between training sessions.

**What was your place in this success?**

Charlie and I had been working together since 1986 and the athletes did not suffer any serious impairments or injuries during that entire period of time. They were always in superior condition before a competition. An athlete can perform maximally over such a time span only with optimal training and optimal regeneration.

While the coach is coaching the athlete, and developing all the technical and mechanical aspects, the role of the regeneration consultant is to monitor the physiological, nutritional and even psychological status of the athlete so that conditioning and training performance is maintained at the highest possible level of efficiency with the minimum risk of injury. Different methods of regeneration are applied according to the stresses of different training protocols, the different needs of each athlete, and according to the training phase.

**Define regeneration.**

Regeneration in sport involves the following:

- continuous management of muscle tension/muscle spasm
- accelerated removal of the effects of fatigue
- rapid restoration of body energy systems and energy substrates
- improved ability to renew physical activity, without wasting unnecessarily the energy of the athletes.

Athletes and coaches are interested in achieving and maintaining the following three states or conditions in their training programs:

- optimum response to training stimuli
- good rate of recovery between training sessions and after competition
- prevention of injuries.

Regeneration plays an important role in helping achieve this state of affairs by:

- the restoration of tissue that has been damaged (high intensity training stimuli result in micro-tears and tissue disruptions)
- the overcoming of the effects of fatigue
- and the restoration of body energy to its' previous full potential.

## **Q & A**

with Waldemar Matuszewski

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*Athletes who want to succeed at the world level have to train hard with the result that they are constantly on the verge of physiological and psychological injury. In order to understand the requisite high levels of intense training safely, they must be afforded unlimited access to skilled regeneration treatment.*

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## What is the European context for regeneration?

Regeneration in Europe has become a distinct field of knowledge where special research institutes and clinics exist to educate specialists in this area. In sports, regeneration treatments are applied from a very young age, when young athletes start to train. An example of this application in Canada is by coach George Van Zeyl who trains young athletes for whom, even at this age, regeneration treatments are organized. His young athletes are able to recover rapidly after heavy training because their muscular systems, joints and ligaments are never overloaded. The application of appropriate regeneration therapies is indispensable if young athletes are to be kept in good condition over the 6 - 12 year span of their careers, without injuries. By continually applying effective recovery and conditioning methods, it is possible for athletes to achieve their potential.

## What regeneration related research has been done?

I have conducted research related to regeneration and the efficiency of athletes and their recovery rates after heavy training. The research has shown that, after heavy training, regenerated muscles regain their vigor much sooner than muscle which has not been fully regenerated. Regenerated — they can do more intensive work, more often. Reaction times are quicker for regenerated athletes than those who are not regularly or fully regenerated.

## What methods are involved in regeneration?

The main methods of regeneration are as follows:

- therapeutic massage
- sauna
- hydrotherapy
- hot/and cold contrast techniques
- electrotherapy
- psychotherapy
- nutrition and proper rest

**THERAPEUTIC MASSAGE** should be an integral part of every training session because it can increase the volume of high intensity - high quality work an athlete can perform.

**LOCALIZED MASSAGE** is applied to one set of muscles only, in order to release the built up tension; for example, to relieve cramps/spasm and reset the muscle tonus to proper levels.

**UNDERWATER MASSAGE** has a relaxing effect and is useful in decreasing muscle tension. This type of massage should be used after particularly hard training and competition. The duration of a full treatment should be 20 to 30 minutes; partial treatment should be 10 to 15 minutes.

**SAUNA** is a dry hot air bath in which the air temperatures are between 60°C and 120°C. The humidity of the air is 5 - 10%.

The main physiological effect of the sauna is to increase body temperature. This is an intensive stimulus which increases the rate of metabolism and the circulation of body fluids, thus aiding the removal of metabolic wastes.

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The psychological effects include relaxation and a feeling of general well being.

Sauna affects the whole body and especially the nervous system. It is very good for joints, ligaments and tendons: it keeps them very flexible. After the sauna, it is necessary to take a cold bath or cold shower but the cooling has to start on the legs and arms and move inward toward the torso or upward to the head. It is very important to drink enough mineral water after taking a sauna to replace the minerals lost through perspiration.

**HYDROTHERAPY** is very important in athletic regeneration. Hydrotherapy involves the external application of water along the lines of energy flow or chi, and to the soles of the feet. The water functions essentially as a conductor of heat or cold in this process thus influencing the temperature of the body surface and the entire organism. The temperature range of the water used in the treatment is between 10°C - 45°C. Some of the effects of hydrotherapy are similar to those of massage when water temperature and pressure are varied.

There are several methods of hydrotherapy:

*Cold water treatment* should be applied for short periods of time — 1/2 - 3 minutes, depending on the degree of the athlete's adaptation and tolerance. *Cold water treatment* has a general effect on the autonomic nervous system, related to a general lowering of the muscle tone. The first reaction is a constriction of the vascular system followed by a reflex expansion of the vessels. During the expansion of the vessels the athletes have a feeling of warmth and the skin becomes pink in colour. It is very important that the athletes acclimatize themselves to cold temperatures gradually.

*Contrast Baths* involve the sequential use of hot and cold water. Hot and cold stimuli primarily affect receptors in the skin and lead to a stimulus/response reaction in the body. The body reacts differently to drops in temperature than it does to gains. Heat dilates blood vessels, but the physiological effects of cold stimuli are more complex: cold contracts blood vessels in the short term but a prolonged application of cold stimuli also triggers heating and should therefore be avoided. The dilation of blood vessels extends to the capillaries, arteries and veins (which is known as hyperemia) without changing muscle tonus. The temperature for contrast baths should be:

HOT	38°C - 44°C (100°F - 110°F)	about 3 minutes
COLD	12°C - 16°C (53°F - 60°F)	about 30 seconds

Contrast baths make the skin more flexible and allow the athletes to accept more easily the changes in temperature.

The contrasting temperature techniques can take many forms:

1. *Contrast showers*: warm showers after training and competition have loosening and relaxing effects. Cold showers have a tonic effect.

HOT shower	about 3 minutes
COLD shower	about 30 seconds

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2. *Washing with sponges* followed by rub-downs or self-massage with a towel; recommended water temperature is 10°C - 15°C.
3. *A partial or localized bath* confined to upper or lower extremities.
4. *Bubbling Water Treatment* for a relaxing effect. The temperature of the water during this treatment should be in the 28°C - 35°C range.
5. *Whirlpool Treatment* too has a relaxing effect after training and/or competition. It also improves circulation. The water temperature should be 38°C - 40°C. The effect can be augmented by the addition of salts or oils.
6. *Mineral Baths* are recommended for treatments following competition. The best effects are obtained with the use of sea salt or Epsom salts. Mineral baths improve circulation in the skin and increase rates of metabolism. Persistent stiffness or soreness are usual cues indicating the need for a mineral bath. The water temperature should be 36°C - 40°C and the duration is 10-20 minutes. Athletes self-prescribe such baths when they feel the need.

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*Persistent stiffness or soreness are usual cues indicating the need for a mineral bath.*

---

**USES OF HEAT.** Heat treatment for regeneration and therapeutic purposes is used in various forms. It improves the metabolic processes and increases circulation. Generally speaking it accelerates recovery. The most commonly used heat sources are:

*Dry Heat:* infrared light; ultraviolet irradiation;  
incandescent light; solar lamp  
*Moist Heat:* paraffin wax; mud baths; hot towels

*Dry = No water or other liquid involved Moist = Hot water/Hot wax used*

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*Heat treatment for regeneration and therapeutic purposes is used in various forms. It improves the metabolic processes and increases circulation. Generally speaking it accelerates recovery.*

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**ELECTROTHERAPY** is a treatment which involves direct application of electricity. The most common methods are:

- ionophoresis
- galvanization
- diathermy
- electronic muscle stimulation (EMS) and electro-acupuncture
- magnetic interferential laser

**PSYCHOTHERAPY** is very important for athletes. Two athletes whose physical, technical and tactical preparation is equal, will be differentiated by their psychological condition at the time of the competition. Inappropriate tension in the athlete should be removed before the competition by use of the proper treatment. Recognizing when such treatment is required by a particular athlete on a particular day is a very important role for the regeneration consultant. A stress management massage is never deep — particularly close to a competition. Such a stress management massage involves very different stroking pressures and sequences.

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*Inappropriate tension in the athlete should be removed before the competition by use of the proper treatment. Recognizing when such treatment is required by a particular athlete on a particular day is a very important role for the regeneration consultant. A stress management massage is never deep — particularly close to a competition. Such a stress management massage involves very different stroking pressures and sequences.*

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**NUTRITION** is a critical factor and should be coordinated with the process of regeneration. A nutrition strategy should be divided into three areas:

- during the general training and during peaking for competition
- during the competition itself.
- Post-competition—recuperative feeding

---

### **Describe the athlete/therapist relationship.**

The athletes will tell you day-to-day where they are having problems and during what movements. As the athletes gain more awareness and skill in sensing, reading and interpreting the feedback from their bodies, the communication between the regeneration specialist and the athlete becomes more efficient and as a result the treatment is more precise.

### **What is your approach to developing athlete self-responsibility?**

My approach is similar to Charlie's in this regard. I rarely write down recommended dietary supplements, or regeneration prescriptions such as contrast baths or EMS series. The athletes must learn to interpret their body's status and take responsibility for ministering to their own specific regenerative needs at any given time. There is no one formula or recipe that works for all individuals in any given circumstance.

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*As the athletes gain more awareness and skill in sensing, reading and interpreting the feedback from their bodies, the communication between the regeneration specialist and the athlete becomes more efficient and as a result the treatment is more precise.*

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Francois Gareau, Olympic Silver medalist (4x100m relay) and Anton Skerret Canadian record holder - 400 metre — taking a sauna as part of a hot/cold contrast regenerative sequence.

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*The athletes must learn to interpret their body's status and take responsibility for ministering to their own specific regenerative needs at any given time. There is no one formula or recipe that works for all individuals in any given circumstance.*

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Angella Issajenko receiving massage from Waldemar at the hotel during a training camp in Spain.



Ben receiving massage from Waldemar between heats during a competition.

*Photo Credit: All-Sport Photographic LTD.*

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## Chiropractic in Sport

with Dr. Morris Zubkewych

*Morris completed a B.Sc. in Kinesiology at Simon Fraser University in 1972 and his Doctor of Chiropractic at the Canadian Memorial Chiropractic College in Toronto in 1979.*

*He was himself exposed to the benefits of chiropractic as a high school athlete in Toronto and continued to incorporate chiropractic into his training regimen over a five-year period as a professional athlete in the Canadian Football League.*

*A large part of Morris' practice involves work with athletes. His involvement with the athletes coached by Charlie Francis spans eight years.*

## Q & A

with Dr. Zubkewych

### What is the place of chiropractic in sport?

First of all, there is not a distinct line separating the services I provide to the athletes from those by Waldemar, the regeneration specialist, or even by Charlie himself. In reality, there is a tremendous amount of overlap, but at the same time we each have a particular orientation, or speciality if you will, that reinforces or complements the others work. The areas in which I am able to contribute to Charlie's program are as follows:

- Initial skeletal, structural, postural evaluation. The purpose is to identify idiosyncracies and abnormalities which might represent potential injury sites, or performance limitations.
- Initial biomechanical functional evaluation which identifies extensor/ flexor imbalances and imbalances in functional strength.
- Identification and treatment of musculature which is in chronic or acute spasm due to joint or postural misalignment or exists as a by-product of training.
- The release of persistent or chronic spasm through interferential electro stimulation, complementary to the stretching, or massage, which the athlete is already receiving.
- Prescription of athlete self-help measures, such as specific stretching routines and strength training movements.
- Treatment of soft tissue injuries through a variety of modalities:
  - interferential electro-stimulation
  - helium-argon laser
  - infra-red laser
  - cryotherapy (ice massage)
  - proprioceptive-neural facilitation (PNF stretching)
- Joint manipulation to release or reduce spasm and to restore joint mobility.

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*Initial skeletal, structural, postural evaluation. The purpose is to identify idiosyncracies and abnormalities which might represent potential injury sites, or performance limitations.*

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### How would you characterize your working relationship with Charlie?

Our relationship has been of sufficient duration that when Charlie or Waldemar recognize a situation in which I can help they send the athlete to see me. I feel that Charlie recognized and valued, first of all, my background in sport. The fact that I characterize myself as a conservative chiropractor, I think, was also a factor in cementing our relationship.

---

### **What do you mean by “conservative”?**

By conservative I mean, that I do not over-manipulate athletes – or anyone else for that matter, as a matter of course. Over-manipulation can lead to abnormal joint play and even chronic joint-ligament laxity. Such laxity is obviously not in the best interests of athletic performance.

It is also not very useful, or at least only of temporary benefit, to treat symptoms rather than the cause of the injury or disability. I believe that this is the essential characteristic of what you would call a conservative health professional — one who does not prescribe or begin treatment without being confident that the cause or source of the injury has been clearly ascertained.

---

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*It is also not very useful, or at least only of temporary benefit, to treat symptoms rather than the cause of the injury or disability.*

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### **Describe the working relationship between yourself, Charlie and Waldemar.**

It is very complementary. Charlie is quite knowledgeable in the area of regeneration and health care. As a result, the treatment and efforts of any one of us was being reinforced by all or at least one other of the group, even to the point where some aspects are duplicated. Both Charlie and Waldemar performed basic forms of manipulation themselves while I would perform the more complex manipulations which require a level of skill which Waldemar and Charlie do not have. The skeletal muscle of the athlete was our common focus. Waldemar was constantly monitoring and adjusting the tonus of the muscle, through stretch, massage and EMS, while I worked on relieving muscle spasm through manipulation, EMS or a modification of the athlete's postural and/or training habits. Charlie, of course, monitored and was in control of the entire process.

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There was a logistical aspect as well. If Waldemar and Charlie got overloaded, I was in a position to handle some of the athlete's needs.

### **What manipulations do you perform on athletes?**

It varies with the season — during the indoor season, you are monitoring the athlete from the feet upwards and during the outdoor season, from the shoulders downwards. Training and running on an indoor track creates some specific environmental pressures. Indoor tracks are shorter than outdoor tracks, and often they are banked. Since the athletes usually run in the same direction on the track the ability of the feet to dorsiflex equally well can degrade to the point where there is a distinct difference between the left and right foot. This is a common problem which requires correction. If there is an imbalance at the level of the feet, you can assume that this will translate up the legs to create an imbalance in the articulation of the left and right pelvis to the tailbone. This situation, if left untreated, may result in a lordotic or scoliotic curvature of the back.

The common areas of manipulation are:

- cervical spine
- thoracic spine
- pelvic/sacroiliac joint/lumbar spine
- knees (particularly if the knees have been previously injured)
- feet/ankles

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- cervical spine
- thoracic spine
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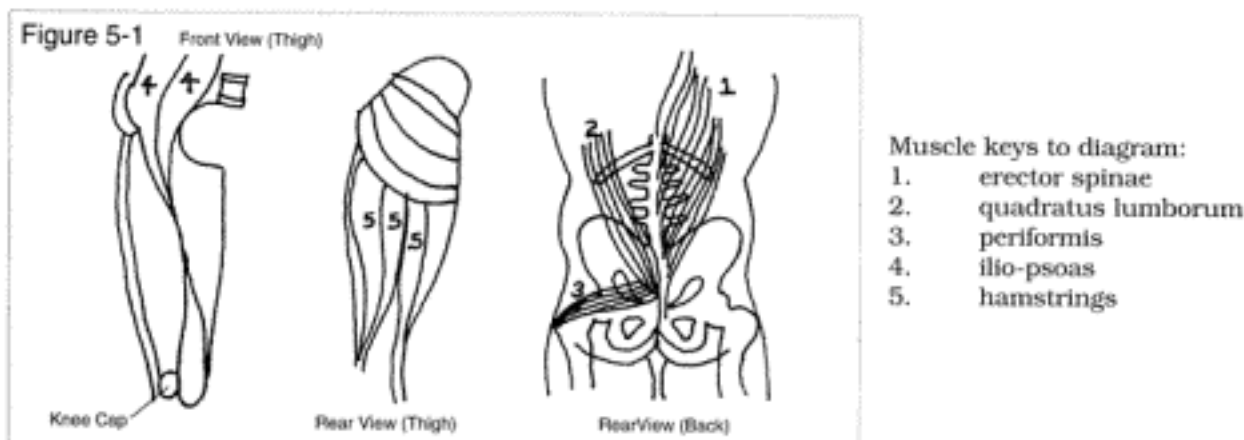
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During the outdoor season the racing distances are longer and the training tracks are straighter and of larger diameter. This gives way to a slightly different injury profile.

**Describe the skeleto-muscular situation you commonly find.**

In addition to my comments, a diagram may be useful here. This may be best answered with the help of a diagram.



1. Most athletes have erector spinae and quadriceps musculature which are too strong, to the point where the abdominals can not provide an effective counter-balance. Charlie's athletes, like all athletes, are prone to underemphasize their abdominal work either consciously or unconsciously, or due to illness or overtraining. As a result the erector spinae will tend to dominate and cause the spinal curvature to degrade into a hyperlordotic curve. To help prevent this situation and/or correct it if it currently exists the erector spinae must be stretched regularly through flexibility work and massage.
2. A common characteristic of athletes is weak or relatively weak *quadratus lumborum* musculature (which acts as a prime mover of the lower back), due to an over emphasis on exercises such as 'good mornings or dead lifts.' This translates into unbalanced core development. Side sit-ups are a common method of building and maintaining quadratus lumborum strength.
3. *Periformis* or external hip rotators are often in spasm to protect a seized sacro-iliac joint, or are in spasm due to constant, unrelieved and unmanaged training stress.
4. The *ilio-psoas* are hip flexors and can be put into spasm through any one of, or combination of, the following conditions:
  - through an effort by the body to prevent injury due to an inappropriate hyper-lordotic curve that is triggered by 'too strong' erector spinae;
  - the left psoas and/or right psoas can be in spasm in an effort to stabilize a seized sacro-iliac joint;



- poor training/flexibility habits which have not recognized the need to establish a high degree of psoas flexibility.
5. The *hamstrings*. Given their attachment on the pelvis and the fact that they act as both knee flexors and hip extensors, their attachment at the point of the hip is important in understanding their injury profile.
- Injury scenarios include:
- Left and/or right side pelvis is limited in its movement or in its postural alignment due to:
    - one or both ilio-psoas being inflexible or in spasm;
    - one or both sacro-iliac joints being immobile and/or the surrounding musculature in spasm.
  - There may be an imbalance in abdominal/lower back strength. This imbalance creates a postural mal-alignment resulting in a lordotic curve in the lumbar spine.
  - The left and/or right side periformis may be in spasm due to unmanaged stress or due to a bilaterally unbalanced strength profile.
  - There may be a hypertonicity in the quadriceps musculature — the tonus of the quadriceps is usually too high due to insufficient flexibility work.

**How frequently did Charlie's athletes use your services and what therapies were required?**

The following table briefly summarizes some of the athlete usage over the eight year period from 1988.

<b>Ben Johnson</b>	
Frequency:	1-2 times per year.
Type:	Soft-tissue injuries.
I tend to get Ben out of the acute injury phase while Charlie and Waldemar handle the ongoing process of injury prevention.	
<b>Tony Sharpe</b>	
Frequency:	2-3 times per year.
Type:	Soft-tissue injuries.
Occasional manipulation related to gluteal (ie. buttock) spasm which, in turn, occasionally triggers or exacerbates sacro-iliac immobility.	
<b>Desai Williams</b>	
Frequency:	2-3 times per year.
Type:	Usually soft-tissue injuries.
As a rule, he undergoes chiropractic treatment only when he is injured.	
<b>Mark McKoy</b>	
Frequency:	Once every two years.
Type:	No fixed pattern of usage.
<b>Angella Issajenko</b>	
Frequency:	3-4 times per month, although this usually takes the form of one or two periods when 4-5 treatments a week are required.
Type:	Sacro-iliac or lumbar spine related sciatic nerve pain. This is a chronic situation for Angella which requires ongoing monitoring and treatment.
<b>Cheryl Thibedeau</b>	
Frequency:	2-3 two-week periods per year during which 2-3 treatments a week are required.
Type:	1.) Facet syndrome (related to subluxation or slippage in the numerous facet joints of the spine). 2.) Hyper-lordotic curvature in lower back.
<b>Molly Killingbeck</b>	
Frequency:	1-2 times per year.
Type:	Bilateral imbalance of sacro-iliac articulation with tailbone. Tends to develop hyperlordotic curvature in lower back.

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**Describe the injury and treatment of Ben's hamstring pull in the winter of 1988.**

I did not see Ben until approximately a week after the injury. He was still in Europe with Charlie and Waldemar managing the injury during that initial period. When Ben arrived back in Canada we began a three-week period of rehabilitation. The degree of muscle damage was a Grade 1-2 strain.

Interferential stimulation was used during weeks 2-4. Initially it was used in the pulsing mode to provide a gentle pulsing massage effect. This reduces spasm, increases circulation and provides a mild pain-reducing anaesthetic effect.

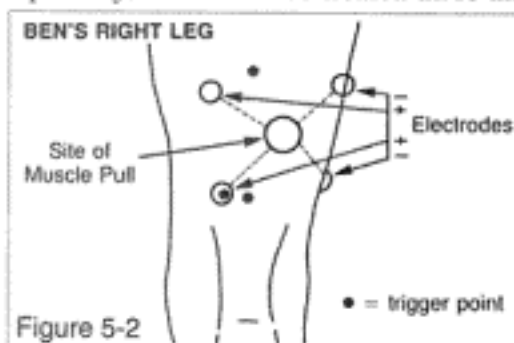
For athletes in whom non-optimal postural/structural/functional and spasmodic tendencies are identified, periodic ongoing monitoring and/or treatment may be useful. The coach must take responsibility for understanding the role of chiropractic and for deciding what the place of chiropractic is to be.

The level of stimulation was gradually increased over the three weeks to provide a strength effect and to assist in breaking down adhesions. PNF stretching was also used in addition to some trigger point work to reset muscle tonus to normal levels.

Helium-neon laser was used in tandem with an infra-red laser to promote healing and stimulate collagen production. In addition the affected sacro-iliac joint was manipulated to restore mobility and to increase the range of motion of the hamstrings.

The area of injury and interferential stimulator pad placement are illustrated below:

Optimally, Ben would be treated three times per week. While muscle



injuries heal rapidly, the trick is to avoid the formation of scar tissue adhesions. Since these adhesions are both stronger and less supple than the surrounding tissue, they make the muscle prone to new tears adjacent to the original injury site. Correct muscle tear management

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***The coach must take responsibility for understanding the role of chiropractic and for deciding what the place of chiropractic is to be.***

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***While muscle injuries heal rapidly, the trick is to avoid the formation of scar tissue adhesions. Since these adhesions are both stronger and less supple than the surrounding tissue, they make the muscle prone to new tears adjacent to the original injury site.***

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includes:

1. Ice/compression/elevation immediately to reduce swelling and prevent tissue damage.
2. Massage along line of muscle fibre to guide tissue regeneration (therapist with proven skills used or no one at all)
3. Light, to moderate stretching—slow/passive to provide additional environmental stimuli, which in turn helps guide orderly tissue growth.
4. Electro Muscle Stimulation and laser used in modes appropriate to soft tissue injuries.
5. Tiered cone drills or acceleration drills, as soon as the therapist gives clearance, to provide the coach with information indicating the athlete's recovery status. (See also Page XI)

## What is the place of chiropractic in sport?

It is most presumptuous for an athlete to assume that the left and right sides of his or her body are identical in terms of limb length, joint articulation, muscular development, and motor-habit usage.

Not only do all human beings have a dominant side (left-handedness or right-handedness), but strength training and performance habits create a dynamic continuum of relative balance and imbalance. The strength training and bounding you do one month creates a new situation from that which existed last month, and last year, and so on.

Given this reality, it would seem useful for all athletes to undergo an initial chiropractic examination in addition to functioning strength testing to establish the status quo. It may even be of further use for the coach to undergo the same experience for the benefit of his/her own well-being in addition to understanding the physical context of his/her athletes before prescribing further training.

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*It may even be of further use for the coach to undergo the same experience for the benefit of his/her own well-being in addition to understanding the physical context of his/her athletes before prescribing further training.*

---

Waldemar Matuszewski (Regeneration specialist) performing a massage sequence which progresses from the tips of the toes to the top of the head:

SEQUENCE:

1. Toes & feet
2. Achilles tendon/ankle
3. Low leg/calfs
4. Knees
5. Upper leg/thighs
6. Hips/buttocks
7. Abdomen/Lower core
8. Chest
9. Arms & Shoulders
10. Neck & Head





Photo Credit: All-Sport Photographic LTD.

## CHAPTER 6

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# Planning / Periodization

*"It is clear that to succeed in international competition, the training of an athlete must be managed to provide maximal stimulus via increasingly heavy training loads without injury."*

*"If an athlete is continually improving beyond their existing level of performance, they will have a new and unknown fatigue response to that new performance level. As a result the coach must constantly re-evaluate how much recovery/regeneration is required."*

**Charlie Francis**



## Double and Triple Periodization

Introduction by Dr. Tudor Bompa

For international class sprinters, who already have a strong aerobic base, the general preparation phase is short. This allows time for two or three peaking phases in the annual plan, (i.e. double or triple periodization). Young sprinters, by comparison, (0-4 years training age) require a longer general preparation phase, (in the order of 8-12 weeks), in order to develop a high aerobic power capability. Coincident training for the young sprinter involves central nervous system related work, such as medicine ball routines directed at the core, for example to promote the conversion of transitional fibre into white fibre rather than red in both core and limb musculature (i.e. increased power capability).

### **Volume versus Intensity**

When training is confined to speed work only, the appropriate volume of work to prescribe is about 2,200 metres/week. But when speed endurance work is added the volumes would range up to 3,300 metres/week., as illustrated in figure 6-1.

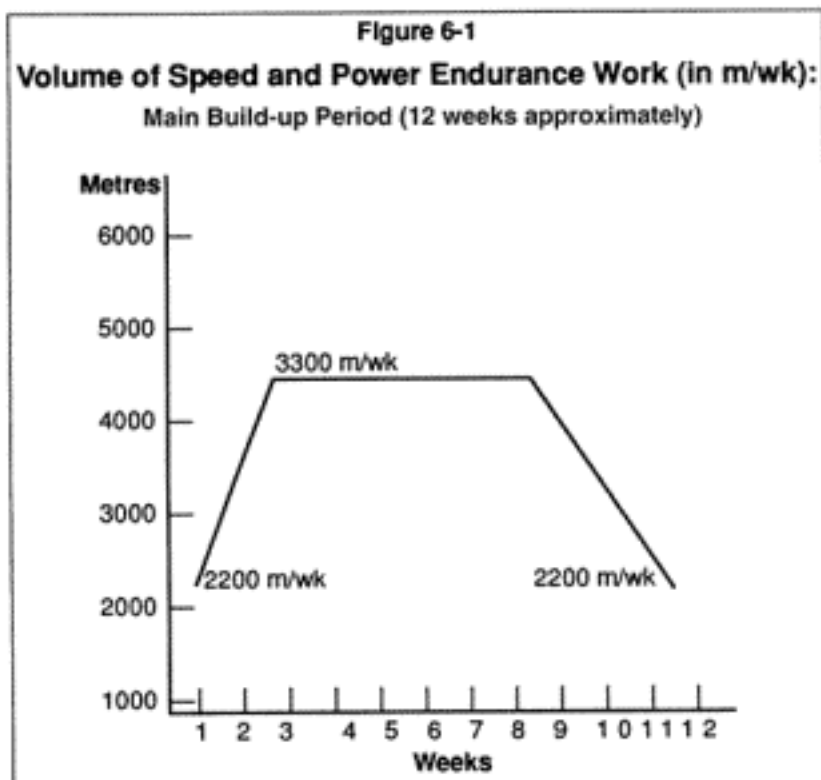


Figure 6-2A depicts the traditional approach to the volume of tempo training versus, the volume of speed training. Figure 6-2A depicts a traditional elevation in volume of speed training during a competition period (late June to mid August). Adherence to such a principle would surely result in sub-optimal performance and even burnout or injury.

Figure 6-2B shows less (although significant) variation in the volume of both tempo and speed training. This is the type of planning which is used by Charlie Francis.

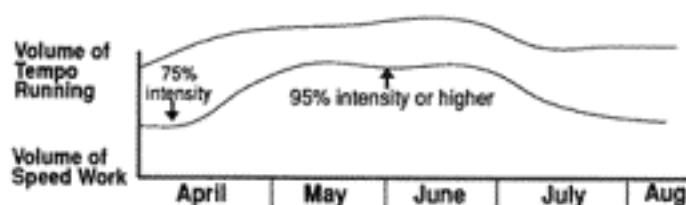
The volume of speed training prescribed by Charlie Francis is tailored to the needs of the particular athlete, (the stage of development, training age, regenerative/ recovery status, injury status), in accordance with the principal that within most micro-cycles there is at least some element of speed training performed with maximum intensity.

**Figure 6-2**  
**A. Traditional Approach**

Dates	April				May				June				July				Aug			
	1	8	15	22	29	6	13	20	27	3	10	17	24	1	8	15	22	29	5	12
Location of Competition					Martique		Provo						Nat. Champ. Winnipeg		Montreal	Sacramento				Los Angeles



**B. Charlie Francis' Approach**



A comparison between the traditional and Charlie Francis' approach re: the volume of tempo and volume of speed work per year.

The yearly segment represented above depicts the 4 months pre- Los Angeles Olympics

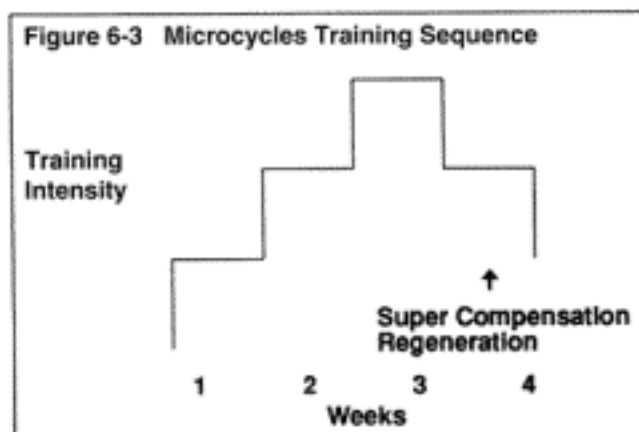


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## Triple Periodization

Until 1982 Charlie used double periodization planning, with the summer peaking period being very long, late May to August. In 1985 however, the first year of the International Amateur Athletics Federation (IAAF) Grand Prix circuit, he began to shift to triple periodization. Initially, in 1985, Ben Johnson and the other sprinters competed in almost every meet. But competing in all meets on the circuit became very taxing, and the athletes were unable to regenerate completely. This fact, combined with the very positive experiences with triple periodization gained with Angella Issajenko in the early 1980's resulted in Charlie concluding that the transitional summer peak had to be divided into early and late peaks. The bi-cycle therefore evolved into the tri-cycle. Charlie became very expert in handling triple-peak periodization.

The last peak (in August) is usually the main peak in the annual plan and requires optimum super-compensation. Charlie is one of the few coaches who can optimally apply this concept. First of all, he uses a three micro-cycle (week) series of step-like, progressive loading followed by a fourth micro-cycle devoted to ensuring complete regeneration/recovery.



Within each micro-cycle he strictly observes the regenerative requirements of the super-compensation process, particularly following high intensity workouts. Light training is done between heavy days, but the next heavy training day is never implemented until the level of both super-compensation and regeneration, as judged by Charlie and his regeneration specialist, is appropriate. In the third micro-cycle there would normally be only two days of maximal loading. Very often, following such heavy days, Ben might require only 48 hours to achieve a super-compensation effect. More recently, Charlie has perfected a peaking process preceeding a major competition which requires only 10 days.

---

## Preparation Phase

Charlie's current approach to periodization is the result of a natural evolution where the length of the general preparation phase is progressively reduced as the athlete develops and matures, in favour of longer periods of specific training. After establishing a solid base of technical and physical abilities early in the athlete's career, there is less and less need to return to a long period of general preparation at the beginning of each year. For world-class sprinters, a general preparation phase which is too long provides only marginal improvement and may even retard overall performance progress because of the non-specificity of general preparation-type training.

### Tempo Running

Tempo training is typified by intensities of 75-80 per cent. It is done in varying configurations of distances, usually 100-, 200-, and 300-metre runs that total 2,000-2,400 metres per workout.

For sprinters this type of work is performed year-round and should not be confined to a specific aerobic/endurance phase, which is so necessary for other running events or other sports. For sprinters, tempo running acts as preparation for, and as part of the warm-up prior to specific speed or speed-endurance training. The volume of such work when it is included, depends on the competition level and training age of the sprinter being coached. Beginning sprinters of 0-5 years training age would spend more time in tempo work than would world-class sprinters of 8-12 years training age.

The general purposes of tempo training are to maintain aerobic shape, running rhythm as one of the nervous system abilities, calf strength, and to maintain leanness and low percentage body fat. Muscle cross-section or body-building work is done in the form of free body strength (i.e. push-ups, sit-ups), during rest periods between tempo run repeats. Tempo training is the antithesis of maximum intensity speed work, so it plays a key role in providing variety of training stimulus.

## Conversion Phase — Strength to Power

Sprint training demands a relatively high volume of nervous system training (e.g. 'stretch-shortening cycle' type of work, which includes plyometrics). As such, the repeated performance of the sprinting skill at maximum velocity over 10 to 120 metre distances is more than enough to convert gains in maximum strength into explosive power. To try to supplement this process with a traditional conversion phase is redundant. Given this fact, and the need to maximize the use of available training time for the primary purpose of developing power, the maximum strength phases used to be prolonged by 2-3 weeks. From 1986 on, however, elements of maximum strength, particularly in the key lifts of 1/2 squats, bench press, behind the neck pulldowns and power cleans, are carried out year round.

---

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## Speed Endurance

Without specifically training for it, maximum speed can be maintained for approximately six seconds (or 50-60 metres). To maintain maximum speed over 100 metres, it is necessary to train for it through speed-endurance training, which is typified by distances of 60-120 metres. Therefore, sprints beyond six seconds can be classified as speed endurance training. Speed endurance workouts are prescribed very carefully (i.e. 1 workout per week), as the resulting CNS (Central Nervous System) fatigue is significant and recovery may require 2 to 4 days.

### Three Main Requirements of the 100 Metres: Acceleration/Speed/Speed Endurance

It becomes evident that three main phases can be identified for which specific types of training are required. These include:

- start/acceleration — 0-30 metres
- speed or maximum velocity — 30-60 metres
- speed endurance — 60-120 metres.

### Charlie Francis on: Planning/Periodization Theory

Traditional periodization methods called for an emphasis during the general preparation phase on low intensity aerobic work such as cross-country runs and 60-minute runs to build up an endurance base. According to this theory of training the athlete would then progress to a short period of high intensity speed development work during the pre-season and early competitive season. This was the accepted method of training sprinters until the late 1950's. During the transition to speed work however, a pattern of hamstring injuries would emerge. The hamstrings were improperly prepared for the new high intensity demands.

The high incidence of hamstring injuries incurred during traditionally prescribed speed work is further evidence that the hamstrings were improperly prepared as knee flexors rather than for their key role as hip extensors.

Over time it became clear that with the traditional planning approach to sprint training the athlete could maintain peak form for only a very short time. The training volume had to be dropped so the athlete could tolerate the sudden move to high intensity speed work (i.e. central nervous system (CNS) related work).

Another drawback with the traditional approach to sprint training was that during the general preparation/aerobic phase of training the athlete was in fact detraining the speed capabilities that had already been developed the previous year.

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*The high incidence of hamstring injuries incurred during traditionally prescribed speed work is further evidence that the hamstrings were improperly prepared as knee flexors rather than for their key role as hip extensors.*

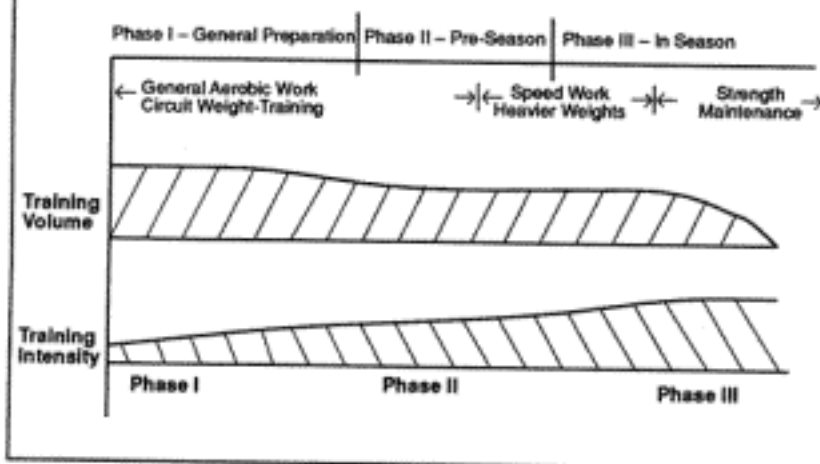
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*Another drawback with the traditional approach to sprint training was that during the general preparation/aerobic phase of training the athlete was in fact detraining the speed capabilities that had already been developed the previous year.*

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**Figure 6-4**  
**Traditional Planning Model**



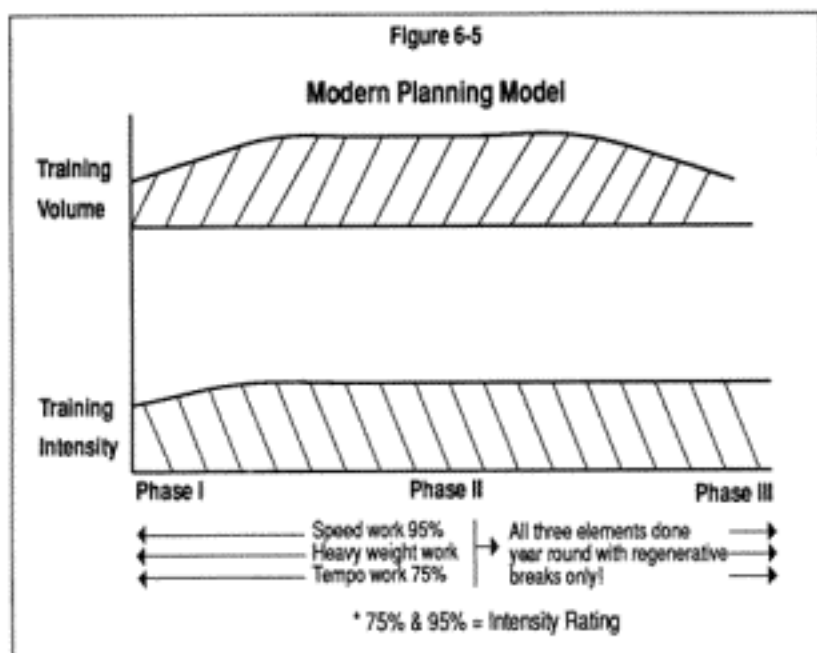
*Today, sprint training methods are totally different from the traditional methods in that they stress the importance of high intensity CNS-related work, and the development of explosive power throughout the entire training year.*

Today, sprint training methods are totally different from the traditional methods in that they stress the importance of high intensity CNS-related work, and the development of explosive power throughout the entire training year. This periodization model (i.e., all elements are trained year-round, only the volume changes), recognizes that the most successful adaptation to any one quality takes place by constant attention to it over a period of years; long-term adaptations permit the handling of greater training loads and ultimately higher levels of performance than would be possible with other methods.

**Table 6-1: Modern Planning**

**Each period includes all 3 types of training.**  
**Note that all training elements are performed throughout the year - only the volumes for each element are changed.**

Early Period	Middle Period	Late Period
Tempo work (low intensity interval runs)	Same	Same
General fitness work (core strength endurance)	Same	Reduced volume
High intensity work (interval runs 30-50 metres)	Same + speed endurance (80-120 metres)	Reduced volume
Short speed and acceleration work	Same	Same
Strength & power work Isotonic exercises	Same	Reduced volume
EMS (electronic muscle stimulation)	Same	Same
Peaking Period Short (1-3 Days)	Peaking Period Short (3 days)	Peaking Period Long (10 days)



By comparing Figure 6-4 with Figure 6-5 it can be seen that a higher intensity and a higher volume can be handled during the in-season phase because of consistent and gradual adaptation throughout the three phases. The result is that an athlete prepared by modern planning methods will always be able to handle high intensity work at any point in the training year without injury. By comparison the traditionally trained athlete would have spent a significant part of the middle and late periods regaining the speed capabilities which would have degraded if he had concentrated in the early period only on building up an endurance base with moderate to low intensity aerobic work.

The structuring of a training program requires a clear understanding of the sport and of how the appropriate strength and power characteristics specific to that sport can be most fully developed. It may be useful to illustrate the relationship between level of development and the various types of speed involved in the 100-metre sprint. (see Figure 6-6).

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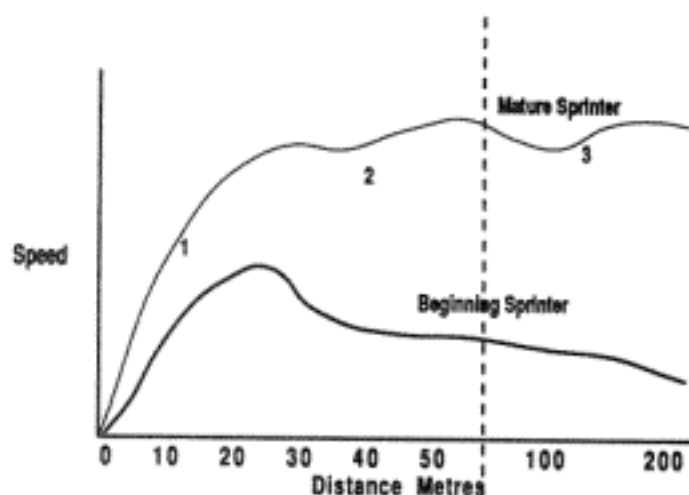
***The result is that an athlete prepared by modern planning methods will always be able to handle high intensity work at any point in the training year without injury.***

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Figure 6-6

### The Problem of Training:

is to understand the demands of the event and recognize the level of development of the athlete



Dominant Demand : Strength Power    Power – Top Speed    Speed Endurance    Special Endurance

#### Beginning Sprinter

- has weak acceleration
- acceleration phase is of short duration
- marked deterioration in speed
- lose up to 25% of speed over 100m

#### Mature Sprinter

- acceleration is faster
- acceleration phase is of longer duration
- 3 acceleration phases 1, 2, 3 as above
- in some cases (not all), an elite sprinter is capable of accelerating late in the race

#### 4 Ways to improve sprint performance

1. Perfect start for that athlete
2. Increase acceleration
3. Increase speed
4. Increase speed endurance

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**How much training theory did you know when you were actually competing and training as an athlete?**

At that time I didn't know what I didn't have. I didn't know about seasonal cycling and planning. I didn't necessarily understand why I was running at a particular level. I was basically racing myself into shape through a series of competitions in the American college system. I was not aware of the European competitions. I'd never heard of them, let alone developed training plans to include them. I had been competitive at the world level, but I didn't know how to structure a training program in order to peak on a given day. I certainly didn't understand how to effectively manipulate all of the factors involved.

**Describe how you now structure or periodize the different training elements.**

I think the one important thing to remember is that every individual component in a training program is separate and has its own cycle. Everything is interdependent, of course, and all things combine into a whole. But your recovery from, and your adjustment and adaptation to every single component is specific. That's why I stack the individual components as I do, in layers, so that I can see how they relate to each other. For each athlete each component is introduced separately: there is never a simultaneous introduction of different components; they're always staggered. There is constant overlapping; as one component is being increased the next is being reduced. You effect the transition gradually in order to avoid the soreness you would have following an abrupt change from low-intensity work to high-intensity work. You are constantly in the process of manipulating training components. You are constantly challenging the organism.

**You integrate the training components rather than compartmentalize them?**

No, I do both. I integrate components and then see how they fall into place along the chart. Each one has its own independent volume and intensity. (see Figure 6-7).

You have to total the work volumes of each training element. I've looked at other peoples' programs; they had this workout and they had that workout, and I said, "Wait a minute, you total it up and over here you've got 4,000 metres of speed work and over here you've got 8,000. Now why such a variation?" And the coach says, "Well, I didn't really think about it." You have to look at the total volume of everything in the workout sessions, and observe how they interact. This includes what is incorporated into a warm-up. You take everything into consideration in order to determine the training impact.

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## Q & A

With Charlie Francis

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*I had been competitive at the world level, but I didn't know how to structure a training program in order to peak on a given day.*

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*I think the one important thing to remember is that every individual component in a training program is separate and has its own cycle. Everything is interdependent, of course, and all things combine into a whole. But your recovery from, and your adjustment and adaptation to every single component is specific.*

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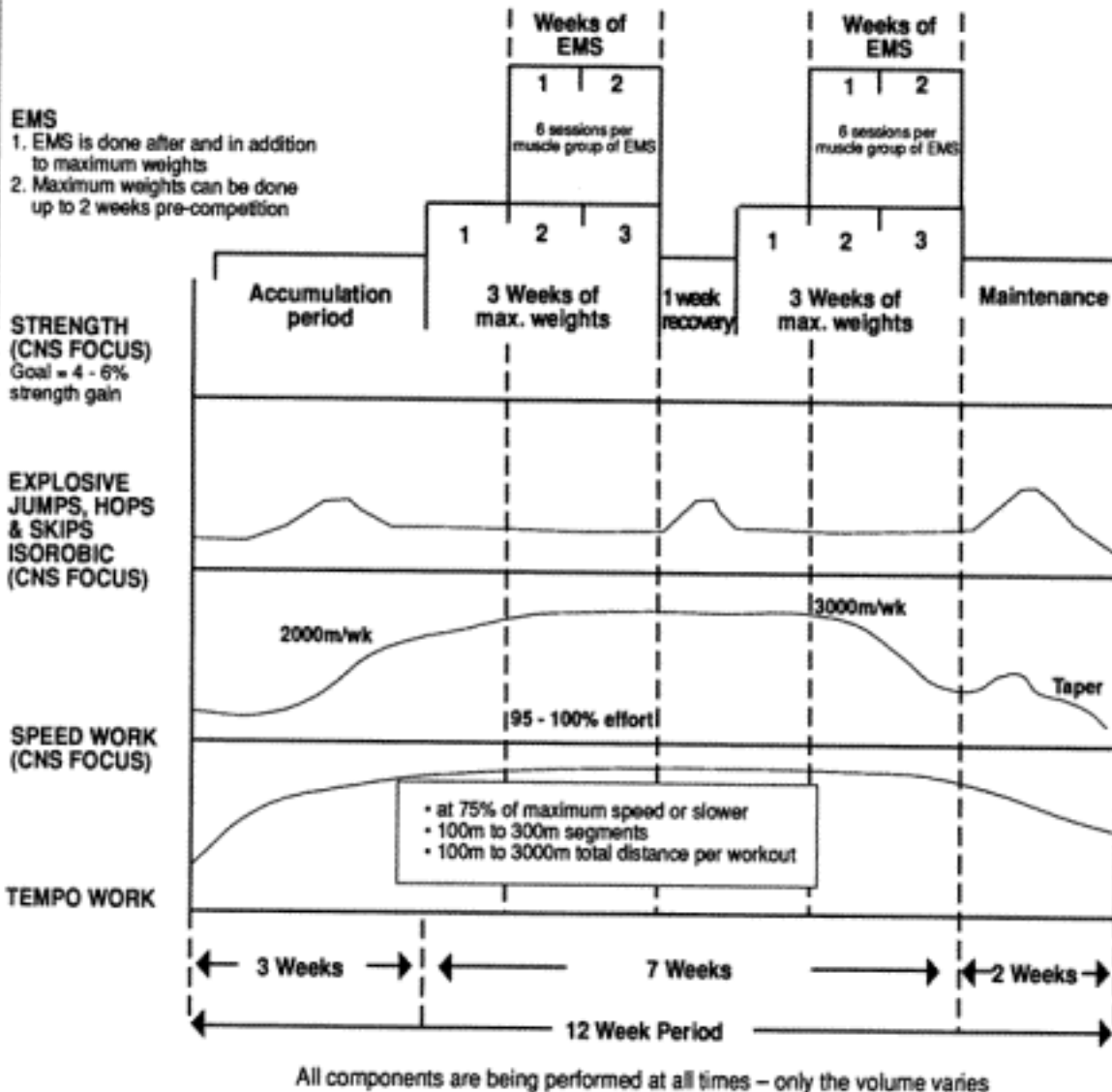
*There is constant overlapping; as one component is being increased the next is being reduced. You effect the transition gradually in order to avoid the soreness you would have following an abrupt change from low-intensity work to high-intensity work. You are constantly in the process of manipulating training components. You are constantly challenging the organism.*

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**Figure 6-7**  
**Periodization of Training Components**

Example of Period 1 - Early Period  
 - Heavy Emphasis 0-30 metres  
 - Moderate Emphasis 30-60 metres





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**How would you characterize the energy system requirements for a 100-metre sprint?**

In the 100-metre event there is a certain, finite energy package available for performing at a high level. An athlete will run within a few hundredths of his or her best time a number of times: sometimes it's a better start (explosive strength), sometimes better acceleration (speed), sometimes a better finish (speed - endurance). What I try to do is increase the total amount of energy available for all four key performance factors (start/acceleration/maximum velocity/speed endurance) (see Figure 6-6).

**How do you manage CNS (Central Nervous System) related or power training?**

First I have to select the appropriate training tasks which will impact on the CNS, (such as 0-30 metre work or maximum weights). Having done that I then have to prescribe the CNS-related tasks in the correct amount, in the correct order (according to the priorities established for a given training session and the appropriate methods and time intervals for recovery). You have to judge to what degree the athletes are going to be able to implement what you ask them to do, based on similar work they have done in the past few days, and on their regenerative status. For high-level sprinters, after a short series of spectacular workouts, the recovery cycle might be 7-10 days, during which time they wouldn't go above 95 per cent intensity. A consistent volume of tempo training and massage is maintained during this 7-10 day period.

**What are some components that you think are necessary for the development of a world class sprinter?**

I think you often have to think about what doesn't have to be there, rather than what does. Gerard Mach has been in Canada since 1973 preaching the recovery aspect of the sprint gospel, and I wonder why more people aren't listening. Time and again I see coaches still doing all kinds of exotic things with sprinters, and killing them off before major meets.

**Give me an example.**

I have seen a coach running his athlete 10 times up a 50-metre hill the day before an Ontario championship. It was no surprise to see the athlete later pull his hamstring in the meet. I've seen other examples, such as a girl from the national team, under the direct supervision of her coach, doing 10 X 150 metres the day before a meet. The result; the athlete ends up injured.

The difficulty is that coaches often look to foreigners for training information and become collectors of a hodge podge of information which they then try to lump into an overall program. There's no continuity, no understanding, no common sense to such programs. There is also the situation where some people are motivated to deliberately spread misinformation.

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*What I try to do is increase the total amount of energy available for all four key performance factors (start/acceleration/maximum velocity/speed endurance).*

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*The difficulty is that coaches often look to foreigners for training information and become collectors of a hodge podge of information which they then try to lump into an overall program. There's no continuity, no understanding, no common sense to such programs.*

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## PERIODIZATION

### Can you comment on your use of double and triple periodization?

My experience with both goes back to Gerard Mach and his experience with Polish sprinters in the 1960's. Double, and even triple, periodization were being used effectively at that time when Gerard introduced a phase which included indoor competitions at shorter distances (i.e. 50-60 metres). This phase became a key part of the preparation for the 100 metre outdoor races.

The East Germans have used triple periodization for some time — they have an early peak in the indoor season, build up to a middle peak in early summer, and then have an absolute peak in late summer to coincide with major championships — and that's basically what I've been doing since 1982. For mature athletes, (at least 5-8 years training age), you don't need an excessive general preparation phase consisting of long months of "slogging" — of laying down a high volume base. This approach will take you too far away from the specific requirements of your event. In fact, with such an approach you are losing and detraining qualities which you had enhanced the previous year, only to have to re-learn them again.

So the question for me is, why would someone — by running through the woods or orienteering, or whatever it is coaches do during a classic general preparation phase — give away many of the qualities he or she has developed during a given year, only to have to start from scratch again the next year? We have to realize the quality of athlete we are dealing with — we are dealing with Ferraris, not Jeeps. So the value to world calibre athletes of slogging up sand hills or monkeying around in the forest at the beginning of every year is pretty limited as far as I'm concerned.

**So, in simple terms, with mature athletes you have modified the traditional model of high volume/low intensity work early in the season and moved to a system where high intensity work is performed year-round, but with only the volume being varied?**

Yes, but we are very careful in monitoring the volume of such work. In many cases the volume will either remain constant, or even drop, with increasing training age; but the intensity of the work will continue to rise. This is contrary to a system of increasing the volume each year. We're trying to improve the quality and intensity of performances to new levels every year.

So once you have a talented athlete and you've arrived at a training program that works for that athlete, you simply go back and repeat the process. However, the intensity of work will continue to go up. Once the quality of performance (training and competition) is clearly increasing, you have to adjust carefully to how the athlete is reacting to this new level. It doesn't matter who the athlete is, if the athlete is continually improving beyond his/her existing level, he/she will have a new and unknown response to that new performance level. As a result the coach must constantly re-evaluate how much rest/recovery is needed. You have to be a keen observer of your athlete's condition if the gains in performance are to be consolidated and advanced to higher and higher levels without injury.

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***You don't plough a field with a Ferrari !***

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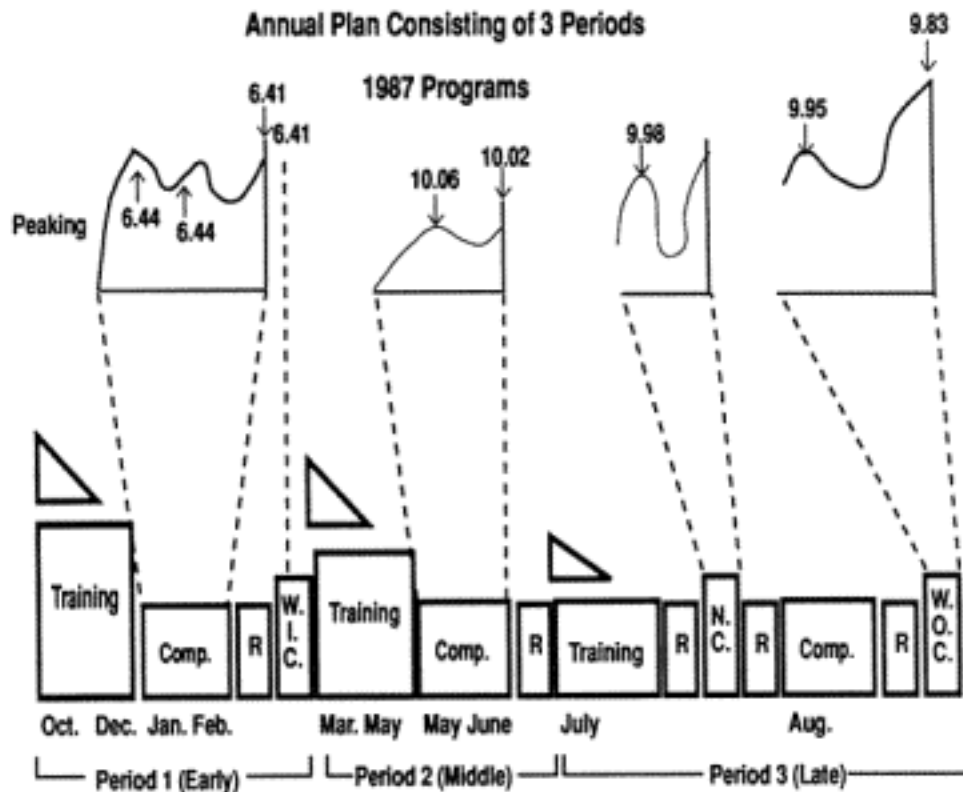
***It doesn't matter who the athlete is, if the athlete is continually improving beyond his/her existing level, he/she will have a new and unknown response to that new performance level.***

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Figure 6-8

Annual Plan Consisting of 3 Periods

1987 Programs



Metres	Speed Emphasis		Speed Emphasis		Speed Emphasis	
	0-60m		30-120m		60-200m	
Bench	30	3.85	3.83	3.80		
Mark	60	6.41 - 6.44	6.38	6.38		
Times	100		9.98	9.95		
(sec.)	120		11.80	11.78		
	150			14.68		
	200			20.10		

PROJECTED  
TRAINING TIME  
TO 100M TIME

3.85 (30M)  
= projected 9.95 100m

6.38 (60M)  
= projected 9.80 - 9.85 100m

6.38 (60M)  
= projected 9.80 - 9.85 100m

Training  
Goal

= Adequate  
Acceleration  
now in place

= Adequate  
Top Speed  
now in place

= Adequate Speed  
Endurance  
now in place

Keys: W.I.C. = World Indoor Championships  
N.C. = National Championships  
W.O.C. = World Outdoor Championships  
R. = Recovery Phase

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**The point here then is that you consolidate your gains and continue to build your base over the life of the athlete, rather than allowing significant periods of detraining to occur?**

We try not to re-invent the wheel every year during a full-blown general preparation phase, for instance. My athletes never go that far away from any given training element and, therefore, they never have to re-establish it. As an example, they never go that far away from heavy weights; they keep lifting right through to the end of one season and the beginning of the next, so they never let their strength deteriorate. Strength is the easiest quality to build, but it is also the easiest one to lose. Consequently, we keep applying a variety of power and power-strength stimuli right through the season.

**Can you comment further on the recovery periods in a triple periodization model?**

Obviously, one peak involves the indoor season. This is followed by an early summer build-up period to a summer competition period and this, in turn, is followed by a late summer competition period. Between competition periods we have "freshening up" periods consisting of 10-14 days to fully recover from competition. We have taken as much as five days off without any training at all, even seven days off without any real sacrifice in performance. When Ben was in Cologne in 1985, and was tired and ill, and had run poorly, he came back to Canada and did not train at all for five days, and then carefully began to come back until he won the world cup in Australia and set a Commonwealth record in the process.

**Would he continue his recovery/regeneration work during this phase?**

Yes. He would continue with massage and other regenerative methods such as epsom salt and contrast baths, and EMS would be used only in the pulsing mode. It appears that you really don't lose that much of a competitive edge in such a recovery phase.

**Are not your three peaks focused on different events? Your indoor peak is directed at racing over 50-60 metres, while the summer peak is directed at 100 metres, for instance.**

Yes, in the earliest winter phase you have to pay more attention to explosive power because of the shorter distances. But in the special preparation for the second and third peaks when you are performing at 100 and 200 metres, there is more emphasis on speed and speed-endurance. The balance of training elements in preparation for the different peaks will vary, but not dramatically.

**How would you characterize the strength work directed at core or torso done in the rest periods between tempo-running repeats?**

That work really covers a cross-section of methods that range from body-building to strength-endurance. It can involve the "burn-out" method, such as doing push-ups "until you drop," waiting 90 seconds, doing it again, waiting 90 seconds, and so on. Sometimes we do that; it really "goes through" the muscle. It's a form of special endurance and it is quite effective in keeping the athlete lean, so that strength relative to body weight is always high.

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*We try not to re-invent the wheel every year during a full-blown general preparation phase, for instance. My athletes never go that far away from any given training element and, therefore, they never have to re-establish it*

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*We have taken as much as five days off without any training at all, even seven days off without any real sacrifice in performance.*

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*The balance of training elements in preparation for the different peaks will vary, but not dramatically.*

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Athletes who do a lot of body-building become bulky-looking. Look at Ben. He wasn't bulky at all compared to what you might expect given the weights he was lifting (i.e., 4 x 365 lb. bench press at a body weight of 175 lbs). He didn't gain more than two or three pounds during a strength-accumulation phase. Ben never got far away from his competition shape; he was fast most anytime. He was fast in December — in mid December he ran a race and was 1/100th of a second off the world record his first time out on the track; he's fast in March, three and a half months later, he was breaking world records (1988).

**Ben's peaking status which you have just described, seems to fly in the face of traditional theories which dictate fewer peaking possibilities in a training year.**

Maybe that is the case for sports which emphasize absolute maximum strength. There's more to sprinting than the level of absolute strength. I bring the athlete up to a peak, then back off and freshen him up, and bring him up to another peak. So really, there are many peaks within a training period. It's not as if we are maintaining a plateau for weeks and months, and doing the same thing day after day. Also, some competitions are used as part of the training, particularly in periods leading up to an absolute peak.

The competitions could be spaced out more, but the athlete would be more tired in the long run. In a competition period the athlete competes every fifth day or so, which makes the competitions part of the training. The athlete is freshened up between each competition.

**You're describing an amazing need for the coach to control the interplay of the myriad of training factors — core, limb, maximum strength work, EMS, aerobic, power, speed-endurance, etc. Can you comment?**

Under the old periodization concept you would really slog through an aerobic/body-building phase early in the season, getting slower and slower, killing yourself with overtraining, then somehow regenerate and somehow get the result. If the result didn't come you would try to modify it a little bit and make an adjustment.

With my approach, there are micro- and macro-cycles in each phase, but you're looking at the status of all of the training factors all the time. You can never let the athlete get beaten down at any point in the training year. You always know where you stand because you are timing speed work so often.

**You don't identify a general preparation phase of two to three months, which would focus on body building methods. Why not?**

It is not necessary. A body-building phase for mature athletes might last two to three weeks. For developing athletes, this phase would be much longer.

**Do you use EMS to promote white fibre specific maximum strength gains in every phase throughout the year?**

Yes, but also you have the running itself. You never go far away from

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*A body-building phase for mature athletes might last two to three weeks. For developing athletes, this phase would be much longer.*

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very high quality running. The distances vary, but ultimately running is the most specific power training of all.

In effect you are constantly converting the gains made in individual training elements to the sprint itself because you are always performing some sprinting elements at very high intensities.

**You are saying that even during a build-up or early preparation phase the athlete is performing at least some training elements at high intensity.**

Yes, we have a progression of development based on quality of training - a build-up phase which in general reinforces strength and power development. At the same time, we will be performing high quality starts and 30-metre work. We then retain these abilities, but extend the training distances to 50-60 metres, and later in the phase we move finally to speed-endurance which involves high quality work over 100-120 metre distances.

To build up absolute speed we use 30 and 60 metre distances. Unlike middle-distance athletes who move downwards from slower and longer intervals to shorter and faster intervals, sprinters move up to longer, equally fast distances as the season progresses.

**What is the key element which you are most concerned about periodizing correctly?**

The key element is the training intensity — the difference between 95 and 100 per cent effort. Even in a phase of heavy loading, involving shorter work up to 30 metres, which doesn't require the athlete to particularly open up, or be particularly fast, you still have explosive power. Obviously you'll be very effective in those areas during that period, but not so effective in other areas. Maximum speed, for example, would not be emphasized; it would be a mistake.

Don't forget that our maximum strength phases are NOT so intense as you might think in the classic fashion - the difference is a little more subtle than switching all at once to maximum strength.

**What is your functional definition of tempo work?**

Tempo, or rhythmic running, is done at 65-75 per cent of maximum speed. For example, a 22-second 200-metre runner would never run faster than 30 seconds for 200 metres during tempo work. A total volume of 2,000-3,000 metres per training session can be done. Between sections of 200-300 metres, (i.e. 2-3 x 100 metres or 1x2-300 metres) core strength elements can be emphasized — abdominals/lower back, upper chest/upper back — via push-ups, sit-ups, medicine ball work. Some coaches spend too much time on tempo work! The priority requirement for sprinting is power — hence most training time should be spent on the development of power. Arm/core/leg/ total body routines should be applied across the techniques of actual sprinting, hopping, skipping, bounding, and medicine ball work.

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*In effect you are constantly converting the gains made in individual training elements to the sprint itself because you are always performing some sprinting elements at very high intensities.*

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*Unlike middle-distance athletes who move downwards from slower and longer intervals to shorter and faster intervals, sprinters move up to longer, equally fast distances as the season progresses.*

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*What is the key element which you are most concerned about periodizing correctly?*

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*The key element is the training intensity — the difference between 95 and 100 per cent effort.*

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*Some coaches push their athletes to improve their performance in tempo workouts — this is not advisable as this will adversely affect the energy reserves available for more important technical work.*

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### **What is the purpose of tempo running?**

Tempo runs are extensive runs at 65 - 75% intensity used to facilitate recovery and improve cardio-vascular fitness. Increased capillarization of muscle also occurs.

### **What is your definition of speed endurance?**

Speed-endurance is characterized by distances requiring more than six seconds of continuous effort. You train speed-endurance over distances of 80-400 metres, and sometimes up to 500 metres.

### **How about absolute speed?**

We use distances of 30 to 60 metres run at 95-100% intensity to develop this quality. This work requires complete rest between runs and must only be done when the athlete is completely fresh.

### **What is meant by speed reserve?**

The concept of speed reserve for a 200 metre sprint is different from that for a 400-metre race. A 400-metre runner would do some of the same acceleration/ pure speed work as a sprinter and then try to maintain as much of that maximal speed capacity as possible. The difference between that maximal speed capacity and the actual pace of a 400-metre race are different — the difference between the two paces is considered to be the speed reserve.

In fact, the key to the longer sprints (200-400 metres) is the speed reserve, especially in races such as the women's 400 metres. There are few women who are good in the 400 metres at the world level and not also good in the 100-metre sprint. Marita Koch of the former German Democratic Republic (GDR) may be the best example of excellence in this regard.

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*Each super compensation cycle is different — there is not just one such cycle. Super-compensation is going on within the micro-cycle. There's super compensation from high intensity work, and from low intensity work. You are continually prescribing a variety of stimuli across the different training elements at different times and looking for super-compensation to occur within each one.*

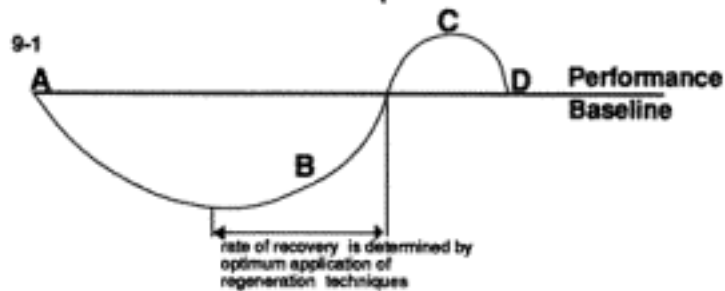
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### **How would you describe a super-compensation cycle?**

Each super compensation cycle is different — there is not just one such cycle. Super-compensation is going on within the micro-cycle. There's super compensation from high intensity work, and from low intensity work. You are continually prescribing a variety of stimuli across the different training elements at different times and looking for super-compensation to occur within each one.

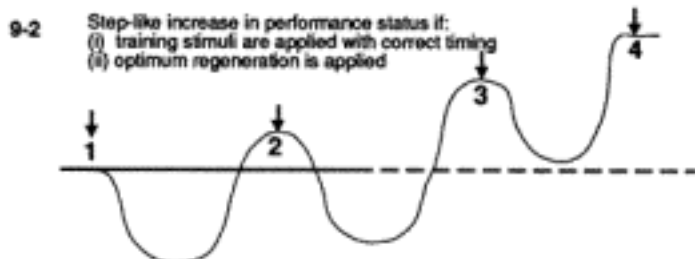


Figure 6-9  
Stimulus — Response Curves

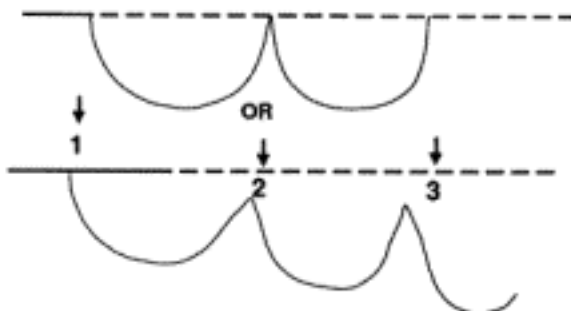


- A = application of training stimulus  
B = adaption of neuro-muscular system to training stimulus  
C = level of super compensation response (continuation of B)  
D = body eventually returns to baseline level if there is no additional training stimulus provided

Note: optimum timing for application of next training stimulus is at 'C'



- 9-3
- Too much work in 1 training session  
Next training stimuli comes too soon  
= overtraining or burnout  
= NO supercompensation



- 9-4
- Next training stimulus comes too late  
= non optimal adaption  
= training plateaus



*Too much work in one training session equals a organism which is driven down too far. This results in extremely slow recovery and no anticipated rebound above the baseline which results in no training effect.*



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## Training Camps

**What are the expected training benefits of assembling athletes into training camps ?**

The former GDR has been using a series of training camps effectively for years, and the results are evident. For our 1984 Olympic preparation we were looking at several possibilities. A camp around Christmas has been missing the past few years, and we have suffered from lack of one. We need a warm climate to develop speed optimally (up to 60 metres) prior to the season. Also speed-endurance training at distances of 80 and up to 150 metres cannot be done properly indoors.

A second camp, in March, would be very worthwhile for recovery from the indoor season and to act as a transition into the outdoor season. Again, a lot of work would be done on grass to rest and protect the legs.

Our final camp would occur during the first two weeks of June in Utah, where conditions (e.g. dry heat, access to various running surfaces as needed - grass, surface of track, sand, ), are near perfect. The past few years we have had such camps in Sherbrooke (1982) and Provo, Utah (1983), and totalled more than 55 personal best and numerous Canadian records. With the right racing conditions and in a low pressure situation, the athletes are loose and relaxed... and personal bests occur!

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*I made a mistake with Angella when she really started to develop as a sprinter. But I didn't realize it at the time. I should have kept the volume of training lower; there wasn't enough recovery. Now I know she doesn't recover from workouts as fast as some other athletes, as fast as Ben, for example.*

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## Summary of Factors

### Training Environment

Training must be done in the most ideal conditions. Grass, sand or turf should be available as often as possible. Nevertheless, the coach must be prepared to adapt to all types of training conditions at all times.

### Planning/Periodization

I made a mistake with Angella when she really started to develop as a sprinter. But I didn't realize it at the time. I should have kept the volume of training lower; there wasn't enough recovery. Now I know she doesn't recover from workouts as fast as some other athletes, as fast as Ben, for example.

If I have these stats right, Angella's progression was 12.4 and 26.2 seconds for 100 and 200 metres in January 1978, 12.09 and 23.87 seconds at the end of '78, 11.29 and 22.74 seconds in 1979, and 11.03 and 22.61 seconds in 1980. These were no big increases, considering the monumental amount of work she was doing. She set a world record of 36.91 seconds in the 300 metres (indoors) and did a 400 metres in the middle of heavy training in 51.91 seconds. These times were done in 1981, at which time she also did a standing 200 metres indoors in 22.5 seconds. Then she suffered a tendon injury. Clearly she left a lot of races on the training track.

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## Tempo Work

It is important to maintain tempo work during the entire year, even during the competitive phase, example: 10 x 200 metres on grass at 75 % intensity (core or torso strength work such as abdominal work, upper chest/upper back work, medicine ball work, can be done during rest intervals between tempo repeats).

## Competition Period

During the competitive period it is recommended that volume of speed work be decreased and intensity increased 10 days before a competition, then kept at 95% intensity until the competition. The following is an example:

### Peaking Micro-cycle

#### \* 10 days before

- very long warm-up (one hour minimum)
- 4 x 30 m. in sets (up to 15 minutes recovery)
- 1 x 80 m. (flying start) (up to 20 minutes recovery)
- 1 x 100 m. (flying start) (up to 25 minutes recovery)
- 1 x 120 m. (flying start) up to 35 minutes recovery
- 1 x 150 m. (flying start)
- cool-down

9 days before	8 days before	7 days before	6 days before
Tempo running	speed	tempo running	speed
10 x 200m	4 x 30m		4 x 30m
easy on grass	1 x 120m		1 x 150m
	95% intensity		95% intensity

5 days before	4 days before	3 days before	2 days before
Off	speed	tempo running	speed
	4 x 30m	10 x 100m	4 x 30m
	1 x 80m		
	95% intensity		95% intensity

#### 1 day before

Off

\* The type of training required for specific speed-endurance is based on the principle that 'maximum speed work requires maximum recovery.' This training optimizes technical quality. This type of work can also be done up to 4-5 days before the target competition.

It is very important to note that during the preparation phase for both the main indoor and outdoor peaks, competitions become a part of specific training. They also represent testing points.

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*It is important to maintain tempo work during the entire year, even during the competitive phase, e.g., 10 x 200 metres on grass at 75 % intensity (core or torso strength work such as abdominal work, upper chest/upper back work, medicine ball work, can be done during rest intervals between tempo repeats).*

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*In all sessions where maximum speed work is done, maximum recovery is essential. Note the fact that sometimes it is necessary to take two days for stiffness to peak from workouts involving 100% intensities.*

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## Key Points

- In all sessions where maximum speed work is done, maximum recovery is essential. Note the fact that sometimes it is necessary to take two days for stiffness to peak from workouts involving 100% intensities.
- High level training requires massage every day to facilitate recovery.
- When we combine speed training and weights on the same day, the quality is high but the volumes of work must be kept low.
- Tempo training and circuit training on the same day are particularly compatible.
- Speed and special endurance are to be considered parallel training in so far as both require long recovery periods.
- Some power-speed work should be included every day. In addition, retaining A and B exercises (skips) during warm-ups is very important for maintaining the quality of technique.
- It is recommended that 4-5 hours rest be scheduled between two workouts which occur on the same day in order to optimize recovery.
- All activities involving a maximum effort, such as speed training, should never be done in the morning since the level of activation of the system is not at a sufficiently high level. The athlete cannot perform at as high a level of quality in the morning and is more vulnerable to injury.
- Speed training should never be put aside for longer than 3-4 weeks within any training year.

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## CHAPTER 7

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# Testing & Monitoring

*"Testing and monitoring is done not only with  
with the eyes and ears of the coach but also with  
the hands."*

*"Testing is not something which occurs according  
to a planned schedule. It is a constant, ongoing  
process that occurs with every waking hour. It  
never stops."*

C. Francis

*"Rational foresight lets him spot danger signals  
of strain approaching stress limit, and insight,  
gained from experience, enables him to take  
counter measures in time to forestall imminent  
disaster..."*

Paul A. Weiss



The approach is quite fundamental. Most testing and monitoring is done with the eyes – meticulous observation! Generally the cues or symptoms one would monitor include degradations in flexibility or in range of motion, degraded posture, fatigue, changes in energy status both during training and outside of training, and changes in personality or mood relative to the individual athlete's frame of reference. *Testing is not something which is done only periodically according to a planned schedule — it is a constant and ongoing process that is done with every waking hour. It is done as you observe the athletes during training, competition, travel, and during social interaction.*

Traditional testing or monitoring include the use of the stop watch, actual weights lifted and repetitions. However, there is not much point in recording this data, or in using this data by itself, because you have to know how the athlete looked while generating it.

I try to stay on top of body weight changes because small changes in athletes' body weights (who have such low body fat percentages) can be significant. This is particularly true for males as they carry less fat than females.

It is also important to recognize that I have a network of people who contribute information; the athlete's friends and parents, my regeneration specialist, our sport psychologist, in short all who are in contact with the athlete whether on a social or a professional basis.

A classic example of the way in which this network functions occurred when the boy-friend of one of my female athletes came over to me at a workout and told me that the food she was eating was not very good – that she was eating toasted bread for supper. I more than likely would never have become aware of this situation had he not told me. The athlete will not admit these things because, number one, he or she may not know any better, and number two, that may be the only food he or she can afford. The athlete may be living on a subsistence level student loan or whatever. But you can't allow that kind of situation to continue in an elite athlete program. As coach you'd better listen and do something about it.

Many times the boy-friends or girl-friends are looking for someone to turn to. They see a problem with someone they care about but they don't know where to go. So they come to you and say, "I think there's something wrong here — get him to see a doctor." We had an athlete one time who could not tolerate anti-inflammatories and was vomiting blood — his girl-friend came to me for help. For whatever reason he himself had not spoken to me or his doctor about this problem.

**How do you monitor living environment?**

You want to know basic things. Are they missing meals or are they living on 'Fruit Loops' back at the apartment? I've literally had this happen where a girl was living on breakfast cereal! Are they making only toast for supper? Maybe you have to bring in some groceries. You have to find out exactly what their living conditions are like.

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How are they surviving, what exactly is going on in their real world? The real world is not a mathematical model. But people like to create models; they like to create paper which of course justifies further models, further projects and further funding commitments. Governments want something that's quantifiable and can be put on paper. I am criticized because my testing/monitoring program does not exist on paper. But my approach to testing is my own and my testing program is not only comprehensive but it is ongoing - it never stops. It is apparently highly successful!

**How do you encourage the athlete to tell you if he or she is having a problem?**

It depends on whether the coach has demonstrated to the athlete that he cares. If the coach has shown the athlete that he cares, the athlete will be more likely to communicate fully.

But what athlete will come to you and say, "I don't have any money - can you help me out?" It is very seldom that any athlete will ask for financial help. In some circumstances they may ask - at a training camp, for instance. So you slip them a few dollars, but nobody likes to be seen in that kind of situation. If athletes have money problems they will usually make excuses such as "I can't afford to take the time off," or, "I don't like training camps" but in reality they simply do not have the required 100 dollars. So you try to find them the money - maybe you will get it back - maybe you won't. I look at this type of financial support as an investment in my athletes.

I received a letter from a former athlete two years after he had retired. In the envelope along with the letter was 100 U.S. dollars. He had been partying after a competition, slept in and missed his bus home. He had no money, so I lent it to him. In the letter he said he always wanted to repay me but he never had the money until now. You never really know what athletes are going through.

**You see this caring aspect as part of the job as coach?**

It's a key part of being a coach. You always want to know how to deal with people more effectively and, in the case of the athletes, care for them at the highest possible level.

In the language of model building, you are treating each athlete as an open system. If you develop a generic training model, at some point you would have to close the system. As a result any interpretive or predictive statement which is derived from that model would assume that some things are equal.

And that is just the point—they are never equal! All constants are in fact variables. You can't project a constant or unified system onto an athlete. You can only have an idea of how you would like to implement their training. Then you struggle to find out what is right for the athlete you are dealing with. With due regard to what point in his or her career the athlete is at, and the circumstances under which the athlete exists.

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### Can you expand on this?

I had an athlete who was working 55 hours per week in an extremely emotionally demanding job. She works with disabled people, trying to teach them certain abilities. This takes tremendous patience on her part. After expending massive amounts of energy at work, this athlete then comes to the track to train. She is at a monumental disadvantage — her ability to learn, her ability to train is just knocked to hell. So when this girl works at a job that initially required 40 hours per week and all of a sudden it's 55 hours per week, she goes from winning medals to finishing third or fourth.

There is nothing I can do about this situation unless I can somehow get her a job which is less demanding. I have to be careful, however, because this may be the line of work she intends to follow after her sport career is finished. If I can find her another job — great! If I can't — then that is her world. You live in the real world — you live on this planet — like it or leave it!

This is what I'm presented with and that is why I get back to this principle over and over again. 'You cannot get full-time results from part-time athletes!'

Only with full-time athletes can you identify and control many of the variables that have a bearing on performance. Athletes need to be in a position where they can train full-time and that's why I want to get maximal funding and support for them — so they can go out and do the job. That's not easy to do but I have to keep trying.

### How many of your athletes were able to train full-time?

Most of them, because I spent a great deal of effort in trying to make it so for all of them.

### To what degree is the sport bureaucracy sympathetic to this reality?

Well, the fact is that there are bureaucratic realities just as there are real world realities and they are not necessarily connected. The bureaucratic reality is that most of the communication is done with paper. As a coach you have to service this reality. But my position is this; I will do whatever I consider necessary for my athletes, whatever the consequences. If the bureaucracy likes me, fine. If it doesn't, that too is fine. I can't serve two masters. As an example, I have had to act in a situation where I had an athlete in a meet and the circumstances were deteriorating. I pulled the athlete out of competition for his own self-preservation, but I'm criticized by the meet director as a result.

I am an agent representing my athletes to government, meet directors or whomever. If I am more interested in relating to everyone around me to the detriment of my athletes I am not doing my job as coach. I am concerned only for what is best for my athletes — in both the short term as well as the long term. The athletes are relying on me to lookout for their interests — they are counting on me. Many things I have to deal with are unknown to them and that is the way it should be; their job is to train and perform; mine, to ensure that process continues as planned. It is

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***'You cannot get full-time results from part-time athletes!'***

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not that I am not capable of making mistakes in training or in dealing with their competitive or training environment. If I know something is wrong or is not optimal I have to try to change it. You can't always succeed but you must never stop trying.

**What is the place of training diaries in your overall monitoring strategy?**

I no longer use them as a matter of course, but I have used them off and on over the years. I can usually remember precisely what a given athlete's times, weights, and training performances have been at various stages in their development. *In reality it is not that I no longer use a diary but that I use a mental one rather than a paper one.*

A general characteristic of the athletes' usage of training diaries would be that women athletes are pretty conscientious about recording training and competition performances and how they were feeling in conjunction with a particular performance. I review their diaries pretty much as the opportunity presents itself or as I see the need.

Male athletes, on the other hand, generally do not keep training diaries up-to-date. Some do, some do not.

**Do you test for bilateral imbalances in strength?**

No! I don't specifically test for it, at least not in the usual way. I believe that I can see if an imbalance exists by the way the athlete's body looks and by the way he or she performs various training movements.

**Do you take girth measures at any point?**

No! Again, I'm looking at them. I'm looking for imbalances; I'm looking at everything. I'm looking for everything to be symmetrical for that athlete - to be as I would like to see it. But I'm not going to get too excited by minor differences in left side to right side unless they're distorted. In fact, everyone is stronger on one side to some degree and everyone has a dominant leg.

**It has been said that you use the sound of the athletes feet on the track to judge fatigue. Explain please.**

To head off injuries - I closely monitor my athletes throughout their speed work. If I sensed the slightest deterioration in form, - if, for example, I heard Ben's feet strike a bit heavier on the track, - I stopped him immediately and either moved him to a different training component or called it a day.

To support my visual observations I peppered my athletes with questions. *How were they feeling? Was the last repetition more difficult than the one before? I would avoid, however, that old coaches' favorite: - Can you do another one? There is only one answer to a question like that: "Yes I can."*

Athletes will ignore their own instincts to please their coach. But I didn't want them training harder, I wanted them to train smarter. I re-examined every drill - if I couldn't find a good reason for keeping it, it disappeared.

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*I didn't want them training harder, I wanted them to train smarter.*

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### Could it be said that you are using intuition?

Yes, intuition or whatever you want to call it. You see it's so easy to generate numbers and statistics and other things which get you away from common sense. In fact, common sense is the key. It's easy to do a scientific analysis on a specific factor, but in trying to assimilate this data you can lose the flow of things.

**Recognizing that many coaches depend on data, to what degree is it an indication of self confidence on the part of the coach to believe in his or her own intuition or common sense versus the data?**

Well, this is the problem, when you bring in somebody from the outside, any consultant or any sport scientist, he wants to show you something, he wants to show you what he knows. But that information doesn't necessarily mean anything. I may not know the relevance of the test data and in fact it may be irrelevant. You shouldn't be afraid to say that you don't know or even that things are going alright regardless of whether or not you can always verbalize the precise cause and effect relationships.

### Do you test for quadriceps/hamstring (ham/quad) strength ratios?

That is an interesting one! They used to say that the ham/quad ratio was 60:100. This data was clearly generated at lower limb speeds because we found that at higher limb velocities the lowest ham/quad ratio was 120:100. If an athlete is in a sport where leg speed or power are not required to be maximal, then testing hamstring/quadriceps strength at slow to moderate speeds may have some relevance. For sprinters, however, traditional laboratory strength testing has little relevance. We discovered this fact on the basis of an informal study with Dale Butterwick back in 1982 using the cybex machine. We looked at five or six of our top athletes and discovered that the average ham/quad ratio was more in the order of 125-135:100.

**Moving to the question of Central Nervous System (CNS) fatigue – and the burnout syndrome, and the overtraining syndrome, how do you actually monitor this?**

It may manifest itself as a slight drop in performance in a given training factor, or cramping, involuntary trembling, flickering eyelids, inappropriate tonus of muscle. This will also be cued by athletes' accounts of how well they slept. Again, you're looking at it, but it's one thing to look at it and another to see it. Other means of monitoring include listening to changes in the athlete's tone of voice, or changes in how their make-up is put on. The sources of information are almost infinite.

### Is massage one of your testing and monitoring tools?

Yes, absolutely! Aside from its regenerative function, massage is the best diagnostic tool, the only way to gauge a runner's muscle tone, which in turn defines the athletes' state of readiness or their vulnerability to injury. Remember the body never lies.

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**You have used the term *general malaise*. What do you mean by this term?**

When general malaise is present, there is a loss of concentration. You notice when athletes fail to pick up information or feedback with their usual speed. You're telling them to correct something and they have a difficult time getting it right. When athletes show evidence of this, chances are they are 'blown out' for one reason or another. Something could be wrong in their training, or it could be that they are distracted by something going on in their personal life.

**So, in fact you really don't differentiate testing from monitoring?**

Only in that testing is done every day via their training performance and monitoring occurs through tactile, visual or auditory monitoring by myself and Waldemar, our regeneration specialist.

It is important to realize that cumulatively, all of these aspects are my testing and my monitoring. I have a testing and monitoring program that never stops, I'm testing them all the time; I'm looking and watching always. To what degree people accept that is not my problem. People say that I don't have a testing program simply because I don't produce copious amounts of paper and statistics.

**How do you put that in a report to Sport Canada?**

Just as I've described. In reality, I'm testing more than anyone else in the country. I'm monitoring my athletes more than anyone else, clearly. I have more advanced scientific knowledge, health status knowledge, and monitoring back-up for my athletes than any other coach I know!

**Is the fact that some coaches are dispensing with scientific monitoring tools, such as lactate analyzers, in favor of observation, a recognition of the power of intuitive observation?**

I think so. Any instrument or device really comes between the coach and his athlete. The coach knows what he sees for an individual athlete and on occasion the device says, "No, you're not right," which causes the coach to question his observations. The data doesn't necessarily create a crisis as long as the coach has confidence in the conclusions he is drawing from his observations.

It's like the story of the efficiency expert: the guy who knows nothing about your business but nevertheless tells you how to run it — and charges you more than you could possibly save, even if you did it right, instead of his way.

**When we were watching one of your female athletes on the track the other day you made some comment about her left side? Please explain.**

Yes, but that was not necessarily related to strength or weakness, that was related to a tightness on her left side which was not normal for her. So you see — you have to judge if what you are seeing on a particular day for a particular athlete is different from what you normally see in that athlete.

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*Testing is done every day via their training performance and monitoring occurs through tactile, visual or auditory monitoring by myself and Waldemar, our regeneration specialist.*

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*I have a testing and monitoring program that never stops, I'm testing them all the time; I'm looking and watching always.*

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*So you see — you have to judge if what you are seeing on a particular day for a particular athlete is different from what you normally see in that athlete.*

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**Where do technicians or scientists fit into your approach to testing?**

They use computers and instruments and they look at numbers. I'm looking at the athlete and use common sense to interpret what I see.

**Have your athletes ever been tested on a treadmill, for VO<sub>2</sub> for instance?**

No, but the point is that we are dealing with an event which is primarily anaerobic. So, what would you do with such data anyway? There are other ways of monitoring aerobic status, but it means the coach must take responsibility for determining both cause and effect rather than delegating it to a third party. Rates of recovery from heavy work, changes in rate of recovery, recovery heart rates, working heart rates, are factors the coach can and must manage himself. To use an aspect such as VO<sub>2</sub> status unto itself is not possible, because all elements are interrelated!

Tests such as the treadmill test could produce numbers that have no relevance. To correctly interpret the numbers it is important to know what is going on in the athletes' lives — did they just break-up with a boy-friend or girl-friend for example? Are they in the middle of a crisis? Was there a crisis in the airport or a problem on the way to the meet, or did they drink too much at a party? Finally, do we really know to what degree any one of these factors might influence on their actual VO<sub>2</sub> results? So what makes more sense, to study the whole athlete in the actual training environment or to study a series of numbers which were generated in an artificial testing environment?

**Charlie, your testing/monitoring involves looking at a massive array of variables; how do you manage this?**

I look at every variable that I can get my hands on. But these variables don't necessarily lend themselves to the development of generic models. There are some variables which are specific to an individual athlete and only to that athlete. I am very mindful of this when it comes to prescribing a work load to a particular athlete on a particular day. No training prescription should ever be cast in stone. The ability to be flexible is a key factor. As a matter of fact I have never met a successful high-level elite coach who was inflexible. Further, I've never met a successful elite coach who didn't like his athletes as people, and enjoy being around them so he could keep on top of what was really going on. So when I hear a national team coach make comments such as, "All athletes are parasites," I wonder how he can be even remotely interested in what his athletes are doing and understand what they are going through. If you don't really care about your athletes, how can you possibly be interested enough to look after them? For some coaches it's a chore to know anything about their athletes off the track. I am very interested in my athletes' welfare. I like the interaction, I'm interested, I'm curious about what they're doing and why.

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*They use computers and instruments and they look at numbers. I'm looking at the athlete and use common sense to interpret what I see.*

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*So what makes more sense, to study the whole athlete in the actual training environment or to study a series of numbers which were generated in an artificial testing environment?*

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*As a matter of fact I have never met a successful high level elite coach who was inflexible. Further, I've never met a successful elite coach who didn't like his athletes as people, and enjoy being around them so he could keep on top of what was really going on.*

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**How many people understand that it is an all-consuming job to be a successful elite athlete coach?**

I think an understanding of all the factors that need to be dealt with if someone is going to run a successful program is very incomplete. There are marketing realities, contracts, meet promoters — you're always being pushed and pulled back and forth, back and forth. Somebody has to take care of these things. Even if there is someone trying to help, they may not understand the situation well enough to help effectively. So when you've had 10-12 years of experience you continue to do it largely yourself.

**Does not having to deal with all of these realities on the track and off the track, create a situation in which you, the coach, might eventually 'burnout'?**

I suppose it does. But given the evolving state of sport in Canada, and given the fact that you are dealing with a human product — athletes, which if you truly care is very demanding in itself — you really have no choice but to continue as long as you feel you are making a difference. You deal with burnout if and when you get there.

**Is it ever possible to develop a testing/monitoring checklist?**

Not really, because every athlete requires a different monitoring approach. Monitoring is an ongoing adaptive process.

Looking, watching, seeing, palpating, and feeling, will always be the key. Certainly there are objective factors too, that you can monitor — things you can measure, such as the time taken to perform an element of training, or lift the weight, but you watch to see how the athletes performed that time or that lift; whether they look washed out, pale, grey, flushed; whether their energy is flat; whether the rise and fall in the voice (which is peculiar to that athlete), is normal; or whether they have a vacant stare. These are all cues that you had better pay attention to. It is exactly the same as with family members, you know your athletes well enough to know when something is wrong, or when something is bothering them. All of this information is manageable if you are paying attention. It is very complicated and confusing if you are not.

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***Every athlete requires a different monitoring approach. Monitoring is an ongoing adaptive process.***

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***These are all cues that you had better pay attention to. It is exactly the same as with family members, you know your athletes well enough to know when something is wrong, or when something is bothering them. All of this information is manageable if you are paying attention. It is very complicated and confusing if you are not.***

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**Monitoring Examples From the  
Training Diaries of  
Angella Issajenko**

Quotes from the diaries:

*"The heights by great men reached and kept,  
Were not attained by sudden flight,  
But they, while their companions slept,  
Were toiling upwards through the night."*

**Unknown**

*"Wisdom is the principle thing — therefore get wisdom —  
and with all thy getting — get understanding."*

**the Bible**

*"Great spirits have always encountered violent opposition  
from mediocre minds."*

**Albert Einstein**

## Sample microcycle February 4-14, 1987

- 3 weeks prior to World Indoor Championships (March 6) 60m performance at this meet was 7.08 secs. (Canadian Record) - 2nd place
- this period ends with an indoor meet at Hamilton on February 13, and a meet at the Meadowlands on February 14, in New Jersey, USA.

### Wednesday, February 4

- 4 x 30m x all drills (i.e. A-skips, B-skips, heel raises, running A's, triplings, medicine ball accelerations)
- 2 x 30m hops (L+L+L:R+R+R leg)
- tempo: 8 x 200m
- medicine ball throws: 30 chest passes, 50 sit-ups, 30 overhead passes, 50 sit-ups, 30 around the body passes (left & right), 50 sit-ups, 30 roll over & throw passes, 5 sets x 20 sit-ups
- 10 reps. x leg throws
- side sit-ups - (9 lb. ball) 4 sets x 25 reps.
- sit-ups - 4 sets x 25 reps.
- massage
- 3000mg Vitamin C, 750mg Calcium  
*'lower left hamstring still sore'*

### Thursday, February 5

- warm-up
- power cleans: 1 set x 6 reps. - 105 lbs.  
2 sets x 4 reps. - 125 lbs.
- 1/2 squats: 1 set x 8 reps. - 135 lbs.  
3 sets x 4 reps. - 225 lbs.
- reverse leg press: 1 set x 10 reps. - 50 kgs.  
2 sets x 6 reps. - 60 kgs.  
*'inverted, left hamstring still not good'*
- hot bath: Epsom salts
- full body massage

### Friday, February 6

- travel to Winnipeg - 5 p.m.
- Training:  
warm-up - 2 x 20m drills
- tempo work: 4 x 50m (25 sit-ups before and after each rep.)  
4 x 50m (10 push-ups before and after each rep.)  
*'legs feel great today, but I am still very tired'*

### Saturday, February 7

*'appetite has improved, sleepy all of the time - went to bed at 2:30 a.m. last night up at 11:00 a.m. - had breakfast and slept again.'*

- Training:  
warm-up
- 2 x 30m drills, 1 x 150m
- 4 x 60m warm-up acceleration
- 4 x 30m from standing start
- 2 x 30m from blocks

### Sunday, February 8

*'my legs feel great - attending a clinic today'*

- full warm-up
- 2 x 30m drills, 3 x 60m
- 1 x 30m from standing start
- 4 start demonstrations
- jog cool down

### Monday, February 9

*'Day off, went to see a musical. I slept almost the whole day - I am so tired.'*  
*'I am 2nd over all in the Grand Prix rankings - leading in the short sprints with 30 points; 20 for world record, 10 for 1st place in Sherbrooke.'*



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## Tuesday, February 10

*'bought new training book and some cosmetics.'*

### Training:

- warm-up: 2 x 30m drills
- 4 x 60m accelerations
- 4 x 30m from standing start
- 2 x 30m from blocks
- 1 x 60m from blocks - 6.6 secs.

*'Nothing will be done 100% today - I am tired.'*

### Weights:

- power cleans: 1 set x 6 reps. - 120 lbs.  
1 set x 4 reps. - 135 lbs.  
1 set x 2 reps. - 125 lbs.  
*(had trouble with the last set - arms tired)*
- 1/2 squats: 2 sets x 4 reps. - 225 lbs.
- reverse leg press: 1 set x 6 reps. - 50 kgs.  
*massage - Waldemar says my muscles are good — hot bath.*

## Wednesday, February 11

*'I finally have enough energy to clean the house. Took 200mg Vitamin C, 500mg Calcium.  
I had a 12 hour sleep.'*

### Training:

- warm-up - *'my legs felt 'achy' today so no bounding'*
- 2 x 30m drills
- Tempo work:  
4 x 100m (25 sit-ups before and after each one) + 10 push-ups  
*'I felt good after the tempo work.'*
- jog cool down
- massage + stretching
- hot bath
- 'my appetite is good again - also I am not as tired. I don't want to be sore for the meet Saturday.'*

## Thursday, February 12

- massage
- 3000mg Vitamin C, 750mg Calcium
- 'Merlene Ottey is running in Hamilton & Meadowlands this weekend. Torrence is undefeated in the US. She has been running 6.63-6.64 secs. for 60 yards. I hope the Ottawa meet doesn't take too much out of me before the US meet.'*

## Friday, February 13

### Hamilton Spectator Meet

- 50 metres - 1st place - 6.16 secs. I didn't make 6.06 secs. for the bonus money
- Ben ran 5.64 secs. - he was exactly 1/10 sec. off his world record  
*'This track is not very good.'*
- 2000mg Vitamin C, 500mg Calcium  
*'Every time I do the medicine ball throws with the ball between my ankles, my lower abdomen has been aching.'*

## Saturday, February 14

*'flight at 10 a.m. Meadowlands, New Jersey Meet. Plane lost power in one engine - delayed - I didn't get to sleep and was tired at the track as we arrived in New Jersey 1 hour before the meet started.'*

- 55 metres heat - 1st place - 6.83 secs.
- 55 metres final - 3rd place - 6.69 secs. (personal best)  
*'I don't like running on boards.'*
- 2000mg Vitamin C, 500mg Calcium
- travel home
- 'My quadriceps are so sore - I seem to have a hard time running on a board surface. I don't get anything from them - I need a synthetic surface for a best time.'*

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**Sample microcycle General Conditioning**  
**October 26 - November 1, 1987**

- preceded by 32 days off training due to injury
- last competitive performance was 3rd place 100m - Lausanne, Switzerland (Sept. 15) 11.09 sec.
- example of a general conditioning microcycle

**Monday, October 26**

*'Resume training — 3 weeks of conditioning work begins today.'*

- warm-up
- power cleans: 1 set x 8 reps. - 125 lbs.  
2 sets x 6 reps. - 130 lbs.  
*'8 reps, or first set was too much.'*
- *'After the power cleans the inside of my left leg got sore.'*
- 1/2 squats: 3 sets x 6 reps. - 205 lbs.
- reverse leg press: 3 sets x 10 reps. - 40 kgs.
- stride jumps - 2 sets x 15 reps.  
*'Massage — I have no muscle tone.'*

**Tuesday, October 27**

*'Tugging (I am getting sore).'*

- cable work - 2 sets x 10 reps.
- medicine ball work: 2 sets x 10 reps. of hamstring drills (6 lb. ball)
- bench press: 3 sets x 6 reps. - 125 lbs.
- sit-ups with medicine ball - 4 sets x 25 reps.
- front and back 'jerks' - 2 sets x 10 reps. - 45 lbs.
- hip flexors - 2 sets x 10 reps. (25 lbs.) medicine ball work: 4 sets x 25 reps.
- side sit-ups (6 lb. ball)
- massage and stretching
- meet in New Zealand March 7th

**Wednesday, October 28**

*'I am extremely sore.'*

- warm-up + stretching
- power cleans: 2 sets x 6 reps. - 110 lbs.  
1 set x 3 reps. - 120 lbs.
- 1/2 squats: 3 sets x 6 reps. - 205 lbs.
- reverse leg press: 3 sets x 10 reps. - 50 kgs.
- hip flexors: 2 sets x 15 reps. - 35 lbs.  
2 sets x 15 reps. - 45 lbs.

*'My power cleans were different today — my arms are depleted from the two days of training — not to worry — I will come back quickly to my usual level.'*

**Thursday, October 29**

- repeat Tuesday's workout  
*'Bench press went well.'*  
*'Today I felt pretty tired — also I am getting sore from resuming the weight training.'*

**Friday, October 30**

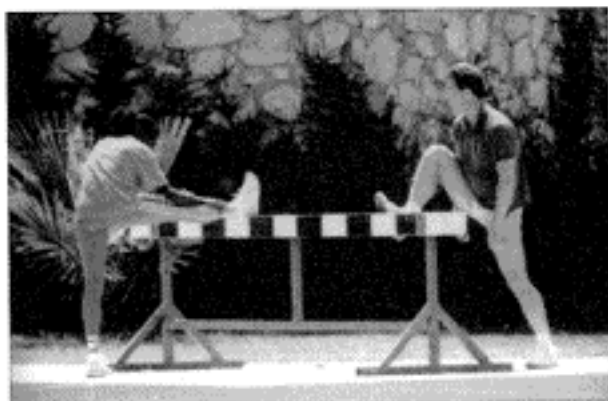
- repeat Monday's workout  
*'Power cleans are coming back already.'*
- 3 sets x 6 reps. - 130 lbs.  
*'Went great today.'*
- 1/2 squats: 3 sets x 6 reps. - 205 lbs.
- reverse leg press: 3 sets x 10 reps. - 50 kgs.
- stride jumps with 40 lb. bar.

**Saturday, October 31**

*'Day off — none'*

**Sunday, November 1**

*'Day off — will start massage next week.'*



Charlie chats with Katie Anderson to help him ascertain her training status



Charlie & Waldemar discuss the readiness of the athletes to train.

*Photo Credit: All-Sport Photographic LTD.*

Month/ Year	Train Days	Travel Days Off	Competition	Diet/ Regeneration/ Chemicals	EMS	Weight Workout	Core/ Medicine Ball	Massage
Jan. 1983	           	 		<ul style="list-style-type: none"> <li>• vitamins B12</li> <li>• hot baths</li> <li>• saunas</li> <li>• heat packs</li> <li>• chiropractic</li> <li>• aspirin</li> </ul>			                	                     
	27 Workouts		<b>COMMENTS</b> - 1 example of tempo workout - 3200m (100m plus 200m) - 12 lb weight vest - 1/2 squats 5 x 302 lb. - plyometric jumps over hurdles - end of EMS cycle					
Feb. 1983	           	 		<ul style="list-style-type: none"> <li>• DMSO</li> <li>• heat packs</li> <li>• sauna</li> <li>• vitamins B12</li> </ul>			      	           
	20 Workouts		<b>COMMENTS</b> - 14 lb weight vest					
March 1983	           	 		<ul style="list-style-type: none"> <li>• sauna</li> <li>• DMSO</li> <li>• swimming</li> </ul>		 	 	      
	26 Workouts		<b>COMMENTS</b> - EMS gloves, knees, back, stomach - 5 x 255 lb. 1/2 squats - 14 lb. weight vest during hills - 1 example of tempo workout - 3600m of (100 & 200's)					
April 1983	                			<ul style="list-style-type: none"> <li>• DMSO</li> <li>• sauna</li> <li>• heat packs</li> <li>• vitamins B12</li> </ul>	 	 	 	 
	36 Workouts		<b>COMMENTS</b> - 3200m of tempo work consisting of (100m & 200m) in 1 workout - 27 lb. weight vest during hill runs - barefoot running to strengthen feet					



Month/ Year	Train Days	Travel Days Off	Competition	Diet/ Regeneration/ Chemicals	EMS	Weight Workout	Core/ Medicine Ball	Massage
May 1983	                 30 Workouts	 		<ul style="list-style-type: none"> <li>• heatpacks</li> <li>• vitamin B12</li> <li>• saunas</li> <li>• calcium</li> <li>• anti-inflammatory</li> <li>• aspirin</li> </ul>	 		                     	
COMMENTS				- 21 lb. weight vest during power speed work				
June 1983	      	      		<ul style="list-style-type: none"> <li>• anti-inflammatory</li> <li>• whirlpool</li> <li>• DMSO</li> <li>• baths</li> <li>• saunas</li> <li>• vitamin B12</li> </ul>			                	
COMMENTS				- use competitions as speed sessions - few weight workouts				
July 1983	      	      	 	<ul style="list-style-type: none"> <li>• vitamins B12, B1, B6</li> <li>• anti-inflammatory</li> <li>• hot baths</li> <li>• heat packs</li> </ul>			      	
COMMENTS				- 21 lb. weight vest during power speed work				
Aug. 1983	 	 		<ul style="list-style-type: none"> <li>• hot showers</li> </ul>				 
COMMENTS				- 11 days of training not recorded (off after Helsinki)				

Training Focus	Injury/ Wellness Focus	Starting Position	Training Times (seconds)	Competition Times (seconds)
<ul style="list-style-type: none"> <li>power speed work</li> </ul>	<ul style="list-style-type: none"> <li>ultra-sound therapy</li> <li>hamstring injury all month</li> </ul>	Stand  Block	10m – 1.44-1.55 30m – 3.85 120m – 13.15-12.99 speed endurance 80m – 9.09 100m – 11.35 120m – 13.5 150m – 17.4	400m – 53.93 100m – 11.3 200m – 23.84-23.28-22.81
<ul style="list-style-type: none"> <li>Personal Best's in standing and block 30m</li> <li>need speed endurance</li> </ul>	<ul style="list-style-type: none"> <li>hamstring attachment has never been this bad</li> </ul>	Stand       Block	10m – 1.27-1.30 20m – 2.54-2.52	100m – 11.32 200m – 22.91-23.54-23.01
	<ul style="list-style-type: none"> <li>constant muscle soreness</li> <li>ultra-sound therapy</li> <li>bone scan</li> <li>blood test</li> <li>urinalysis</li> <li>heat wrap</li> </ul>	Stand      Block		100m – 11.33-11.35-11.36-11.17-11.22 200m – 23.0-22.94
<ul style="list-style-type: none"> <li>preparation for Helsinki – World Championship maintenance focus</li> </ul>	<ul style="list-style-type: none"> <li>injured hamstring</li> </ul>	Stand      Block	4x300m – 47.80-53.0	100m – 11.24-11.22

PB = Personal Best; CR = Canadian Record; WR = World Record

Month/ Year	Train Days	Travel Days Off	Competition	Diet/ Regeneration/ Chemicals	EMS	Weight Workout	Core/ Medicine Ball	Massage
Sept. 1983	           	      					 	      
	21 Workouts							
Oct. 1983	           	      		• aspirin		 	 	 
	22 Workouts							
				COMMENTS				
				- A & B skips with 27 lb. weight vest - workout in pool				
Nov. 1983	                			• anti- inflammatories		 	      	                               
	41 Workouts							
				COMMENTS				
				- increased work load results in sore tendon attachment - power speed work in water on occasion				
Dec. 1983	                	 		• anti- inflammatories	 	 	 	                                    
	38 Workouts							
				COMMENTS				
				- tempo and speed work done in water sometimes - 5 kg weight vest - some bounding/skip bounding done in shallow water - EMS applied to lower hamstrings, calves, shins, stomach, back				





Month/ Year	Train Days	Travel Days Off	Competition	Diet/ Regeneration/ Chemicals	EMS	Weight Workout	Core/ Medicine Ball	Massage
Jan. 1986	                	 		• vitamins B12 • anti-inflammatory	      	           	                	                     
	31 Workouts	COMMENTS						
		- 1 workout of EMS only						
Feb. 1986	      	      		• anti-inflammatory • hydrocortisone cream • cortisone injection (.1cc)	 	 	      	                
	20 Workouts	COMMENTS						
		- up to 660 x medicine ball reps in workout - injury - medicine ball workout only						
March 1986	                	 		• anti-inflammatory • calcium 1,000mg	 	      	      	                               
	32 Workouts	COMMENTS						
		- up to 10-15 day sequence of EMS (heals, quads, ham, abds) - 12 day camp - Florida (17 workouts) - 1,000 medicine ball throws in one workout						
April 1986	                	 		• calcium • anti-inflammatory • cortisone shot • aspirin	 	      	           	                                    
	39 Workouts	COMMENTS						
		- up to 1,000 medicine ball throws in one workout - up to 2,000 mg calcium per day - 14 day camp - Trinidad (19 workouts)						



Month/ Year	Train Days	Travel Days Off	Competition	Diet/ Regeneration/ Chemicals	EMS	Weight Workout	Core/ Medicine Ball	Massage
May 1986	      	      		<ul style="list-style-type: none"> <li>• anti-inflammatories</li> <li>• calcium</li> </ul>	 	      	           	           
COMMENTS				22 Workouts - up to 2,000mg calcium/day - 7 days off of anti-inflammatories - I need time given the fact that baby is still very young (9 months)				
June 1986	           	 		<ul style="list-style-type: none"> <li>• vitamin B12</li> <li>• calcium</li> <li>• salt water baths</li> <li>• Epsom salt baths</li> <li>• anti-inflammatories</li> </ul>				           
COMMENTS				19 Workouts - some workouts consist of medicine ball work and massage only - take anti-inflammatories in suppository form to avoid stomach irritation				
July 1986	           	 		<ul style="list-style-type: none"> <li>• Epsom salt baths</li> <li>• hot baths</li> <li>• calcium</li> </ul>	 		      	                
Aug. 1986	           	      		<ul style="list-style-type: none"> <li>• hot baths, hot tub, sauna</li> <li>• calcium</li> <li>• vitamin C</li> <li>• Epsom salt baths</li> </ul>			      	      
				16 Workouts				



Month/ Year	Train Days	Travel Days Off	Competition	Diet/ Regeneration/ Chemicals	EMS	Weight Workout	Core/ Medicine Ball	Massage
Sept. 1986	  8 Workouts			• hot baths				 
Oct. 1986	                 22 Workouts	      		• Epsom salt baths • aspirin • calcium • anti- inflammatories		      	      	           
<b>COMMENTS</b> - core drills - alternate fast & easy 10m segments 60 total x 4 reps - workout example hill work - 6 x 60m - upper body medicine ball - 9lb - lower body - 12lb - begin weights again- Universal machine, circuit & reverse leg press, step ups, good mornings and light weights (muscular endurance) - add 1/2 squats & power cleans later - cable work consists of hip extensors & flexors								
Nov. 1986	           	      		• calcium		      	      	           
<b>COMMENTS</b> - start heavier weights this month - power cleans with 120 lb (1 x 6 reps) & (1 x 4 reps)								
Dec. 1986	           	      		• calcium • vitamin C		      	           	           
<b>COMMENTS</b> - 3 weeks off medicine ball work - power cleans (3 set x 6 reps) with 120 lb - 1/2 squats (3 set x 6 reps) to 250 lb - reverse leg press (3 sets x 6 reps) with 154 lb								

Training Focus	Injury/ Wellness Focus	Starting Position	Training Times (seconds)	Competition Times (seconds)
<ul style="list-style-type: none"> <li>• acceleration fantastic</li> <li>• need speed endurance</li> </ul>		Stand		100m – 11.40-11.25 200m – 22.8
		Block		
<ul style="list-style-type: none"> <li>• regain acceleration</li> <li>• regain strength</li> <li>• stretching is going well</li> </ul>	<ul style="list-style-type: none"> <li>• sore from weights</li> <li>• sore shins</li> <li>• urinalysis</li> <li>• blood work</li> <li>• EKG</li> <li>• chest x-ray</li> <li>• hemoglobin low</li> <li>• back &amp; pelvis sore</li> </ul>	Stand	30m – 3.55	
		Block		
<ul style="list-style-type: none"> <li>• speed endurance</li> <li>• power speed work</li> </ul>	<ul style="list-style-type: none"> <li>• trouble sleeping</li> <li>• arms sore from weight work</li> <li>• left glute and leg sore</li> </ul>	Stand	30m – 3.49-3.40 60m – 6.82-6.61-6.62	100m – 11.24-11.22
		Block		
	<ul style="list-style-type: none"> <li>• right knee sore</li> <li>• shins sore</li> <li>• quad spasm - cut 1 workout short</li> </ul>	Stand	60m – 6.63-6.46 (PB)	60m – 7.37
		Block		
NOTE: Massage given predominantly by Waldemar & occasionally by Charlie – year began with daughter 3 months old				

PB = Personal Best; CR = Canadian Record; WR = World Record

Month/ Year	Train Days	Travel Days Off	Competition	Diet/ Regeneration/ Chemicals	EMS	Weight Workout	Core/ Medicine Ball	Massage
Jan. 1987				<ul style="list-style-type: none"> <li>• vitamin C</li> </ul>				
<i>Training Diary was lost with January's entries</i>								
Feb. 1987	      	 		<ul style="list-style-type: none"> <li>• vitamin C 2000 - 3000 mg</li> <li>• calcium - 500-750mg</li> <li>• hot baths</li> <li>• whirlpools</li> </ul>		 	      	      
16 Workouts		COMMENTS						
		<ul style="list-style-type: none"> <li>- 9 lb medicine ball for abdominal work</li> <li>- EMS on glutes only some sessions</li> </ul>						
March 1987	 	           		<ul style="list-style-type: none"> <li>• whirlpool</li> <li>• Epsom salt baths</li> </ul>			      	      
14 Workouts		COMMENTS						
		<ul style="list-style-type: none"> <li>- Japanese massage therapists very effective</li> <li>- I can now totally block out everything - I hear nothing - see nothing until the finish line - my arm action is the key</li> <li>- weights: power cleans, 1/2 squats, front pull downs, bench press, reverse leg press, back pull downs, cables for arm action</li> </ul>						
April 1987	                	 		<ul style="list-style-type: none"> <li>• Epsom salt baths</li> <li>• calcium</li> <li>• vitamins</li> </ul>		      	      	           
26 Workouts		COMMENTS						
		<ul style="list-style-type: none"> <li>- 1 workout: 12x60m - 6.85-7.10 - speed endurance</li> <li>- medicine ball leg throws - 6 lb ball - medicine ball sit-ups, 4 sets, 25 reps</li> <li>- power cleans 6 x 123 lbs &amp; 4 x 143 lb</li> <li>- tempo work - 10 x 100m with core work between reps.</li> </ul>						





Month/ Year	Train Days	Travel Days Off	Competition	Diet/ Regeneration/ Chemicals	EMS	Weight Workout	Core/ Medicine Ball	Massage
Sept. 1987	 	           	 	• hot baths				      
	9 Workouts							
Oct. 1987		                						
	5 Workouts							
				COMMENTS				
				- extended recovery period - off 25 days				
Nov. 1987	           	 		• vitamins		      	      	 
	20 Workouts							
				COMMENTS				
				- Waldemar is sick for 3 weeks - limited massage - EMS with chiropractor is focused on lower back				
Dec. 1987	           	      			 	 	 	 
	17 Workouts							
				COMMENTS				
				- weights - 1/2 squats - 2 reps x 355 lb, 1/2 squats 6 reps x 275 lb, bench press - 6 reps x 135 lb, power cleans - 6 reps x 125 lb - 4 reps x 130 lb				

Training Focus	Injury/ Wellness Focus	Starting Position	Training Times (seconds)	Competition Times (seconds)
<ul style="list-style-type: none"> <li>competitions: London Rieti Lausanne Sardinia Monte Carlo Tokyo</li> </ul>	<ul style="list-style-type: none"> <li>recover/ regenerate from last month's heavy competition schedule</li> </ul>	Stand		100m – 11.36-11.34-11.21-11.09-11.37
		Block		
<ul style="list-style-type: none"> <li>recovery</li> <li>begin training at end of month</li> </ul>	<ul style="list-style-type: none"> <li>recovery</li> </ul>	Stand		
		Block		
<ul style="list-style-type: none"> <li>resume training</li> <li>accumulation phase for strength</li> <li>build speed endurance back up - "stay tall"</li> </ul>	<ul style="list-style-type: none"> <li>sore from resuming weights</li> <li>sciatic nerve acting up again</li> <li>shins sore - no bounding</li> <li>chiropractic treatment (EMS &amp; adjustment)</li> </ul>	Stand	60m – 6.90-6.99	
		Block	30m – 3.36	
<ul style="list-style-type: none"> <li>jumps into long jump pit</li> <li>30m hops (L.L.L.R.R.R.)</li> <li>30m lunges</li> </ul>	<ul style="list-style-type: none"> <li>quadriceps sore from weight work</li> </ul>	Stand	30m – 3.29-3.26 60m – 6.65-6.85-6.55	
		Block	30m – 3.29-3.33 60m – 6.54-6.46-6.43	

PB = Personal Best; CR = Canadian Record; WR = World Record



## CHAPTER 8

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# Sport Psychology

*"Many sport psychologists seem to want to be arbitrators of communication between coaches and athletes - I will say what I have to say directly to my athletes."*

C. Francis,  
D. Stubbs article, *Champion Magazine*, 1987

*"I don't want anyone having performance related conversations with my athletes that I am not privy to."*

C Francis

*"If the coach is a 'Little Man' he will strive to remain in authority — retain control over his athletes and dominate them by assuming a superior position."*

Percy Wells Cerutti



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This chapter was prepared with Dr. Vietta 'Sue' Wilson, an associate professor of psychology at York University. Sue has extensive training in self-regulation and counselling, and is a certified biofeedback therapist. She has 15 years experience working with elite coaches and athletes and is one of North America's most skilled sport psychologists.

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**"We use Sue because she tries to teach the athletes self-reliance."**

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Sue is the only psychologist Charlie Francis has ever allowed to work with his athletes. Charlie explains "We use Sue because she tries to teach the athletes self-reliance. She also recognizes the appropriate place of any consultant vis-a-vis the coach - the coach must always be in control."

### **What is your opinion of the current usage of sport psychology in sport?**

I seem to be quoted as having said that "Psychology is a bunch of bull." Well, as it is currently practiced it seems like a 'bunch of bull' because I listen to consultants saying how they came in at the last minute, worked with some athlete and the athlete went out and won. They attribute the winning performance to some great psychological technique. They may in fact be doing more harm than good by undermining the coach-athlete relationship and be totally unaware of it.

Traditional sport psychology is based on the incorrect premise that a variety of techniques can be taught to an athlete in a 1 or 2 hour workshop, and that somehow the athletes can incorporate and integrate these techniques into their daily training.

Charlie is using very sophisticated psychology in his coaching. What Charlie is doing differently, is fully integrating it into the everyday practice, both on and off the track. He calls it common sense, commitment, and good coaching. There seems to be a misunderstanding here. It arises because the delivery of most sport psychology programs begins with group seminars to introduce each mental training technique, and is followed by drills to practice each technique. I believe that this format suggests to the athletes and coaches that there are specific periods set aside as 'sport psychology or mental training times.' This may lead to the lack of integration of these skills into everyday practice and competition by athletes and coaches. These techniques need to be individualized and fully incorporated into daily practice and competition and not regarded as something extraordinary.

Charlie prefers that new research or skills in sport psychology be discussed with him. He then decides whether or not any of his athletes might benefit. Charlie is then kept fully informed of the intervention and resulting feedback from the athlete. The majority of input is done at practice, but 'learning moments' also occur during travel, training camps, and competition. The most powerful and efficient times for the delivery of information or skills are those which occur naturally and are initiated by the athlete, usually at unplanned events.

## **Q & A**

With Charlie Francis

*Comments in italics by  
Dr. Sue Wilson*

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**Sport psychology also seems to operate under the dreadful misperception that the athlete should do 'something special' in a competition. In fact the athlete must learn to repeat only what he has done correctly time and time again in practice.**

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**The majority of input is done at practice, but 'learning moments' also occur during travel, training camps, and competition. The most powerful and efficient times for the delivery of information or skills are those which occur naturally and are initiated by the athlete, usually at unplanned events.**

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Charlie has a keen eye. He reads body language better than an electromyographic instrument. He says little to the athletes at the track, but when he does he seems to have an instinctive sense of when to say something that is "dead on." The sense of his profound caring comes through to the athletes as a by-product of his day to day coaching activities. After many years observing him coach, I believe the underlying basis for his success — training techniques aside — is his absolute commitment to his athletes. His being there, always working for them on and off the track, has a powerful effect on their commitment, trust, and on the quality of their work. Underrated in sport psychology is the structuring of the daily training for each athlete. Charlie has made this into an art — an art specific to each athlete.

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*"After many years observing him coach I believe the underlying basis for his success — training techniques aside — is his absolute commitment to his athletes."*

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## Motivation

### How much effort do you have to expend to motivate your athletes?

Successful elite athletes are inherently highly motivated to train. I spend 90% of my time slowing athletes down and limiting work volumes; only 10% of my time is spent motivating athletes to work.

This characteristic, however, does not carry over to the area of regeneration. Some athletes tend to wait until they are injured before they get serious about regeneration. I spend more time motivating athletes to make full use of the whole range of regeneration therapies we make available to them than I do motivating them to work.

### Can you expand on some of the motivational elements which are inherent to your training system?

Goal setting is very closely linked to motivation. Sometimes they don't have to visualize where they want to be — they can simply use an existing athlete who is already at the desired level as a role model. In our club we have the whole range of abilities represented — from developing athletes to world record holders — so their influence on each other is pretty powerful.

You can see a recent example of this kind of influence illustrated by the confidence which athletes have in the low volume — high load strength work Ben has been doing — Ben, Mark, Angella, Molly, and Desai are now feeding on, and influencing each other.

You can see the changes in motivation as the athletes develop; they begin to see more clearly where they're going — they're aspiring to compete in the Grand Prix or they're going for medals at the Olympics — they're aiming for different levels of achievement. You see changes in the way they perceive what they are doing and how they are working and training. I believe there is a difference in perception between our club and other athletes I see. In many cases the athletes who are from our group have clear perceptions and approaches about where they are going. Other athletes are not clear in where they are going.



Photo Credits: All-Sport Photographic LTD.

Charlie and Angella Issajenko talk. There is little room for communication errors when working with the explosive nervous system and matching personality of a world class sprinter.



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*The only time the athletes seem to need assistance in goal setting is when injury, illness or a significant 'non-performance' occurs which causes them to question their capacity or causes them to try to make up lost time. Charlie then reminds them of the process necessary to reach their goals and also restructures the practice and competition schedules to ensure observable progress and success.*

#### **How are short-term goals set?**

Athletes will normally set their own short-term goals — and they do not kid themselves about where they are in real terms and what goals are realistic. You must, however, keep an eye out for those athletes who tend to self-limit and underestimate their abilities. You try to help them understand that their bodies will tell them what they are capable of — that they must be open-ended in the broad sense — that realizing one's athletic potential is a long-term process. They are quite aware of the time that Ben, Angella, Desai, Molly, Tony, and Mark have invested. In Ben's and Angella's cases for example, the athletes know that in excess of 12 years of hard work has been required to realize their current performance levels.

Some of the considerations when setting short-term goals are:

- reading of performance in training elements to judge when the athlete is ready for a more challenging training element, or for a higher intensity of stimulus in the same element;
- the judging of training performance relative to past performances of successful athletes such as Ben and Angella;
- at some point the conclusion is drawn that a series of training performances indicates a readiness for a new 100 metre performance.

#### **How did you decide that Desai Williams was ready to go below 10 seconds in the 100 metres?**

Each athlete, over time, develops a certain model of performance and training. You then watch how easily or with what difficulty they perform individual training elements. In addition, there are statistical models of world class men's and women's performances, using 60 metre performances to predict 100 metre performances.

Much of Desai's training is performed in tandem with Ben. In a training situation such as this you can judge with a fair degree of accuracy what an athlete is capable of. Desai has in fact been ready to go below 10 seconds in the 100 metres for sometime now.

#### **Do you give athletes written training prescriptions?**

I never write programs on paper for an athlete because of the tendency for the athlete to treat that piece of paper like a page from the Bible. Paper used in this manner will prevent the athlete from ever taking responsibility for his own training. Athletes must interpret training programs through their bodies; programs written on pieces of paper redirect the athlete's focus and encourage athletes to interpret training programs through their heads.

If you write a training program down on a piece of paper the athlete will follow it to the letter. Then if he is injured or achieves less than optimal results he will blame the paper — the program — the coach — never himself.

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*The only time the athletes seem to need assistance in goal setting is when injury, illness or a significant 'non-performance' occurs which causes them to question their capacity or causes them to try to make up lost time.*

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*I never write programs on paper for an athlete because of the tendency for the athlete to treat that piece of paper like a page from the Bible. Paper used in this manner will prevent the athlete from ever taking responsibility for his own training.*

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*The perspective used by Charlie is to prepare an athlete for a 'quality' performance at practice, and then at competition the athlete needs merely to repeat this performance. No attempts are made to introduce anything special; in competition no new material is added. Angella recounts that her sub-optimal performance at the 1987 World Championships was due to the fact that her perspective was inappropriately on the consequences or outcome of the race rather than focusing on her practiced pre-race strategy.*

*Charlie will change the dates of time trials if he does not feel the athlete is ready. He is very careful about not scheduling activities which allow a sub-optimal performance to take place.*

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***The perspective used by Charlie is to prepare an athlete for a 'quality' performance at practice and then at competition the athlete needs merely to repeat this performance.***

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## Training Diaries

There is no standard format for recording training progress for all athletes in any given sport, nor can there be one. Nor do all athletes use training diaries in the same way if at all. Female athletes seem to use diaries most consistently.

Athletes always have access to their past performances as meet results are publicly posted. Videos too are available, but athletes are able to recall with incredible detail their past performances in any case.

Angella Issajenko is one athlete who has religiously recorded both physical and psychological aspects on her training life for the past 10 years. The value of her training diary was evident following a sub-maximal performance in the 1987 World Championships in Rome. She found re-reading the diaries very beneficial for consolidating her motivation; she was able to see her progress across time and obtain another perspective on her future potential.

The elements which she records in her training diary include:

- how she feels upon waking - fatigue, attitude;
- quality of sleep;
- commitments for the day including off-track commitments;
- monetary/financial status and concerns;
- injuries with accompanying concerns eg. impact on performance and career;
- thoughts on performances of national and international competitors, as their results appear in the media;
- anticipated, desired feelings relating to upcoming competitions for a new training year, or phase of training;
- status of personal relationships - family, training peers;
- status of relationship with coach;
- response to training elements - warm-up, stretching, weight training;
- the purchase of clothing etc. for training and social purposes.



Photo Credits: All Sport Photographs LTD.

Charlie giving a directive to his athlete charges: if there is not synchrony between your voice and your body language your communication will be rejected.

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## Energy Management

Energy management is a process of recognizing what amount of energy will be needed to perform at maximum, and be able to apportion the correct amount of energy to train for this level when it is needed.

### What does the process of energy management involve?

Some aspect of energy management is occurring at all times. It begins with the skill of the coach in prescribing training stimuli at the correct time and in the correct amount. This skill is transferred to the athlete over time so that the coach and athlete become training partners.

Through monitoring internal environment and experiencing cause-effect relationships, the athlete becomes very skilled at judging their psycho-neuro-muscular (mind-body) status precisely.

Energy management is influenced by many factors:

- comfort/quality of living environment
- adequacy of financial support for living, training and competing
- disciplined personal and training life
- the maintenance of positive relationships with coaches, support personnel, fellow athletes and family
- clear life and sport goals
- handling higher quality work through increased rest, relaxation and recovery.

## Relaxation/Energizing

### How would you characterize the mental set required of the 100 metres?

The best 100 metre performances are typified by no thought process at all, just automatic response. During a sprint, everything you think has a negative impact because the act of thinking tends to make you tighten up. You can't panic after a bad start and try to go harder, that will only make it worse. There is nothing you can do beyond going the best you can go — so you have to relax and go. While being able to 'relax' is to some extent a natural ability, this ability can also be learned.

*Competition simulation is critical.*

### How did Ben learn to relax?

Ben would spend hours watching Carl Lewis on video prior to the period when Ben began beating Lewis decisively. Ben concluded that the only difference between Lewis and himself was that Lewis was 'running relaxed.' Ben was able to play a key role in helping himself across the performance barrier from being ONE of the top sprinters in the world to being THE top sprinter in the world.

### How do you account for Ben's ability to focus totally on a given race?

A large part of Ben's success stems from the very characteristic which caused some people to criticize him initially —his retiring

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*While being able to 'relax' is to some extent a natural ability, this ability can also be learned.*

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nature, a by-product of which is his ability to tune out distractions before a race.

At any meet, things never go exactly as planned. Athletes always come to you and ask how they are supposed to run with this and that going on. Ben simply didn't notice any of it, he concentrated on what he was doing, and he blocked out the rest.

*Charlie provides only one or two cue words for the athletes to facilitate focusing in practice session. He says very little to each athlete but provides the right word at the right time. Mark McKoy relates that he made the error in Rome of losing attention/focus by 'trying to beat another athlete' who was in the race, rather than simply relaxing and duplicating his 'practice' performance. Basically he forgot to use his cue word/competition image and race against only himself.*

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**Mark McKoy relates that he made the error in Rome of losing attention/focus by 'trying to beat another athlete' who was in the race, rather than simply relaxing and duplicating his 'practice' performance. Basically he forgot to use his cue word/competition image and race against only himself.**

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### **How is imagery used with your athletes?**

Athletes of all ages and stages of development work out together as a training group. So when some athletes are performing their A and B skips, 30 metre accelerations or 1/2 squats for example, the other athletes are able to observe. When Ben and Desai are performing their 60 metre power or power endurance work, all the other athletes are watching. Sometimes consciously, sometimes unconsciously, the image of world class performance in each and every training movement is imprinted.

*Imagery is also used by the athletes, but what image, when it is used, and how it is employed is an individual matter. Prior to his world record run, Ben reported visualizing a previous race that he considered his best performance. Other athletes report visualizing standing on the victory podium at the Olympics or seeing their personal-best time on the clock. They don't all see 'pictures' or images. Some athletes 'feel' the event, others talk to themselves.*

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**Sometimes consciously, sometimes unconsciously, the image of world class performance in each and every training movement is imprinted.**

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## **Recovery**

*There are many factors related to recovery between intense practice sessions and heavy competition schedules. These factors include adequate sleep, good diet, active relaxation and relative freedom from such worries as family problems, financial status etc. The relative importance of each factor depends on the athlete. Some athletes seem to be able to recover easily while others have to work on this diligently. An extensive range of massage techniques is used and is fully outlined in Chapter 5. The athletes have access to individual relaxation sessions or may choose to use relaxation tapes which are designed to relax the muscles, increase blood flow, park thoughts, or enhance confidence.*

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**They don't all see 'pictures' or images. Some athletes 'feel' the event, others 'talk' to themselves.**

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## Confidence

Many of your athletes say that a large part of their confidence comes from having 'done it' in practice. Can you comment?

A basic principle underlying all training is to bring only a fully regenerated athlete to each training element. The element is then performed with the highest quality possible. This results in the athletes performing at very high levels and even achieving personal-bests to the point of world record levels in the controlled environment of training. They learn to take responsibility for the cause-effect relationship of their 'body-set' and 'mind-set' to performance. In competition then, they have only to duplicate these conditions. If the athlete has not taken this level of responsibility for their performance then the coach has not done his job.

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*They learn to take responsibility for the cause-effect relationship of their 'body-set' and 'mind-set' to performance. In competition then, they have only to duplicate these conditions.*

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## Athlete Self-Image

You have mentioned the role of uniforms in relation to the athletes' self-image; could you elaborate?

Uniforms are a psychological factor. I want the athletes to make their own judgements on uniforms because I want them to feel good about how they look. Female athletes will buy their body suits or shorts the same way they buy street clothes and earrings. Different styles, (shorts, bodysuits), different fits, (loose, skin-tight), and different colours represent a source of variety which helps break the day-to-day tedium of training.

Do uniforms play a role from a marketing standpoint?

Absolutely! The sums of money involved with our top athletes dictate that they should be dressed according to the image you are trying to project. A particular style and colour of uniform can either enhance the athlete's image or distract from it.

Are uniforms a factor in observing technique?

Interestingly enough, yes! Ben, on occasion would wear particularly loose and baggy shorts which can make it difficult to see exactly what is happening. From that standpoint the body suits that female athletes often wear are optimal for observing technique.

*The self-image of the athlete is respected in that Charlie defends the right of each athlete to define him/herself. An example of this was during the 1986 Commonwealth Games in Edinburgh when the team uniforms arrived and they were boxer shorts for the women. He vehemently supported the women's request for more form fitting uniforms and had new ones shipped from Canada, which arrived in time for the competition.*

*Mark McKoy's confidence in Charlie's coaching directives is derived from knowing that he was a world class sprinter himself. "Charlie knows exactly when you should move from one training element to another — it is uncanny how he knows."*

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*Mark McKoy's confidence in Charlie's coaching directives is derived from knowing that he was a world class sprinter himself. "Charlie knows exactly when you should move from one training element to another — it is uncanny how he knows."*

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## What was your motivation to become a coach?

It is never totally clear but after competing for a number of years, leaving sport for a while to work at a more traditional job, and seizing the opportunity to return to coaching – something about sport and coaching, some aspect of working with young people and trying to have a positive effect – something was obviously more attractive and has held that attraction ever since.

## What motivates you to remain a coach?

I have been fortunate to persist as a coach and remain in coaching long enough to realize the kind of results most coaches can only dream of. I feel I have been able to help athletes become successful in their sport and life careers.

At some point however, the all-consuming job of dealing with very intense athletes, in combination with dealing with bureaucrats, corporations, begins to take its toll. You wonder sometimes just how long you can keep it up.

### Below is The Charlie Francis Stress Management Model



The first problem is soon forgotten as ensuing problems occur.

## What factors do you consider important for a coach to be successful at the world level?

- coach has superior listening skills,
- coach demonstrates that he is a partner in the process with the athlete and is not overly motivated by ego,
- previous experience of the coach as a world class athlete
- daily presence at the track,
- interest and commitment in solving training problems and life problems of athletes,
- technical sophistication, as evidenced by the ability to produce training/competitive gains,
- learning status – coach demonstrates that he is always searching out new information,
- coach fights for athlete support – government, corporate,
- coach is successful – past athletes – current athletes,
- coach demonstrates that he can read the status of the athlete with a high level of skill and accuracy,
- interest and caring about the athlete as a person (eg. social and career aspirations, - coach helps the athlete find a suitable job).

***"If the coach is a 'little man' he will strive to remain in authority - retain control over his athletes and dominate them by assuming a superior position." — Percy Wells Cerutti***



Photo Credit: All-Sport Photographic LTD.

An athlete talks — Charlie listens. Listening is usually the missing one-half of communication.

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***It is difficult to listen with your mouth open***

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## Communication

### **Are there differences between North American and European approaches to coaching?**

I have always been heavily influenced by European sport where you see the heavy workloads and the high levels of motivation. If, however, you try too dogmatically to impart these values to your athletes, you get a lot of resistance. You cannot be too militant or autocratic; if you are, you will shut down your lines of communication and the athlete will no longer come to you and confide.

### **Do you control or limit the amount of information you give to the athlete?**

All athletes study their event, trying to gain a better understanding of what it's all about. The pace and complexity of this self-learning will be controlled by the athletes. As a coach you try to accommodate to each athlete's learning pace and take care not to overload a particular athlete. To be effective the information has to be internalized. Too much information can be a stressor in itself. Some coaches dump too much information on their athletes which is either an attempt to prove to the athletes that they are smart or is a reflection of the coaches' poor communication skills.

You can't deal with all factors simultaneously. You introduce one factor. The athletes address that factor, master it, and feel that they have accomplished something. If you introduce 25 factors you will discourage the athletes and they will go away with their 'tails' between their legs. I call this 'common sense,' not psychology.

### **What part does the athlete play in a decision to change an aspect of the program?**

Everything is open-ended. The athlete or the athlete's body is talking, not I. My job is to listen to what the athlete or the athlete's body is saying. At the same time, most of our athletes have a sense of self-responsibility and the maturity to know what training adjustment is required and to make the change without being prompted.

### **Can you provide an example of this?**

The athletes know their bodies well enough that if they want something changed there is usually a good reason.

I can remember a very graphic example of this. In 1982 Ben Johnson came up to me and said "I don't feel like running special endurance 300's. I feel they break me down." I said "Okay, you're not doing them anymore." After that his 200 metre time went from 21.20 to 20.37 so you have to conclude that he was not far off the mark in his judgement.

There is no question that Ben had a very high tolerance for high intensity short speed work. Tony Sharpe, on the other hand, had

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*You cannot be too militant or autocratic; if you are, you will shut down your lines of communication and the athlete will no longer come to you and confide.*

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*Some coaches dump too much information on their athletes which is either an attempt to prove to the athletes that they are smart or is a reflection of the coaches' poor communication skills.*

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*The athletes know their bodies well enough that if they want something changed there is usually a good reason.*

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very little tolerance for that type of work and I kept him away from it. Tony did 300's and 500's and responded well to them. Desai Williams and Angella Issajenko tended to be more in the middle between those two extremes.

You must listen to the athlete and add this information to your own observations before you can manage the training environment optimally.

*Unfortunately most coaches aren't trained to listen and interpersonal conflicts usually occur because of this deficit. To listen to coaches and athletes separately describe competition behavior you wonder if they are describing the same event —the descriptions are so different. After listening, the coach needs to decide how to integrate the information rather than 'manipulate' or 'convince' the athlete of the correctness of his opinion.*

#### **Do you find any differences in handling male and female athletes?**

There are differences, certainly. Women do not seem to produce as consistent training results as males. In some cases there are obvious reasons such as a female athlete recovering from having had a baby. The fluctuations in the female endocrine system are a factor (i.e. menstrual cycles). Each female responds differently to these factors in terms of emotional and physical highs and lows. On this basis the emotional status of females is more variable than males.

Many times after a poor performance, male athletes will blame the coach or the equipment. I find that female athletes, in the same situation will tend to blame themselves. As a result female athletes tend to require more positive feedback and reassurance than males. Female athletes are also more sensitive to negative feedback.

With Ben, you left him alone most of the time. He knew what to do and also knew the significance of training results and body feedback. Over the years he has developed a tremendous self-confidence. This is true of most elite athletes.

*Some day coaches and administrators may recognize that genetic make up and early learning experiences differentiate male and female athletes. Then perhaps different coaching techniques will be developed.*

#### **How did you handle Angella after her disappointing performance in Rome in 1987?**

I, in fact, did and said nothing for a few days. If you try to communicate with an athlete when he or she is upset, very little of what you say will penetrate. We eventually talked about some of the reasons for her poor performance. Angella, herself, felt that a major factor was her inappropriate focus on the financial repercussions of her performance.

#### **What bearing does coach self-confidence, coach-ego have on communicating with athletes?**

You have to develop confidence to the point of being self-sufficient. When you are a novice coach and you lack confidence you are more

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*When you are a novice coach and you lack confidence you are more likely to get into squabbles with your athletes — 'Do what you are told because I say so, because I'm the coach and you're the athlete.'*

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likely to get into squabbles with your athletes – 'Do what you are told because I say so, because I'm the coach and you're the athlete.' But when you are a little more confident you get a thicker skin and you are not going to get into confrontations as readily. The athletes may have a point of view worth listening to. It's not going to be an affront to your ego if in fact they have something to contribute. So you do not beat down feedback. You must maintain an open line of communication.

In 1981 I was pushing, pushing, pushing, trying to make athletes come out and do this and do that without always explaining to them all the things that were going on. The athletes weren't fully aware of what was happening around them and in many cases there was the misperception that we were operating at cross purposes.

Now, another clear example to me was when I was pushing my athletes for attendance. In 1981 I nearly had a mutiny. There was a lot of bitching. Athletes would complain about their performance and I would say "Look here's your record of attendance — you missed this, this, and this so how can you really complain?" So then I decided, leading in to 1982, OK that's it! Nobody gets called, nobody gets hassled. They come to practice or they don't. It is now their choice, period! I have never called an athlete since that time.

Some athletes, of course, suffered because they could get away with things that they couldn't get away with in the past. However, in the long-term, the training environment gained. Some athletes fall through the cracks because they are not responsible enough to take care of themselves, but most come through.

Whenever you are in a really pushy type of program and are always trying to get the athletes to do stuff, you can't be listening to them because they're not listening to themselves; they're simply busy trying to do what you ask them to do.

I found this to be particularly true for myself subsequent to 1984 when I really assessed why Angella was not performing well. I concluded that I had been pushing too much, pushing too hard, and by the time she rebounded it was too late. At this time I recognized that Angella simply didn't recover as quickly from high intensity work as Ben did.

**Would you describe your communication as being 'horizontal' rather than 'vertical'?**

Yes, but the relationship between coach and athlete varies from one athlete to another. Some will listen to you in a 'vertical' sense: you are a sergeant major as far as they are concerned. In a 'horizontal' sense - to others you're just the guy standing on the other side of the stop-watch.

**What has been the impact of your world class status as an athlete on coach-athlete communication?**

A lot of the impact stems from the confidence you have in yourself and in how you communicate that confidence to the athletes. This confidence over-rides everything you do. If you analyze technique

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*I concluded that I had been pushing too much, pushing too hard and by the time she rebounded it was too late.*

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*Some will listen to you in a 'vertical' sense: you are a sergeant major as far as they are concerned. In a 'horizontal' sense - to others you're just the guy standing on the other side of the stop-watch.*

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inaccurately, or prescribe training elements in the wrong amount at the wrong time for the athlete, you can destroy your credibility in the eyes of the athletes. Both your own confidence and the confidence of the athlete suffer as a result. Having been a world class sprinter has been an incredible advantage to me as a coach in this regard.

**What are some of the more noteworthy human relation problems you have had to deal with as a coach?**

I have had athletes telephone me at 10:00 at night telling me that they don't have confidence in me or in the training program. In that situation you get in your car, go over to the athlete's home and work it out right then and there. Sometimes athletes will be in a training phase where they don't fully understand the rationale for the training content; they can lose their objectivity or be in a confidence crisis.

If the athlete does not have faith in what we are doing, I have a serious problem that must be addressed. But in order for me to act, the athlete must believe he or she is able to tell me how he or she feels. The athlete may be completely discouraged and may not believe that the training he is doing is progressive. If he does not or cannot communicate this, I can't do anything about it. If an athlete keeps it inside — is stewing about it, is uptight and unhappy, I can't defend myself nor help the athlete. You must keep lines of communication with your athletes open otherwise you are both in real trouble.

I have had athletes leave me to either go work out on their own or with another coach. I used to take this personally. But you have to come to realize that it is not only the athlete who is developing and maturing but also you, the coach. Sometimes your development as a coach and as a person can be out of synch with the pace and level of development of the athlete.

*Charlie does not give 'inspirational' speeches to the athletes or repeatedly tell them how much he is concerned about them. Rather his communication of caring comes from actions - actions such as taking athletes to the hospital at 11:00 PM and waiting for them until 1:00 AM, visiting athletes when there are problems, securing support for their sport and private life, reading differences in athletes, and knowing when and how to deliver a critique of performance.*

## **Control of Training Environment**

*Charlie is well-known for 'doing battle' to obtain what he believes is necessary for the success of his athletes. Some of the things he has done include:*

- *providing money to athletes for food, rent, travel;*
- *relocating athletes out of a competition site hotel and into more suitable lodgings and at his own expense if he feels there is a need;*
- *making sure training and competitive uniforms are acceptable to the athletes;*
- *willing to confront track officials, government officials if he feels conditions for his athletes are non-optimal;*
- *ensuring that dietary supplements which athletes require are available;*

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***You must keep lines of communication with your athletes open otherwise you are both in real trouble.***

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***Sometimes your development as a coach and as a person can be out of synch with the pace and level of development of the athlete.***

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- *providing for massage even at his own expense (therapist's salary);*
- *working with financial consultant/agent to ensure athletes financial returns are maximal;*
- *finding sponsors and suppliers for his athletes;*
- *finding experienced and skilled support personnel.*

#### **What is the effect of having media personnel at practice?**

There is a lot of waiting involved in training — the athletes are not always moving. They may be recovering or getting a massage; so for someone to come out with a camera and do an interview is not really a major concern. There are some athletes who might consider this to be a bit of a hassle but most get a real charge out of it. In fact, I want cameras around in certain circumstances. I want this kind of attention because this feeds the athletes' self-esteem and can be very beneficial.

#### **Given the time and energy demands of commercial and public appearances to what degree do these demands have to be managed?**

Most of these aspects were handled by our agent, Larry Heidebrecht. He established a clear time frame and usually specified that they must not disrupt the athletes' normal training. But it got difficult, the athletes had obligations, and contracted obligations had to be met.

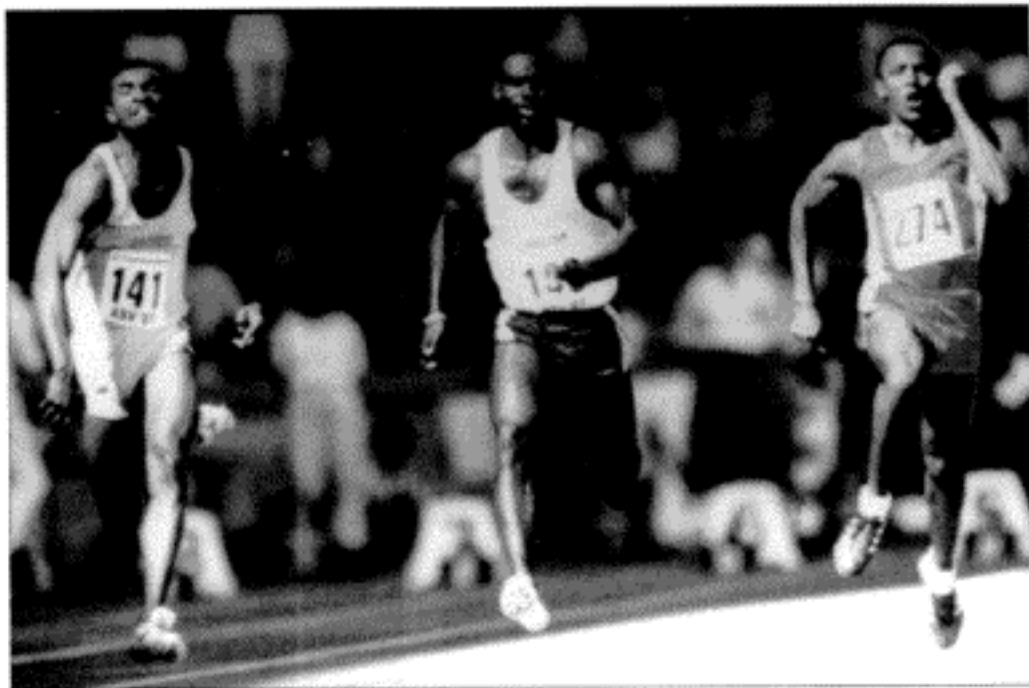


Photo Credit: All Sport Photographic LTD.

- FLOW denotes relaxed sprinting
- Relaxed sprinting begins in the face, neck and shoulders and cascades down through the body of the runner.
- Imoh and Smith struggle as evidenced by contorted faces and elevated shoulders in a race in Cologne, West Germany, 1987.
- meanwhile Johnson flows.



## CHAPTER 9

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# Electronic Muscle Stimulation (EMS)

*"My own results have been so favourable that I am not interested in debating whether or not EMS works but rather in optimizing the use of EMS in the training of elite athletes."*

*C. Francis*



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## Introduction

*This chapter is divided into four parts: EMS in regeneration; the treatment of injuries; EMS in maximum strength training including the principles and technique of application; and periodization of EMS.*

*The EMS equipment used for the training described in this chapter was the "POWERSTIM" range, manufactured by B.M.R. Ltd. (Bunberg Ireland) and is available in Canada through Bio-Med Systems Corp., Oakville, Ontario. (See page 206)*

## The Use of EMS in Sport

EMS has been used by athletes in former Communist block countries for sports training since the early 1950's, while western countries have become aware of the use of EMS only in the early 1970's.

In 1973, Dr. Y. Kots of the Central Institute of Physical Culture in the USSR, presented a paper on Electronic Muscle Stimulation (EMS) at Concordia University in Montreal, outlining the tremendous potential for strength enhancement beyond that which was possible by voluntary training methods. These claims raised many eyebrows and considerable effort was expended attempting to validate Kots' claims. Crude studies pitted EMS-fired muscles against voluntarily contracted muscles, and some studies, using EMS in combination with Cybex machines, appeared to show that EMS was not as effective as Kots had indicated in producing strength gains. The design of these studies, however, was flawed due to poor understanding of how EMS works on the neuro-muscular system. An EMS stimulus fires all motor neurons in the area being stimulated. It creates an uncoordinated contraction which is isometric in nature. Kots was able to show, using a tensiometric device, that the muscle tension produced by EMS is up to 30% higher than a maximal voluntary contraction. This finding was corroborated by Ikai et al (Sport Science and Sport Medicine 1967), Bigland-Ritchie et al (Clinical Science and Molecular Medicine, Vol. 57 - 1978) and others.

There is a motor learning aspect related to using EMS in the context of maximum strength work. It helps an athlete learn how to recruit and fire greater numbers of muscle fibre, for example if you are having trouble learning how to wiggle your ears - incorporate EMS stimulation of the desired muscles into your training. You will not only learn to fire the intended muscle group but also greater numbers of motor units within that muscle.

The implications of using EMS in athletic training are clear, particularly in relation to strength training. I believe that EMS helps an athlete learn how to recruit greater numbers of both red and white muscle fibres.

Given this fact EMS can help an athlete experience a training stimulus which is otherwise unattainable, or at the very least difficult to attain. It is also hypothesized that EMS creates intramuscular changes at the enzyme level (ATPase, SDH) resulting in gains in both work and in recovery capacity.

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***Paul Patterson attended and was the test subject — experiencing the effects of Dr Kots EMS device—at Concordia University in 1973.***

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## **The Role of Electronic Muscle Stimulation (EMS) in the Prevention and Rehabilitation of Injuries**

Injuries are often a result of imbalances of strength between extensors and flexors and between left and right sides of the body. In addition inappropriate strength training and incomplete recovery all predispose the athlete to injury.

It is prudent to use every possible tool to minimize the chance of injury and to enhance recovery should injury occur. A coach should be aware of the role of EMS in modern rehabilitation programs. The coach should also be aware of the risks of re-injury as a result of incomplete rehabilitation of an original injury. The use of EMS in rehabilitation is universally accepted as a technique of physiotherapy. However the time frames employed by physiotherapists are usually excessive and are not applicable to athletes.

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*Often overlooked in the search for specific injury factors and causes is the fact that the source of injury may be the training program itself.*

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### **The Role of Improved Speed and Strength in the Prevention of Injury**

The athlete with higher performance capacities in speed and strength will always be able to carry out a given training task at a lower percentage of his absolute capacity than an average or incompletely trained athlete, (i.e., if an athlete can squat 600 lb he is unlikely to be injured while squatting 400 lb).

### **Poor Athlete Preparation/Conditioning as a Source of Injury**

Without a doubt, the leading cause of hamstring injuries, indeed all muscle injuries — is poor conditioning and incomplete preparation. Often overlooked in the search for specific injury factors and causes is the fact that the source of injury may be the training program itself.

The overall performance of the athlete and even the success of an athlete's career is directly related to injury prevention. The coach who is able to employ a sophisticated training program will reap a double benefit in terms of avoidance of injuries, and ultimate performance results.

### **Immediate Post Injury Application of EMS**

Kots of the Soviet Union suggested that EMS could be allowed within two hours post injury. He recommended that a gentle pumping or pulsing type of EMS be accessed via an interferential electro-stimulator involving two pairs of electrodes. The electrodes are placed on the periphery of, but not directly over, the injured area. The gentle pulsing mode is applied for a period of ten minutes. After ten minutes a very gentle contraction (well below the pain threshold), is maintained for 12 seconds followed by an eight second rest interval. This procedure is repeated for another ten minute period followed by a further five minutes of EMS in the gentle pulsing mode (i.e., a series of one second contractions and one second relaxations).



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EMS is used in combination with elevation and compression to prevent edema (the accumulation of fluid) and the resultant swelling. This would follow the application of ice to the injured area to control inflammation and swelling.

At the outset, a careful appraisal of the circumstances of the injury is more important than the immediate post-injury physical examination. The immediate post-injury probing, in combination with any functional tests, might only exacerbate the problem and since ice/elevation/compression are called for in any case, immediate post-injury testing serves no real purpose. A clearer assessment can be made the following day. If it is suspected that the athlete has sustained a third degree strain, the application of an EMS treatment should not be used.

### **Prevention of Adhesions**

Approximately 48 hours after a muscle-pull type injury occurs, EMS can be applied in a slow pulsing mode to provide a low level of strength exercise to the injured muscle. This helps prevent the formation of adhesions which can complicate and prolong rehabilitation. EMS provides a gentle, predictable, and fully controlled form of strength exercise which is ideal for this purpose.

### **Increased Circulation (EMS and Heat Therapy)**

EMS used in a pulsing mode will cause vasodilation in the area being treated. This will increase blood supply and oxygen to the area to promote healing. This is particularly valuable for treating injuries to tendons which are not naturally well supplied with blood. Soviet research has shown that EMS can increase blood flow to tendons by up to 45%. In addition EMS works well in conjunction with heat therapy.

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*Soviet research has shown that EMS can increase blood flow to tendons by up to 45%.*

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### **Exercise of Non-Involved Muscles During Injury Period**

One of the biggest problems presented by an injury such as a hamstring injury, is the loss of fitness it can cause. The athlete normally detrains while recuperating from injury. The problem is compounded when the athlete overextends himself/herself later on in an attempt to make up for lost time. By using EMS in it's strength building mode, the strength fitness (power and muscle cross-section), of non-injured muscle groups can be maintained during the recovery period, and thereby prevent detraining.

The rehabilitation strategy in the case of a hamstring injury is based on the fact that the level of hamstring involvement in running is directly related to the speed attained. During a smooth acceleration (which in itself is a recovery cue), the distance over which the athlete can continue to accelerate, from the standing start, will predict accurately the final speed. Improved accelerations, both in terms of smoothness and total distance, then determine the recovery status.

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Running speed is determined by the distance over which the athlete is able to accelerate. From this data any speed deficit can be determined which in turn gives rehabilitation status.

Once top speed for that workout is reached, the athlete can then maintain that speed for the desired training distance. Since this procedure requires confidence on the part of the athlete, he should be taught these procedures as part of his regular training when he is healthy to facilitate the same procedure when he is injured. The athlete begins with ten metre accelerations and proceeds to increase the distance by two to five meter increments. Tape marks must always be used and the athlete must always start from a standing position.

## **Regeneration Enhancement with EMS**

The use of Electronic Muscle Stimulation (EMS) to aid recovery/regeneration is a relatively new technique, although similar modes such as interferential electro-stimulation have been used for some time. For example, interferential electro-stimulation involves the use of one pair of positive electrodes and one pair of negative electrodes. The area of the body to be stimulated is then bounded by the four electrodes.

The action of the EMS is to stimulate circulation and promote relaxation with a rhythmic pulsing action. The key areas of focus are the feet, calves, and upper thighs. During the treatment the athlete should be lying down with the feet slightly elevated above the head. For best results a quiet, calm environment should be maintained.

Pulse cycle consists of a one-second contraction during which blood is forced or pumped out of the muscle, followed by a one second relaxation during which fresh blood enters the muscle. The intensity of the pulse should be adjusted to personal preference. This treatment should be used anytime accelerated recovery from a workload is required and massage is not available.

During and following intense exercise, individual muscle fibres swell with fatigue by-products and remain in an excited state for a few hours after the cessation of exercise. These by-products must be transported out of the muscles before the circulatory system can transport nutrients into the muscles to initiate the recovery cycle. This is why recovery tends to be slower in the early stages of the recovery cycle and faster later on. EMS, when used in its pulsing mode, particularly during the delay phase of adaptation increases blood flow and lymphatic drainage. The 'EMS massage' can reduce the delay period and speed up the onset of recovery and the subsequent overcompensation process.

Manual massage has long been used for accomplishing this task. However, when dealing with large numbers of athletes — particularly in a team setting, manual massage may be unavailable. EMS then is the next best alternative therapy. To facilitate optimal recovery both EMS and massage should both be used in conjunction with a range of other regeneration techniques such as sauna/shower/contrast baths and hot wax.

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***However, when dealing with large numbers of athletes — particularly in a team setting, manual massage may be unavailable. EMS then is the next best alternative therapy.***

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## EMS — Training of Strength and Explosive Power

Tremendous improvements in strength are reported to have been achieved when EMS was added to the strength building regimes of Soviet weightlifters and throwers. Kots of the USSR reported strength gains after 10-15 treatments of up to 30% in a period of three weeks. This is remarkable because these athletes had already been doing everything possible to be as strong as possible.

Maximum strength gains are usually achieved after 10-15 treatments and there is no advantage to going beyond 10-15 treatments. These strength gains are not accompanied by increases in muscle mass or cross-section. This characteristic is consistent with CNS related strength training such as maximum weight methods, eccentric methods, and plyometrics.

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*Maximum strength gains are usually achieved after 10-15 treatments and there is no advantage to going beyond 10-15 treatments. These strength gains are not accompanied by increases in muscle mass or cross-section.*

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### EMS - Training of Speed

It has always been assumed that two unalterable factors determined an individual's ultimate capacity to run fast:

1. A high inherited ratio of fast twitch (explosive) muscle fibres to slow twitch (endurance) muscle fibres.
2. Different mounting points for the muscles on to bones providing different mechanical advantages (there is individual variation in tendon attachment distance from the joint fulcrum, resulting in varying lengths of lever arms and of resulting mechanical advantage. Larger distance equals larger mechanical advantage).

Electronic Muscle Stimulation (EMS) preferentially contracts white fibre before red fibre, which is opposite to the natural recruitment order of the body. Kots described a significant reduction of the time necessary to achieve 100% tension within the muscle after 10 to 15 treatments with EMS. Similar results were found by Dr. Ianuzzo of York University in Toronto (Journal of the Canadian Athletic Therapists Association, Vol. 7, No. 1 Issue 24, Mar 1970). Fast twitch fibres generally reach maximum tension in 20 milli-seconds and slow twitch fibres in 65 milli-seconds. Ianuzzo states that the speed of contraction of slow twitch fibres can be improved with systematic EMS training (principle of 'adaptation to demand'). The implication is that EMS training improves the rate of force development (i.e. power), in a contracting muscle beyond that which is possible by any other means.

(Note: This would explain gains in power without gain in muscle size).

### The Use of EMS in Training Hamstrings/Ankle/Abdominal Strength

#### Function of the Hamstring Muscle

The hamstring muscles are the most vulnerable to injury. This vulnerability warrants an understanding of how the hamstring muscles function. In running, this may help clarify how injury can occur, and why there is some confusion as to the mechanism of hamstring injury.

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## Multiple Roles of the Hamstrings

The hamstrings function as the primary flexor of the knee joint as well as the secondary extensor of the hip. In view of the dual role of the hamstrings and the tremendous rapidity with which muscle contraction takes place, the need for implementing correct running technique at high speed is obvious. Any disruption in technique can have disastrous consequences. The coach should keep this in mind when confronted by an athlete who is constantly injured in the hamstrings despite all preventative and therapeutic regimes. The hamstrings of this athlete may have been trained only for knee flexion and not hip extension.

### Insufficient Hamstring Strength Relative to Quadriceps

It is well known that an imbalance between hamstrings and quadriceps strength is a leading cause of hamstring injury. In running, during the support phase the hamstrings and quadriceps contract simultaneously to maintain the knee position. If one force is greater than the other and external resistance is maintained, something must give. In most cases it is the hamstrings. Traditionally, the strength ratio between quadriceps and hamstrings has been assumed to be about 60/40. However additional research has put these findings in doubt. An informal strength assessment of the six leading sprinters in Canada (all world ranked), done at Bishops University in 1982, showed that in all cases, when tested at high velocities on the Cybex, the hamstrings actually exceeded the quadriceps in producing power. Results ranged from 100% to 130% of quadriceps power at the highest test speed. This very informal look at Canadian sprinters seems to confirm the study on 1972 Olympic Champion Valery Borzov done in the USSR. This suggests that, since the hamstrings tend to have a higher ratio of fast-twitch fibre than the quadriceps, then as contraction velocity increases the strength ratio will increase in favour of the hamstrings. Further, a balance must be achieved between the hamstrings of the left and right leg. This is difficult to achieve with traditional strength building techniques because, generally, both legs are involved in the exercise simultaneously. Strength levels are improved in both legs but the percentage imbalance can remain unchanged. In general a 10% difference in strength between the left and right legs is considered significant. Electronic Muscle Stimulation is extremely effective in correcting strength imbalances because of its great strength-building potential and the fact that it is applied specifically to deficient muscle groups.

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*Electronic Muscle Stimulation is extremely effective in correcting strength imbalances because of its great strength-building potential and the fact that it is applied specifically to deficient muscle groups. This also brings in to question, the advisability of routinely taping ankles, as this action tends to refer injury to the hamstrings.*

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### Insufficient Strength and Endurance Qualities in Related Muscle Groups

#### Ankle Strength

Electromyography has demonstrated that, during the running stride, most of the absorption of force at the point of ground contact is accomplished during a slight dorsiflexion at the ankle joint. This knowledge has resulted in a great deal of emphasis being placed on the development of foot and ankle strength. Foot strength is difficult to develop through traditional strength training methods: EMS is used, in this area, particularly by the Soviets.

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## Abdominal Strength

In sprinting, abdominal strength is critical to success. If the abdominals fail in the late stages of a race the athlete will begin to lean back, in an attempt to maintain knee lift. This backward lean causes the foot strike to occur too far ahead of the center of gravity. This results in deceleration and overstress of the hamstrings, potentially leading to injury. Strength and endurance in the abdominal muscles can be developed relatively quickly with EMS.

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*In sprinting, abdominal strength is critical to success. If the abdominals fail in the late stages of a race the athlete will begin to lean back, in an attempt to maintain knee lift. This backward lean causes the foot strike to occur too far ahead of the center of gravity.*

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## Planning and Periodization of EMS into a Modern Training Program

Since EMS can influence so many training components, it should be introduced into the training program very early so that the development of adequate strength and power always preceeds the performance of all other training components.

If an athlete cannot attend all training camps and if they train for periods of time away from coach supervision, it may be advisable for them to consider the use of EMS. A muscle stimulator which is portable, simple to use by the athlete, and relatively inexpensive, is required.

## Periodization of EMS

The partial season graph (see figure 4-3, Chapter 4), shows how the individual components of a training program fit together with EMS. When strength and power are key elements of performance even shorter cycling periods should be used - cycles as short as three weeks operating on a loading principle of 80% in first week, 100% in second week and 60% unloading in the third week in terms of workload (volume) capacity. Note how explosive power work is increased at the end of each EMS treatment series to compensate for the overall reduction in CNS work. (ie., as the EMS work ends, explosive power work is increased to maintain a consistent overall volume of CNS related work).

Each component, if introduced in isolation, will cause stiffness in the initial stage but when introduced in combination with other components, the athletes can move from one training element to another without experiencing stiffness. Each component prepares the body to handle the next. In designing the training plan the coach should realize that the EMS component works primarily to enhance the qualities of speed/strength and speed endurance. Once the overall approach to training has been mapped out, the composition of the individual EMS phases can be planned.

Kots (USSR) indicates the following guidelines for EMS use:

1. Speed Enhancement — 10-15 treatments
2. Strength Development — 20-25 treatments
3. Strength Endurance — more than 25 treatments

However my own experience indicates that 10-15 treatments of EMS are optimal for both Speed Enhancement and Strength Development.

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In deciding on the number of treatments to use in a given EMS series — one must consider the training phase and time available within that phase. One should also keep in mind that best results are obtained with shorter EMS phases applied more often in the year.

It should be noted that the training gains from EMS are rapid in the beginning of the series and slower towards the end. This would indicate that the training returns from a series of more than 25 treatments would be marginal. A consolidation period of between two and four weeks should be allowed between treatment series.

## Single EMS Session Characteristics

When used for training purposes as opposed to rehabilitation each EMS treatment for each muscle group involved in the EMS session should consist of ten repetitions of :

10 second stimulation (maximal contraction) followed by 50 second rest; The rest period must never be shortened – this reduces the effectiveness. Note also that no more than ten contractions (repetitions) should be administered to any one muscle group within a 24 hour period.

In sprint training we target the following muscle groups:

Lower Back	10 repetitions of EMS
Abdominals	10 repetitions of EMS
Quadriceps	10 repetitions of EMS
Hamstrings	10 repetitions of EMS
Gluteals	10 repetitions of EMS
Feet	10 repetitions of EMS

It is of critical importance that any time the quadriceps (front thigh) are stimulated, the hamstrings (rear thigh) must also be treated in order to avoid (or correct) a quadriceps/hamstring imbalance which can lead to injury. The lower back, abdominal, and leg muscle groups are treated while the athlete is lying down with legs extended.

Optimal sites for pad placement will vary between individuals and some experimentation will be needed. Furthermore, the athletes being treated should always be in control and set the intensity levels themselves; the electric current required for a maximum contraction can vary greatly among athletes so the coach should be careful not to push the athlete to use an intensity which the athlete is not prepared for. An athlete's tolerance and comfort will almost always improve dramatically after the first week of treatment. Just as with the onset of weight training the athlete may experience some soreness and stiffness initially with EMS but this will diminish as the treatment series continues.

With the advent of multi-pad machines, more than one muscle group can be stimulated at the same time. This greatly reduces treatment time, *however the extensor and flexor of a given joint should never be stimulated at the same time.*

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*In deciding on the number of treatments to use in a given EMS series — one must consider the training phase and time available within that phase. One should also keep in mind that best results are obtained with shorter EMS phases applied more often in the year.*

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## Example Microcycle (week)

In a given microcycle, high intensity work is separated by at least one day of rest. EMS should be done three or four times per week, generally on the same days when high intensity power work is done. The microcycle illustrated would be typical of a general preparation period.

The one day separation between speed work and speed endurance work allows for the recovery of the central nervous system. Any departure from this general principle will eventually lead to diminished performance gains and result in 'overtraining.'

By itself EMS treatments, since they act on the muscle motor points directly and, bypasses the normal pattern of activation of the Central Nervous System (CNS), could be used every day; but, to adhere to the variety principle they are periodized over the week or microcycle. Four EMS sessions per week are possible. If three sessions per week were used, then they would occur on Monday, Wednesday and Saturday. For best results EMS should be used at the end of the day, no sooner than 2 hours after the last workout.

As with any other type of exercise an EMS treatment should be preceded by a warm up. The skin must be clean and free from oils to allow for good conduction of current through the skin to the target muscle. A warm bath or shower will warm the muscles as well as clean the skin. This should be followed by a short period of relaxed stretching and a few calisthenics exercises to complete the pre-EMS warm up.

## Supercompensation

Supercompensation is the desired result which caps the 'stimulus — recovery — supercompensation' training cycle and on the basis of which all training and performance improvement occurs. In effect 'supercompensation' is the amplified rebound response of an organism to an environmental stressor.

When work is performed the body is fatigued as a result. At the end of a training session the body responds by attempting to restore itself to its pre-workout level. As the body regenerates, its capacity not only reaches the pre-workout level but rebounds above its pre-workout level temporarily, and if no further training stimulus is applied, will return to normal. At this point it should be noted that the Central Nervous System takes longer to recover than the peripheral musculature and different individuals recover at different rates. Muscles will generally recover within 24 hours while the Central Nervous System requires 48 hours or longer to recover after high intensity work. After particularly demanding high intensity work the CNS can require up to 2 days and even longer to regenerate fully. It is not always possible to adjust workouts to accommodate this fact, especially in team training situations where high stress tasks must be carried out at the same time with many athletes. The first adjustment which should be made is to apply Central Nervous System stressing activities very sparingly whenever possible, to compensate for the high stress tasks which cannot be avoided.

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*Supercompensation is the desired result which caps the 'stimulus — recovery — supercompensation' training cycle and on the basis of which all training and performance improvement occurs. In effect 'supercompensation' is the amplified rebound response of an organism to an environmental stressor.*

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Since Electronic Muscle Stimulation bypasses the Central Nervous System, the use of EMS to replace or partially replace heavy weights during a competitive phase is a very effective way of reducing CNS stress. During the competitive phase, four to six contractions per muscle group would be sufficient to maintain strength.

In addition, the training gains made earlier in the program through the use of EMS can change the perceived effort of a given task from high stress to medium stress.

#### **What is the place of electro-stimulation in the recovery process?**

For recovery you are using a short duration pulsing type of stimulus one second as opposed to the ten second contractions you would use for strength development.

#### **Is it the pumping or pulsating action which facilitates recovery?**

Yes, EMS can function as a form of massage or it can function by stimulating certain nerve points to release hard contracted muscle or muscle spasm. There are many different ways in which it can be used, depending on the expertise of the person that is using it.

#### **Do you use the same device for recovery/regeneration as you do for maximum strength?**

You can use any EMS machine and convert it, provided it has a small enough contact point to hit the sites that you select. When you are targetting nerves you use the smaller pads, to stimulate a smaller area. It depends on what you want to accomplish — there is a wide variety of uses.

EMS has been used within the Eastern Block countries since the 1950's but is still considered novel in the West. Similar in theory to acupuncture, EMS can isolate the tiniest nerve point for a wide range of effects. It can relieve pain, reduce swelling and increase circulation to the treated muscles thereby hastening recovery from injury or fatigue.

#### **Can EMS be self-administered or does it have to be administered by a professional?**

When you need to stimulate specific motor points, then it's much more difficult for the athlete to do the therapy. But when using EMS for recovery purposes the athletes can operate the stimulator themselves.

#### **Mark McKoy and Desai Williams say they find EMS painful. What is the variation in tolerance of EMS among athletes?**

There seems to be a wide variation in tolerance among athletes. I'm not sure how much of it is physiological and how much is psychological. Ben Johnson, Angella Issajenko and Cheryl Thibedeau have used EMS the most extensively, but even they will go through periods when they do not use it. Mark McKoy and Desai

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*Since Electronic Muscle Stimulation bypasses the Central Nervous System, the use of EMS to replace or partially replace heavy weights during a competitive phase is a very effective way of reducing CNS stress.*

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## **Q & A**

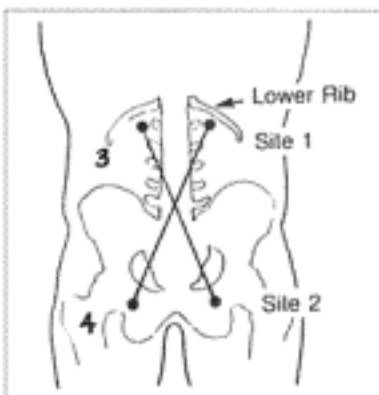
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*EMS can function as a form of massage or it can function by stimulating certain nerve points to release hard contracted muscle or muscle spasm.*

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The following five figures illustrate electrode site options for EMS strength training.

**FIGURE 9-1**





Williams use EMS only infrequently, and on fewer muscle groups because they find it uncomfortable and painful.

#### **Would EMS be applied before competition?**

Muscle stimulation wouldn't be used before competition in the strength mode but in the case of injury it could be used in a pulsing mode for a massaging effect.

#### **WHAT PLACE DOES EMS HAVE IN STRENGTH TRAINING?**

EMS can be used as an adjunct to weightlifting and other strength work. EMS can also be used to improve an athlete's explosive power.

#### **Can you elaborate on the difference in recruitment order during an EMS contraction as compared to a voluntary contraction.**

EMS recruits white muscle fibre preferentially before recruiting red fibre. During a voluntary contraction it is just the opposite — red muscle fibre is recruited initially because it is more efficient but as the intensity of contraction increases white fibre is fired.

In young athletes you also are training the transitional fibre to take on the firing characteristics of white muscle fibre because of the nature of the EMS stimulus. I also believe that regular use of EMS will shorten the time required by the muscle to achieve maximum tension. Generally white fibre requires 20 milli-seconds and red fibre 65 milli-seconds. I think EMS promotes a shortening of contraction time in the red fibre as well.

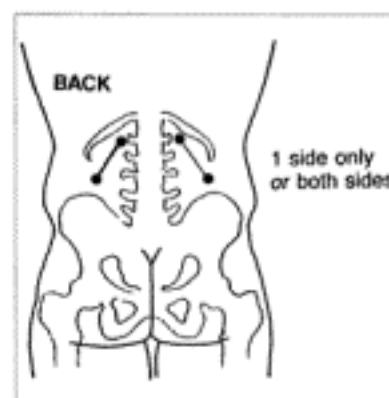
#### **Your periodization model illustrates that you apply EMS in conjunction with a maximum strength phase of training. Do you use any EMS repetition configurations with EMS other than 10-15 repetitions?**

No. We have tried different configurations earlier but we don't go beyond 10-15 treatments anymore. It seems that maximum power gains are made in this range. Again though, sometimes individual adjustments have to be made.

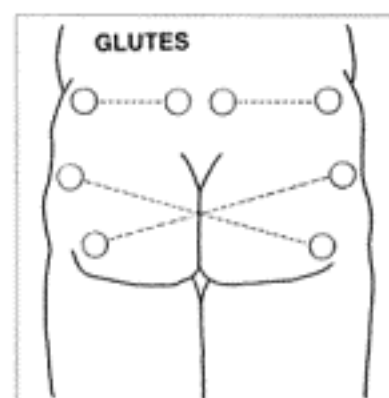
#### **What is the place of EMS in strength maintenance?**

Sometimes the athletes do not have access to strength training apparatus or weights when they are off-shore. In this situation they may resort to brief sessions of EMS. A graphic example of the value of EMS in preventing detraining occurred with Molly Killingbeck. She sprained her ankle severely and couldn't run at all in December of 1981. She was placed on muscle stimulation exclusively for almost 3 weeks. She could only do calisthenics and muscle stimulation — no running whatsoever. She was back in form two days after beginning to run again. She ran the fastest time in the world for the year 1981 in the 400 metres. I found that pretty interesting that she was able to prevent detraining with EMS for that period of time and achieve a personal best immediately after.

**FIGURE 9-2**



**FIGURE 9-3**



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*I found that pretty interesting that she was able to prevent detraining with EMS for that period of time and achieve a personal best immediately after.*

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**When in the course of a day's workout do you schedule EMS work?**

EMS work is always done at the end of the day, after all skill related work is completed. It can be done by the athlete before going to bed. According to Waldemar, *an EMS session is never followed by massage. The massage is usually done the next day.*

**How difficult is it to use the EMS device?**

The device we use is a 'Powerstim' unit which is very easy to use. It is equipped with four sets of two pads so that the pads can be moved from muscle group to muscle group quickly. It takes 10 to 15 minutes to work each muscle group. This consists of one set of 10 x 10 second contractions interspersed by 50 second rest intervals.

The muscle groups normally exercised with EMS are the hamstrings, the quadriceps, the gluteus, sometimes the soles of the feet, and the lower back and abdominals.

**How is EMS used to strength train the feet?**

Foot strength is very important. When you can hear the feet smacking down on the running surface - this is an indication of weak feet. You have to be careful however, because the same sound can indicate not only weak feet but also that the foot is spending more time on the ground due to fatigue.

EMS is one of the few options I know of for dealing with weak feet. Running in bare feet on grass is another. There are other ways of strengthening feet such as rolling a towel up with your toes and this kind of thing. But most certainly EMS is a very effective and easy method of dealing with the problem. You stand on the EMS pads with one contact pad at the front and one at the back of the foot. That way you prevent the foot from rolling up into a cramp. The athlete stands on the pads for the duration of the EMS treatment.

**What is the specific muscular effect on the foot as a result of EMS work?**

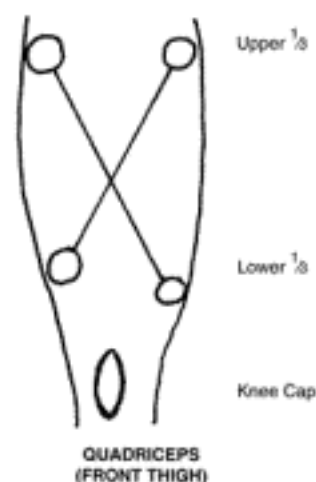
The effect is directed at the muscle action of the toes and the musculature which supports the arch. The performance result is that a stronger foot spends less time absorbing shock when it contacts the ground and is thus able to transmit force against the ground more efficiently (i.e. run **over** the ground not **on** it).

**Would you say that the training effects differ between maximum strength work and EMS work?**

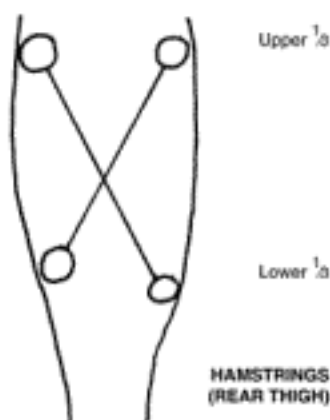
It is not so much that the effects are different as that with the combination of the two methods, the cumulative CNS cost of a given training session is lower than it would have been had you applied the same total stimulus through maximum weightlifting methods alone.

With weights there is a crossover effect of strength from the exercising limbs to the non-exercising limbs. For example, when you work the left side of the body you have a crossover strength effect to the right side of the body. When you use EMS you focus only on the target muscle(s) and there is no cross-over effect impacting on the entire organism.

**FIGURE 9-4**



**FIGURE 9-5**



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*It is not so much that the effects are different as that with the combination of the two methods, the cumulative CNS cost of a given training session is lower than it would have been had you applied the same total stimulus through maximum weightlifting methods alone.*

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## How important is EMS as a recovery/regeneration option?

It is another regeneration option but where it has particular value is to complement the work limitations of a massage therapist. We have a full time massage therapist but he can massage only so many bodies in a given day. The athlete has another option through using the EMS in a pulsing mode. For athletes who have no massage therapist, or very limited access to massage, the regenerative capability of EMS provides an important alternative.

### EMS CASE STUDY

Cheryl Thibedeau

- SET-UP: When placing pads - they are positioned to achieve:
- maximal contraction (isometric or no limb/joint movement)
  - avoidance of a co-ordinated contraction which creates involuntary movement of the limb, by placing the pads at appropriate distances from the motor points.

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*For athletes who have no massage therapist, or very limited access to massage the regenerative capability of EMS provides an important alternative.*

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EMS intensity setting (0-10)	Muscle	Muscle Sites	
4-5	Quadriceps	site 1.	proximal to knee on the vastus medialis muscle
		site 2.	2/3 distance up the thigh from the knee
10	Hamstrings	site 1.	lower 1/3
		site 2.	upper 1/3
9	Gluteals	site 1.	1 pair of electrodes high on each gluteal close to hips
		site 2.	1 pair of electrodes low on hips to crossover of electrical current
7	Back	site 1.	lower back on spinal erectors
7	Stomach	site 1.	upper abdominals

EMS electrode placement on lower core (back and stomach) is such that bilateral strength imbalances are corrected (ie., if right side of back is weaker - only that side will be stimulated.)

You will notice three key aspects of EMS application in the following photographs:

1. Muscle site selection.

2. Three different electrode types (see #1, 5, 10).

3. Four different EMS stimulation configurations:

– (i) 4.Electrodes (see # 4, 5, 6, 8) -

(ii) 2. electrodes (see #9)

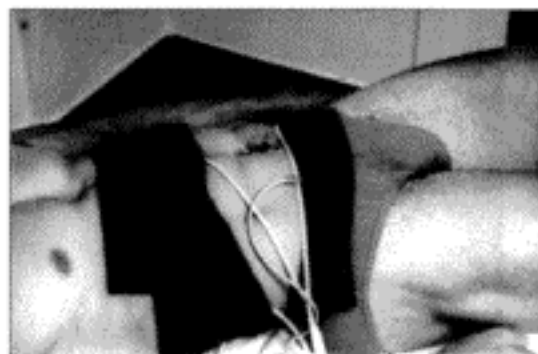
– (iii) 3.electrodes (see # 1, 2, 3, 7)

– (iv) 1.electrode (see #10)

1.



2.



3.



4.



5.

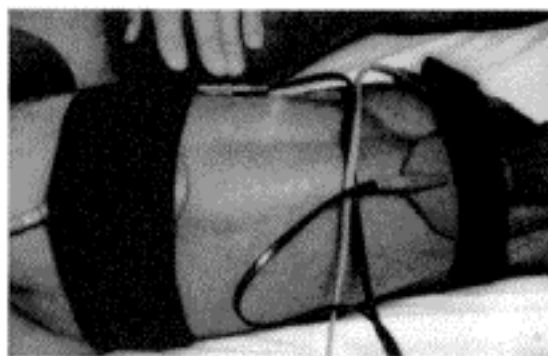


6.

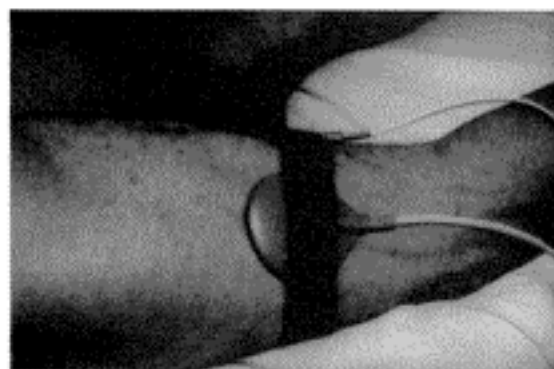
Note that the 'Powerstim' device has a capacity of 4 pairs of electrodes



7.



8.



9.



10.



## CHAPTER 10

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# Politics And Coaching

*"If you are patient in Canadian sport you will be patient until 'hell freezes over' — it's as simple as that! No one will do anything unless you go and kick over some garbage cans. You have got to do something — you can't just sit there. Nothing is going to happen unless you make it happen. You are your own support structure in this country and if you don't do it, it won't get done."*

Charlie Francis

Interview by D. Stubbs, *Champion Magazine* 1987

*"If you sit there with a tin cup in your hand, waiting for finances to arrive on your doorstep, nothing will ever happen."*

Charlie Francis



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## Is sport an art form?

Yes, sport is an art form. It is entertainment. It is no less a part of a country's culture than is ballet, music, literature, painting or sculpture. The same people who begrudge the money which this country spends on so-called pure art-forms begrudge the money which is spent on sport. You would think that what they want is a nameless, faceless, bee-hive culture where everyone lives and acts in the same way — a society, in other words, where people wander to and from their jobs without culture and without reason. Such a society is in the process of committing suicide. There must be some joy in this process to make life worth living. Sport is a part of the cultural phenomenon that gives meaning to a nation.

## Could you comment further on sport as entertainment?

Entertainment is that which brings joy to the viewer — it brings some experience, some challenge to the sensibilities. A movie can be a challenge, as can a sporting event. It can challenge the viewers' beliefs, their views and opinions, their self-image — their national image.

## Why should there be a public policy on sport?

Sport is part of a nation's culture. There are those in Canada who view it as being separate from the arts, but it is not. You have only to use the example of ballet as a physical art form to appreciate this fact.

The former East Germans used high performance sport to establish a sense of national identity. Canada's self-image could benefit from using sport in this way. Being a nation which historically, has the highest rate of immigration per capita in the world, we may have an even greater and ongoing need to develop and strengthen our sense of what it is to be a Canadian.

At the world level, Canada is seen as a nation of negotiators or peace makers and as a sporting nation. I am not sure, however, to what degree Canadians themselves base their national self-image on this external image of Canada. One of the biggest sources of pride, both from a national and international point of view, is our war record. If you go to Europe, people there remain quite impressed with the job Canadian soldiers did in Western Europe during the two world wars. However, I hardly think we want any more wars to further establish this reputation. But we can certainly promote Canada's image abroad through sport.

As a sporting nation we could make political inroads into Third World countries. Many third world countries have ideal climates for sport. We could be exporting sporting knowledge and technology, running clinics and educating coaches abroad, while at the same time advancing our own sporting programs by having access to foreign training camps as we require them.

Our club did this in order to provide the variety of training environments which we needed. We were able to arrange for nearly cost-free training camps in Caribbean countries in return for

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## Q & A

with Charlie Francis

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*Sport is a part of the cultural phenomenon that gives meaning to a nation.*

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*Sport is part of a nation's culture. There are those in Canada who view it as being separate from the arts, but it is not. You have only to use the example of ballet as a physical art form to appreciate this fact.*

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instruction to their athletes and coaches. This instruction would otherwise not have been available to them. This could easily be implemented at the national level, through The Department of External Affairs, as part of an overall foreign affairs policy.

**What is your opinion of the Association of National Coaches in Canada?**

This concept is barely off the ground as this is the first time in Canada (1988) that such an association has existed. They remained without a phone number for a long time, however. It seems rather ironic that service agencies such as the Sports Medicine Council of Canada have had a phone number for 10-15 years but the clients — the coaches — had to wait too long to have contact with an agency that was put in place for them.

**Why does this situation exist?**

I suppose because doctors, physiotherapists, and sport scientists see themselves as professionals and have set up professional structures. Coaches have always viewed themselves as amateurs and, it would appear, have conducted themselves accordingly.

Another facet of this problem is that medical professionals are well paid; they can better afford to establish professional associations, and make them work. Coaches, on the other hand, are very poorly paid and can afford neither the time nor the money to launch an effective organization. I don't know many coaches who can afford to pay annual dues out of their subsistence level earnings.

**Is our current method of training coaches appropriate?**

There must be a better method than we now have of teaching aspiring coaches certain basic information and then at some point certifying them so that it is apparent to athletes, and parents of athletes for that matter, that they do in fact know how to coach. Not everyone is capable of, or aspires to coach at a high national — let alone an elite international — level. There must be a method of distinguishing various levels of capability.

The situation Waldemar Matuszewski, our regeneration specialist, describes in selecting candidates for sport massage training in Poland comes to mind. Out of every hundred candidates for such training, only a handful were accepted who had the tactile skills as judged by their ability to find scar tissue and adhesions in a test subject. The ability to produce results has to be the deciding factor.

In Canada you have to wonder how valid or effective the current system of coach education is, based on the fact that a coach can achieve level 4 or international coach status without having demonstrated an ability to produce results in the form of an international athlete.

Obviously, the system as it currently operates does not have much credibility in my mind. But this brings me back to my favourite topic of apprenticing. Going back through history, whenever someone wanted to learn an art-form — which sport is — he or she had to

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apprentice with a master, and in most cases for many years. They had to perform and they had to produce results, even as apprentices, or they did not last very long. Master and apprentice alike had to produce results. If I were a developing coach I would want to work with an already successful coach for at least one to two years.

**You have spoken of your vision of a sprint centre which is significantly different from the current 'event specific centre' concept you worked under. Can you elaborate?**

The idea is that if we could involve athletes who could be coaches then we would have the beginning of a really excellent project. We were attempting to get this off the ground based on the knowledge that sprints and hurdles are related. And it does not stop there. Sprinting techniques relate not only to hurdles but also to jumps such as the long, the triple and the high jump, as well as to the pole vault. Athletes in power dominant events such as throwers (i.e. shot putters, discus throwers), have trained at the sprint-centre to access the CNS related maximum strength-power development techniques.

So much could be accomplished if we could get good apprentices involved on a predictable basis. There would be a multi-year apprenticeship allowing further development as an athlete and at the same time not interfering with the athlete's preparation as a coach.

All sprint, hurdle and jump athletes come from the same base. Furthermore with the approach I have described, I believe you could channel athletes more effectively into events in which they would have a greater chance of succeeding at the world level. Currently I require approximately nine athletes to get one who will succeed at a high level in sprinting. If this same pool of athletes had access to all sprint related events in the same centre, this ratio could be improved threefold to 3:1. Most of the nine athletes I get who do not succeed at sprinting either 'fall through the cracks' and are lost to sport, or they move on to work in some other event with a coach who does not know how to coach sprint technique. As a result the athletes do not realize their potential.

To set this up would require a lot of co-ordination so that everyone would be on the same technical and philosophical wave length. If the pole vault coach and the long jump coach are coaching athletes in totally different ways management is difficult and results suffer. It would take a comprehensive effort to establish such a centre — at least in the way I envision it.

**Describe the working relationship among centre coaches.**

What we did in 1985 was identify the needs for our club: What are the needs of the athletes in the Mazda Optimist Track Club? Athletes can be ranked into approximately five levels of aspiration. First there are rank beginners, then there are athletes who aspire to the provincial team, to the national junior team, to the national senior teams, and finally the athletes who have national carded status.

Of the five groups identified, only the beginners do not need training camps. The next group could benefit from the occasional mini-camp, the national junior team would need a spring camp, the senior and

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*Going back through history, whenever someone wanted to learn an art-form — which sport is — he or she had to apprentice with a master, and in most cases for many years. They had to perform and they had to produce results, even as apprentices, or they did not last very long. Master and apprentice alike had to produce results. If I were a developing coach I would want to work with an already successful coach for at least one to two years.*

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*Of the five groups identified, only the beginners do not need training camps. The next group could benefit from the occasional mini-camp, the national junior team would need a spring camp, the senior and carded athletes require spring and winter training camps.*

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carded athletes require spring and winter training camps. Next we identify where these training camps should take place, how many days would be involved and how many athletes would attend; then we calculate how much money is required to make these camps happen. The competitions have to be selected and thus the points at which it is necessary to peak the participating athletes' performances. Beginners need to compete as often as they can without peaking for any particular meet. Athletes at the next level require a minimum number of competitions, but need to peak for the national junior events because they are trying to be selected for the national junior team, and so on up the line to athletes who are trying to be carded at the national level.

At this point you have identified within each level of aspiration, and by each event, how many competitions are required. If it is the 100 metre sprint, for example, you require approximately 5-6 competitions prior to the major competition to make sure the athletes are really sharp and ready for a personal best performance. To peak for the 200 metre event, it might require 4-5 competitions; for the 400 metre event, 3-4 competitions; for the 100 metre hurdles, 7-10 competitions, and for the 400 metre hurdles, 4-5 competitions.

Having identified the competition needs of each event we then decide how many events we can actually handle financially. During such a process the coaches can see exactly where we are trying to go and how we intend to spend the available monies. We then would go to Ross Earl, the club president, and present our plan from the club standpoint and proceed from there.

**How do other clubs function - that is, those who do not have a Ross Earl with the capability of raising funds in excess of \$100,000 per year?**

Other clubs have fund raising programs as well but there are key differences in the operating philosophies of most clubs compared with the Mazda Optimists. Our policy has always been to spend most of the money on the athletes and very little on the coaches until all the athletes' needs were met. We took a lot of flack for that approach. Other clubs take the approach of paying the coaches first out of their limited funds and then trying to charge the athletes a fee. Most athletes, particularly beginning athletes, are unable to pay this fee. Furthermore, these clubs do not provide the necessary training camps — in many cases they provide no training camps at all. However, their coaches are paid. We continued with our approach because we were getting results; we knew we were on the right track on the basis of these results. We were then able to go to agencies such as Sport Canada to find funds to pay coaches.

The most cost effective way to get results is to look after the athletes' needs first. Otherwise you have to ask yourself why the sport system exists in the first place.

**How do you view the place of the University system in Canadian sport?**

The university system in Canada has been dead from the neck up for some time as far as I can see. If the universities don't even try to achieve excellence then I think you have a real problem on your hands. Are these such profound questions to be asking? "Do we

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want to achieve excellence? Do we want to be good?" The universities have apparently not asked these questions. When they try to prevent training centre athletes from competing in university track meets you have to wonder what exactly it is that the universities are aspiring to. Do sport mediocrity and academic excellence co-exist with optimal results? I don't believe so! It's like the Vietnam war — if you don't know what your objective is, you are not going to achieve it.

The Canadian Interuniversity Athletic Union (CIAU) actually lobbies to exclude national sport centre athletes from competition. In other words you're banned from university competition for being good.

While the universities *line up at the trough* attempting to get Sport Canada to fund research programs, or to pay faculty members for teaching coaching theory courses, they are not focusing on the athlete at all. Some of this largesse should be passed along to the athletes in the form of scholarships. Otherwise, university sport programs are no more than exercises in recreation rather than sport excellence.

The present policy of freely allowing Canadian athletic talent to go into the US university scholarship system is ill-advised. However, changes in the Canadian university system would have to occur to create viable options for talented Canadian athletes. Canadian universities would have to commit to excellence in sport. Presently, it is largely for monetary reasons that the Canadian athlete accepts a US university scholarship. This is compounded by the fact that the Canadian carding system is based on international rankings and it's much more difficult for an athlete to remain in Canada. You do not have to perform at near the same level at a U.S. university to maintain your scholarship.

#### **What is the situation at the elementary and high school level?**

It's really not the same as at the university level. At the high school level, the sport results can be quite high. Ontario has some very advanced high school programs which are producing excellent results. Evidently there is a commitment to sport excellence at this level.

#### **Would you make any changes to the Canadian system of carding athletes?**

Yes. We need a system of carding which both federally and provincially is based on international rankings. In other words, an athlete who is not carded by Athletics Canada (using Sport Canada funding), should be carded by the province. I am against the use of domestic rankings unto themselves to be the basis on which funds are allocated because under such a system, sports whose performance levels are not at world level continue to be funded. If one of our national sport goals is to succeed at the world level then let us use world rankings across the board — for all sports.

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***Do sport mediocrity and academic excellence co-exist with optimal results? I don't believe so!***

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***In other words you are banned from university (C.I.A.U.) competition for being good — this is tantamount to banning a student from an exam because he studied for it!***

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**How many coaches in this country are doing an effective job?**

My answer would depend on whether the coach is paid or is a volunteer. I think that the number of paid coaches not doing the best job they are capable of would be relatively small.

On the other hand many coaches, both volunteer and paid, lack the specific knowledge and experience to develop athletes optimally.

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*On the other hand many coaches, both volunteer and paid, lack the specific knowledge and experience to develop athletes optimally.*

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**Did the retention of an agent help you be more effective?**

First off, as a coach you are busy trying to obtain results and trying to provide for your athletes. You have some success in helping them with things like finances but at some point you realize that what is required is beyond what you alone can deliver. I tried many times to talk to agents, such as Alan Eagleson, and could not create any interest at all. They all told me to get lost. The interest wasn't there because of the lack of pay back: 10% of nothing is nothing. When things started happening though, and we began to produce results, we were able then to bring in people who had the expertise.

In 1985, I met and began working with Larry Heidebrecht, our agent. He did not make much money initially, but when I would receive calls at 2:00 o'clock in the morning, I knew that he was working his butt off for us.

**To what degree was the coaching of a world champion a personal goal versus a goal on behalf of Canada?**

I wanted Canadian athletes to do well and succeed at the world level and I saw absolutely no reason why this was not possible. But there was a difference in perception between the way I was thinking and the way most other coaches thought. There is a massive difference between being motivated to coach a national champion and being motivated to coach a world champion. In the sprints, in Canada, there was no difference because the national champion was the world champion, but that gap in perception still exists for coaches in many sports.

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I listen to many Canadian coaches and athletes talking about beating each other. They're not talking about beating the Soviets, the Americans or the Germans, they're focusing on beating each other.

**Is Ben's success an inadvertent by-product of the Canadian sport system?**

I don't think it is inadvertent. It is certainly a stated intent of Sport Canada. But it is not just a question of what the intent is — that alone is not sufficient. The real issue is whether in fact you have the commitment to put enough financial resources into play to do the job and to go as far as required to realize your intent. So it is a very difficult situation; you have objectives and intent on one hand but is this matched by determination and commitment on the other hand? Are you sufficiently committed to these objectives to pay the price? I doubt that Sport Canada is fully aware of the costs involved in producing Ben's world records.

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*So it is a very difficult situation; you have objectives and intent on one hand but is this matched by determination and commitment on the other hand? Are you sufficiently committed to these objectives to pay the price?*

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Once the National Sport objective begins to be met — as evidenced by a Canadian athlete coached by a Canadian coach, winning a World Championship - why is there an apparent reluctance by the Canadian sport system to learn and benefit optimally from this success?

I'm not sure that the response is one of reluctance. It may be simply the balancing of one political reality against another. What is the real cost of this World Championship? If you went to the public and said it would cost 3.5 million dollars over 12 years per Olympic medal, the public may well recoil. On the other hand, who is in a position to rationalize effectively to the public the direct and indirect benefits of that medal? These benefits range from motivating affiliated athletes and coaches to the benefits in terms of self-image and so on that accrue to the nation itself. It is not inconceivable that the credibility which Ben gives Canada via his performances helps to sell Canadian technology abroad. In this regard, External Affairs has already involved Ben in a trade show in Korea.

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I had a discussion some years ago with members of the US Olympic team related to the cost of sport. In 1982 in Colorado Springs, one of our coaches was making the point to some American coaches that the cost of 40,000 scholarships, at an average of \$15,000 each, amounts to 600 million dollars alone. Then you begin adding facility costs etc. and you are quickly into the billions of dollars. The Americans seem quite unaware of what they are actually spending.

We were also talking about the situation of a sprinter who was capable of winning a medal in the 1984 Olympics, leaving track and field to sign a professional football contract for one million dollars. The US, as a nation, wanting to win the maximum number of medals, would have been better advised to pay the athlete one million dollars to keep him in the sport long enough to compete in the 1984 Olympics. This would have been much more cost effective than the alternative, for the cost of bringing another athlete to the same level would be in the range of 2 to 4 million dollars over 8 to 10 years.

#### **Are Canadians reluctant to make heroes out of their sport figures?**

We have always had sport heroes in hockey and football, but part of the problem Canadians have in recognizing the achievements of Ben, Angella, Desai, Mark, Molly, and others, is their ignorance in knowing the relevance of these athletes' performances. In most nations in the world, track and field is the number one sport. It is practised in one hundred and sixty five nations. In Canada, track and field would rank fifth or sixth behind sports such as football which is limited to two nations and hockey which is limited to about 12 nations in the world.

This is changing, however, as Canadians see the attention which the Italians, Spanish, Japanese etc., pay to Ben for instance. Al Sokol, a sports reporter with a Toronto newspaper, relates meeting an individual at an airport in Caracas, Venezuela; on learning that Al was from Toronto he said, "Oh — Ben Johnson." In Japan, in 1988, Ben's commercial for a gas and oil company was voted the most popular commercial and was run 10,000 times over a two-month period.

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In addition, a contest was run involving 'Ben Johnson sport jackets.' They manufactured 10,000 jackets and 1.2 million Japanese applied for them. Ben gets mail from all over the world addressed 'Mr Ben Johnson, World Champion, Toronto, Canada' —and it gets delivered. Canadians finally are beginning to realize the significance of what Ben has accomplished — certainly if having to move Ben into the cockpit of a Canadian Airlines plane returning to Canada from Europe, to relieve him from the constant attention of passengers wanting autographs, is any indication.

Much of the typical Canadian's awareness and understanding of sport is determined by the media. Whether the national television networks choose to broadcast on a given weekend the Bob Hope Golf Classic or the World Cup in Track & Field from Europe for instance, or whether Ben's 9.98 second 100 metre performance at the 1987 National Championships is on page one or page twenty in the local newspaper.

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When Ben ran that 9.98 I telephoned Larry, our agent in Virginia, USA and it took me some time to get through. By the time I succeeded, Larry had already heard about Ben's results through a friend's mother who had telephoned him from Holland. Ben's result had been featured prominently on television because of an upcoming race, involving Ben, in Sweden. People in Holland and Sweden — in all of Europe for that matter — know what a 9.98 second 100 metres means. This is not yet so in Canada.

When a local Canadian television announcer covers the story he will say that Ben Johnson failed to break the world record of 9.93 seconds. Neither the announcer or the public understand that the World record of 9.93 seconds was set at altitude or understand the significance of track conditions, wind conditions, etc. on performance results.

## **Introduction**

*Ross Earl acted as coach and business manager of the Mazda Optimists Track Club until 1986. In 1961 he became involved with the club, then known as the East York Mercuries, as a parent who was looking for a club where his children could run.*

*He initially coached with the club but as the club badly needed operating monies he became involved in fund raising. He secured funding from the Optimist Club for two years - hence the club name change to the Scarborough Optimists. Three years later the club had an annual budget of \$8,000.00 and was self-sufficient, on the basis of funds raised through bingos. By 1972 the Scarborough Optimists had a membership of 500 athletes. An annual budget in excess of \$150,000 was being generated largely through regularly operated bingos which were administered by Ross. Rather than recruiting athletes, which was a common practice at the time, Ross recruited coaches. This practice paid off as the Scarborough Optimists became the number one track and field club in Canada. Ross left the club in 1986, but continues to advise athletes on their financial affairs.*

## **Q & A**

**With Ross Earl**



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We have observed Charlie interact with his athletes at practice. During one practice, Angella was running 30 and 60 metre repetitions which were not very good, but Charlie said nothing. However, immediately after Angella ran a personal best 80 metres. If Charlie had commented on the poor 30's and 60's, the personal best in the 80 metre would probably not have occurred. Do you agree?

Charlie really understands his athletes. All he would have had to do is say to Angella that the 30's and 60's were terrible and the 80 metre personal best would not have occurred. They would have argued, and she would have gone home.

Now he *could* give this type of feedback to Ben. Now he *could* have told Ben that his 30's and 60's were awful and had Ben do them again.

Charlie was like an octopus, he was in control. Charlie set up a program that generally all of his sprinters followed. But when it comes to a certain point — if you want a diamond to really shine — Charlie had to get a tentacle in there and understand that being. There is more to coaching than following the book; there is a level of coaching that involves 'complete understanding.'

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*There is more to coaching than following the book, there is a level of coaching that involves 'complete understanding.'*

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Could you expand on what you mean by 'complete understanding'?

There is a state of completely understanding not only sprint training but also the athlete. Every athlete is an individual. Charlie is not going to tell a coach how to train an athlete to be like Ben. A lot of people will pick up this book and think they can now make a Ben. They will feel that there is no longer a need to go to seminars given by Charlie. When in fact the only way they can possibly understand fully what Charlie does is to spend a year with him and even then they may not understand.

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*What Charlie's book should do, from a technical aspect is to teach coaches how not to trash an athlete. There are so many coaches who in their quest to get results trash their athletes.*

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What Charlie's book should do, from a technical aspect is to teach coaches how not to *trash* an athlete. There are so many coaches who in their quest to get results *trash* their athletes. This is wrong! Coaches should not be learning their profession by hurting athletes.

You have used 'diamond' and 'octopus' analogies when describing how Charlie coaches. This really implies a level of intuitive skill does it not?

Charlie was hassled all the time for not sending in his reports of testing data. They do not understand that Charlie tested everybody all the time. He watched how they warmed-up, how they ran, even how they sat. Voice intonation, the way their hair was combed etc., these were Charlie's testing tools.

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*Intuition can not be written in a book.*

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Intuition can not be written in a book. I have a car mechanic who is one of the best I have ever encountered. When he has an apprentice come to work with him, he can tell within a year or two whether or not that apprentice is going to be a good mechanic. He says, "It depends on whether you can feel a motor or not. Now you listen to this and say, "What is this guy talking about — *feeling a motor?*" You feel it and it's as hard as steel, but that is not what he is talking about. He can come out to your car, lift the hood and tell by

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listening to the engine that the car is not running right. When he has finished working on it he will ask if you can hear the difference. This is the same intuitive sense that Charlie used when working with his athletes.

You know, this aspect of coaching was built into a program that I tried to get off the ground years ago. The intent was to give clinics that would cover each event in track and field and show public school teachers what to teach at that level. We wanted to help athletes arrive at the university level undamaged and in a state that didn't require unteaching poor skills.

Charlie used to get angry with the handling of athletes like Charmaine Crooks, in high school. At one point Charmaine was still recovering from an injury and Charlie was concerned about how much she could safely handle. Charlie advised her to run only the quarter mile to see how the injury felt. But her high school coach comes out and makes her run the 100 and 200 metres plus the 4 x 100 yard relay, and the 4 x 400 yard relay. The high school coach couldn't understand why this track coach was interfering with his high school athletes. Coaches at that level sometimes exploit the athletes rather than taking care of the athletes' best interests. In some cases, I suppose they just don't know any better.

**Can you comment on Charlie's ability to minimize injury through training and his ability to manage injuries once they have occurred?**

This goes back to the competitive history of both Charlie Francis and Harry Jerome. They were both injury prone. Some people accused them of *choking*, or faking injury. The reality was that Charlie and Harry were usually competing with six of eight cylinders functioning. They were constantly competing while hurt. When Charlie pulled up in Olympic or Commonwealth Games, the press would say, "Charlie pulled up again!" Most often when someone is pulling away from you in a race, you demand a little more from your body and something lets go. Charlie has torn muscles many times and as a result he understands having to train and run while injured. He is more conscious of and experienced with injury than any coach I know.

He learned from Gerard Mach how to rehabilitate a torn muscle. This included how to handle an injury immediately after it has occurred, what should be done in the subsequent 24-48 hour period and what training movements could still be handled during recovery. He also learned various massage techniques which would minimize the build up of scar tissue and promote the orderly regeneration of muscle tissue.

**From your point of view how has Charlie been able to learn the art of coaching?**

Charlie has often mentioned that, in addition to Percy Duncan, he would love to have had the opportunity to work with Gerard Mach when Gerard was a full-time coach. He feels that with such an opportunity he would have been able to coach at his current level of expertise sooner. When Charlie travels he digs for information — he talks to East Germans, West Germans, to anyone who can speak enough English to communicate. Most of the really useful

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information upon which a coach grows and develops comes from other high level coaches who are practicing sport. Now that Charlie has the credibility of being the top sprint coach in the world, it will be much more of a 'two way street.' Other coaches are now motivated to divulge more fully their training information and Charlie will reciprocate.

Even then, Charlie never changed a training element on hearsay alone. He must be confident that he understands it. Many coaches will implement a piece of advice or information without prior understanding.

**How did your club support your first professional massage therapist, Mike Dincu?**

We were never able to support him fully. He worked with club athletes but at the same time worked at the Fitness Institute to make ends meet. Charlie paid Mike out of his own pocket and I would pick up his expenses occasionally. For example, I would pay for him to fly to Florida to be at a training camp or to go to the Pan Am Games in Puerto Rico.

**Do Canadians still attach more value to the same piece of information if it comes from outside, rather than from within this country?**

Historically we have always believed that the answer lay outside of Canada. In fact, the answers have been here all the time. You look at the foreign coaches who have been in Canada for years in addition to our successful domestic coaches and you will find that very few people have been listening to them.

You also have the situation where we have some national coaches who have never produced results. These people may have written articles and may even be in good standing with the bureaucracy, but they have never produced winners at the world level. These people are listened to more completely than a Charlie Francis.

**You allude to a school which would produce coaches who do not 'trash' athletes. How would this work?**

Now the thing is, that if a school were properly set up involving an apprenticeship situation which was properly conceived and managed, a coach like Charlie could be working with 8 or 10 of the top Canadian sprinters and their coaches. The results produced by these apprentice coaches would only be an indication that they now understood and were able to successfully coach to Charlie's methods. This now would provide the opportunity for these coaches to go beyond Charlie's teachings. If Charlie had taken what he had learned from Gerard Mach and gone no further, he would presently be producing sprinters who would be successful in 1974. But a successful athlete in 1974 is not going to fare too well in 1988. However, Charlie was able to take the knowledge from Gerard and Percy Duncan and produce sprinters who were capable of winning in 1988. Charlie is not going to last forever, and the current sprinting mentality represented by his methods should be completely understood by as many coaches as possible so that at least one coach will develop an Olympic athlete who can win for Canada in the year 2016.

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**You mean that a gifted apprentice will always exceed the master?**

Exactly!

**How much time does the master-apprentice relationship require?**

Years! The relationship never really ends. But a formally structured master-apprentice situation would have to be in place for at least a year, and preferably for 2 to 3 years. The current situations in Canada which tend toward a master-apprentice relationship are distinctly perfunctory. They are simply not of sufficient duration to produce the kind of learning that is required of an art form, which is what Charlie's coaching really is.

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**With Charlie and his athletes it occurs to me that you have a situation where a Ferrari is coaching Ferraris. What are your comments?**

I don't necessarily think it has to be that way. It doesn't have to be a high-strung coach working with a high-strung athlete. I think it depends to a much greater degree on the empathy the coach has for the athlete. If a low-strung coach tries to change a high-strung athlete, he is not going to produce a sprinter. In addition, Ben, is on the surface, not as highly-strung as Angella, but both are explosive world-class sprinters. Much of the relationship needs to be dependent on the coach having empathy for the athlete and the athlete having confidence in the coach.

**For developing sprinters, Charlie seems to use the same training model while allowing each athlete to demonstrate how much of the training menu he or she is able to handle. Your comments please.**

Okay, but I don't think Charlie would handle 9-11 year olds. Beginning to work with Ben at age 14 was an accident. Angella was 17 years old when Charlie began to work with her. In most cases — Angella, Cheryl, and Molly, for example — the athletes began working with Charlie when they were 16-18 years old, and most of them had been mis-handled and mis-coached up to that point.

It is important to teach all coaches that you do not make an 11 year old sprinter run 22 x 100 metres and 10 x 50 metres with 25 accelerations, over three hours of work to be good. At age 11, an athlete can gain strength relative to body weight faster than at any other age. An 11 year old girl can climb up a rope, using only her hands, but by 15 she can no longer do this. You can take 11 year old gymnasts and teach them incredible strength related movements because their strength in relation to body weight is at its peak. Now you take an athlete at this age and subject them to incredible work loads for four to six months. They will survive and step out on the track and beat everyone. The coach says, "My god! Am I ever good. I've got an 11 year old that two months ago was running the 100 metres in 16 seconds and is now running it in 14 seconds. At this rate I will have a world junior champion by the age of 15." The reality is that the athletes are being taught to believe that high volumes of work rather than high quality work produce results. There is also the danger that the athlete will be burnt out by the age of 15 and lost to sport.

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**Do you feel that Charlie handles male and female athletes differently?**

It's interesting that Charlie's first really good athlete was Angella. He began coaching at a high level with females. I think he handles men and women athletes equally well. And had he discovered Ben before Angella I don't think that there would have been any difference.

**Do you think Charlie is typical or exceptional in this regard?**

Charlie is definitely exceptional because there are very few coaches, especially Canadian coaches, who have both male and female elite athletes. I think many male coaches relate to women athletes as females first, whereas Charlie does not differentiate between the sexes — he coached athletes.

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**How did pulling out of the 1980 Moscow Olympics affect Angella — Charlie's top athlete?**

Angella was ready for the 1980 Olympics! I was with her during the preparations for those Olympics and I cried with her when Canada withdrew. To prepare for 1980 she had left home and moved into a house next door with two other athletes. She had finished her grade 13 examinations and decided that she was going to prepare full-time for the Olympics. She was eighteen years old.

Every morning when I would leave for work at 7:00 a.m. I would see Angella out already jogging up the road. After a light breakfast she would do light weight training and some stretching. After lunch she would go by bus to York University's training centre where she would meet Charlie and go through a very heavy running workout. After running they would go to the weight room and not finish until 9 - 9:30 p.m.. Upon returning to the house she would go on the electro-stimulator until about 10-10:30 p.m., (Charlie and Angella had been using electro-stimulation since about 1978). Each morning the same scenario began again.

**At that time, how many workouts per day was Angella doing?**

As I said, it was almost solid training from 7:00 o'clock in the morning to 10:30 at night. Fifteen to sixteen hours a day. She was either training or travelling from one session to the next. She worked in 4-5 separate sessions including jogging, light weights and stretching, running workouts, heavy weights, and electro-stimulation. It is important to realize that this heavy work schedule could only be maintained because she was being regenerated fully from each work phase.

**What performance was Angella ready for?**

She was ready to win at the Olympics! She had started to run incredible times just when Canada pulled out of the Olympics. People couldn't understand why she didn't agree with Canada's action, and considered her unpatriotic. One man got very angry when she broke down and cried. She had sacrificed over a year of her life to prepare for Moscow but very few people understood. She trained harder that year than at any time before. Her life then was consumed by and committed to sport — it was all she had!

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She later went to Europe and beat many of the women who had won in Moscow. She knew, Charlie knew — she had been ready. It was really a traumatic period in her career.

**Looking at what Angella went through in 1980 and recognizing that there is something more to sport than medals and winning World Championships, what is the point of sport — what is accomplished by sport?**

Athletes develop a tremendous self-discipline which is required for a successful life. In the latter part of the 1960's and into the 1970's we were going through a period in this country where there was a tremendous breakdown in discipline, especially as it applied to young people. You didn't strap a child in school for misbehaving, you didn't make youngsters stand straight, you didn't do this and you didn't do that. Sport was one of the few places where young people were learning self-discipline. There are many people out there who never learned the level of self-discipline that an athlete learns.

**How does track and field equate to sports such as football and hockey?**

In Canada, money rather than the developmental experience for the young athlete seems to be the foremost consideration. If track and field was professional like football and hockey there would be no question that it would have the same prominence. You are not going to find hundreds and hundreds of people making money in track and field.

This explains why the Toronto politicians tore the track out of the Canada National Exhibition grounds to make room for the Blue Jays, a professional baseball team. Now you tell me in what way have the Toronto Blue Jays benefitted Canadian sport and Canadian youth? The players with very few exceptions are not even Canadian. Also, look at the young athletes that have been trashed by virtue of their involvement in football or hockey. This is occurring and continues to occur because we do not have a national policy on sport that defines specifically what we are trying to accomplish on behalf of Canadian youth.

**Does the Canadian public appreciate the current level of track and field performances?**

When we were in Switzerland for a competition in 1977, Milt Ottey, then our national high jump champion, was practising at a height of 2 metres. Swiss children would be sitting around watching him in awe and discussing how a 2 metre height related to their national record and so on. In Canada, to children and adults alike, the ability to high jump over 2 metres means very little. The 'either you won or you're a loser' mentality of our country indicates an inability to understand high performance.

When Ben won the bronze medal at the 1984 Olympics, which was a tremendous feat, his home town of Scarborough in Toronto provided no recognition for him at all — no recognition because he didn't win! In Italy or Switzerland he would have been a hero, a native son winning third in the world in the 100 metre sprint. If Ben had won

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the local Scarborough championship, they would have had a dinner for him. In this country they have dinners only for winners. In Europe, Ben's winning of the bronze medal in Los Angeles caused him to be recognized as an exceptional athlete, while in Canada he was recognized as a loser!

#### **Where then does high performance sport in Canada fit?**

In Canada, high performance sport has a great deal of difficulty fitting in anywhere. There is a great amount of levelling in the national psyche, in the national self-image. Everybody in Canada was proud to be a Canadian when Ben hit the tape in 9:83 seconds — after the significance of this feat was explained to them. But two years ago none of those people would have given 50 cents to support Ben in his quest for 9:83 seconds. Canadians were paying through their tax dollars about 15% of the cost to support Ben, but the average Canadian does not know that. Nor do they know exactly how much they are paying to support a sport bureaucracy, or with what efficiency that money is being spent.

#### **How successful has your club been over the years?**

In the 1982 Commonwealth Games at Brisbane, Australia, Canada won 26 medals. Our athletes won 17 of them - that's 65% of Canada's output. In the 1984 Olympics our athletes won 11 of 14 medals or almost 80% of Canada's track and field output.

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*In the 1984 Olympics our athletes won 11 of 14 medals or almost 80% of Canada's track and field output.*

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#### **Has the bureaucracy ever considered paying a coach for realizing their mandate of successfully producing athletes at the world level?**

Charlie and I have suggested such a practice. We have sat in meetings in Ottawa where we tried to make that point. We recommended that a coach be paid bonuses for the top three placings at the national championships and for international medals. The response was that results are not everything. They wanted to pay a coach for having university degrees and other qualifications. Qualifications could have been considered in tandem with results. The reality is that the coach continues not to be rewarded for either.

Charlie has produced 12 world records and he has received two gold watches for his efforts. If the people who are running the sport bureaucracy were running a corporation and rewarded the successful efforts of employees in this manner, they would have been out of business long ago. The bottom line should always be the ability to produce results .

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## CHAPTER 11

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# Financial Aspects

*"I finished my own sprinting career at 22 years when in fact I should have been entering my career peak. This is why I pushed the financial aspects of athlete support so heavily. Through my own experience it became so clear to me that sufficient finances are critical to keeping athletes in the sport long enough to realize their potential."*

*Charlie Francis*

*"Part-time athletes get part-time results."*

*Charlie Francis*





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## Introduction

*Larry Heidebrecht has been acting as the agent to Charlie Francis and his athletes since February of 1986. Larry was an 800 metre runner himself at the University of Northern Colorado and was head track and field coach at the University of Texas at El Paso from 1982 to 1984.*

*He left coaching in 1984 and began working as an agent for the International Management Group (IMG) for the following year and a half. He worked in the athletics and fitness division and handled the financial affairs of many athletes from around the world.*

*In 1985 he left IMG to join the Heritage Group Agency in Virginia and worked with this agency until 1988, when he severed his formal ties with the Heritage Group and became a private agent.*

*The groundwork for the working relationship was laid in 1985 when Charlie approached Larry on behalf of one of his athletes. In 1986 the first management contracts were signed on behalf of Ben Johnson, Angella Issajenko and Tony Sharpe.*

*Larry began to research future endorsement possibilities for Ben, Tony, and Angella and began negotiating competition schedules with meet promoters. By this time Ben had won the 100 metre event at the World Cup held in Australia.*

*The initial purpose of the agent-athlete relationships with Ben, Tony, and Angella was to begin maximizing their earning opportunities to help keep these athletes in track & field. Their future worth was largely undetermined as the practice of paying top athletes such as Carl Lewis significant sums of money to run in specified meets was just beginning.*

*The frame of reference in which an agent acts on behalf of the athletes is to maximize the income of athletes within the context of the race schedule which the coach has determined. The coach usually doesn't have the time to establish and maintain working contacts with the network of meet promoters around the world.*

*However, Charlie Francis was already exceptional in this regard as he had a feel for the strategies which would have to be used in striking financial arrangements with corporations and meet promoters and for the intricacies involved in negotiating contracts. But Charlie, as national sprint coach, was at the same time under significant time pressures as there were usually no fewer than thirty athletes under his direct responsibility. He, needless to say, did not have access to enough information to establish current market values of his athletes let alone define and service the day-to-day marketing opportunities and scheduling demands.*

*Charlie's club, the Scarborough Optimists, was already an exceptional club in financial terms, with Charlie Francis as coach and Ross Earl as financial manager. Ross Earl was successfully able to raise enough funds to finance the club operations through regularly operated bingos. He also managed the athletes' financial affairs up until the time that Larry Heidebrecht was retained.*

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*The driving philosophy behind Charlie and Ross's efforts was always to maximize the athletes income and manage this income effectively to allow the athlete's to train without having to work. At this point the top athletes at least could function as full-time athletes and begin to worry less about how they were going to pay for the process. Government monies were, and remain, only a subsidy to the total costs of preparing and training a world class athlete.*

**What is the commitment in time and effort required to produce a world record performance?**

Ben is a good example. He began at age 14 and produced a world record 11 years later. It should be recognized that for at least 6 of those 11 years, Ben was in fact a full-time athlete. If he had not been able to function as a full-time athlete, I question whether his ultimate performance level would have been possible at all.

**What were some of the financial implications of your decision to become a full time coach?**

I can only speculate, but it's a mixture sometimes of what you do not earn or what you do not have to spend as a coach. The one thing I discovered after leaving my job in 1975 and living on \$300.00 per month was that it didn't make any real difference in terms of surviving. At the same time, remember that I was single and didn't have the family and housing costs that many coaches have.

You suddenly discover, after you deduct the money you were spending on keeping a traditional job, that you can survive on much less than the 30-odd thousand dollars a year I was earning as a re-insurance underwriter back in the early 70's. To be a full-time coach in Canada, you must change your financial priorities.

**What is the cost/benefit profile of being a coach? Estimate the personal cost to you?**

Taking into consideration unrealized personal earnings, I would estimate that the cost to me over the first 10 years of coaching has been in the order of \$200,000-\$400,000. For example, I had no salary at all for the first 3 1/2 years after I left the re-insurance industry. I suppose you can speculate on what my earning power might be had I not left the industry.

**How much athlete support monies was it necessary for you to actually pay?**

Each athlete would contribute whatever he or she could. They would bring you a sealed envelope but most of them were empty when you opened them up. They didn't want to be embarrassed in front of their friends. Every athlete paid as much as they could and Ross Earl, the club manager and I, would split the remaining cost 50/50. Sometimes I would personally be spending \$2,000-3,000 to take the athletes to a given training camp.

I was able to talk Ross into training camps outside Canada because I thought they were important for the continued development of the athletes and I was willing to put some of my own money on the line.

## **Q & A**

With Charlie Francis

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**What did you spend out of your own pocket on your athletes?**

Close to \$6,000-7,000 per year. This goes on food, supplements rent, etc. But looking in retrospect, these outlays were actually investments in these athletes particularly in light of the results which were coming in. When you believe in something the money is secondary and is in fact a by-product of the process.

**Do you think the salary and benefit packages for coaches are comparable to those that other personnel in the Canadian Sport system enjoy?**

I would have no comment relating to benefit packages in terms of pension plans and health care packages because they don't exist for coaches. Further it is difficult to argue one way or the other about the salary of \$43,000.00 I was paid as national coach, recognizing that the sport system in Canada is evolving and has to begin somewhere. The fact that salaries were paid at all has been important to me because it has helped me to survive and further my coaching career.

At some point, however, I think the Canadian sport system has to do a better job in recognizing productive and successful coaches. Currently the recognition both in conceptual and tangible terms ranges from limited to non-existent.

**You had Mazda, the Japanese car manufacturer as a major sponsor. How did your athletes benefit?**

First of all, this is part of Mazda's global marketing strategy. Mazda are involved with the IAAF (International Amateur Athletic Federation), over the entire world, and within the last 2 years have come into Canada. They had 63 athletes under contract in the world and of those 63, 21 were Canadian. This is a Japanese company with a world marketing strategy and I was happy to have been able to arrange that level of support for 21 athletes.

**Overview of the financial relationship between Mazda car manufactures and the Mazda Optimist Athletic Club**

1. Mazda Optimists are funded as a club by Mazda Corp.
2. The use of Mazda funds in the Club Budget includes:
  - athletes receive varying amounts of money for wearing the Mazda name on their uniforms
  - salary supplement for regeneration therapist
  - salary supplement for team doctor
  - track rental costs
  - training camp travel (3 camps per year)
  - assistant coaches' salary supplements
3. After the club budget is defined a proposal is submitted to Mazda and the level of support is negotiated.
4. Mazda annually provides a 'Most valuable athlete' award by which the selected athlete receives a Mazda car.
5. Benefits which Mazda receives in return for funding support:
  - The 'Mazda Optimists' name on the uniforms of athletes is seen by spectators, television viewers and newspaper readers
  - This 'impression count' is measured by: Neilson ratings, television count, newspaper clipping service, world newspaper count
  - A television commercial featuring Ben Johnson
  - 2 days of personal appearances by a specified number of athletes
  - A guarantee of a minimum number of races per year which in turn guarantees a minimum level of exposure.

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**How did your relationship with Mazda actually develop?**

Mazda have people out there who are actively recruiting individuals and they decided that they wanted Ben. The negotiations proceeded on that basis but at some point they expanded to extending the concept to the club. A number of athletes were initially signed with the international body but an additional requirement was that these same athletes had to be registered in a club in their own country. At this point our club, the Scarborough Optimists, was renamed the Mazda Optimists. Mazda paid a registration fee to the Canadian Track & Field Association (now Athletics Canada). Then the process evolved in that they wanted to support additional athletes. We were able to offer them athletes such as Mark McKoy, Atlee Mahorn, Tony Sharpe, Molly Killingbeck, Angella Issajenko, Marita Payne and Desai Williams. The fact that all of these athletes were medallists at the world level was very attractive to Mazda. So you begin with a list of demands, and begin negotiating details, and the process goes on from there. That really was the way the whole thing started, and we were able to expand the level of support the following year. The whole process hinged, however, on the success of our athletes in promoting the product and on increasing the visibility of Mazda in Canada.

**How did Mazda know if their investment resulted in increased visibility?**

The evaluation process involves clipping services for newspapers and magazines and television monitoring to ascertain the actual level of logo exposure. Mazda also employ agencies such as the International Management Group (IMG), who are the administrators of the worldwide Mazda Track Club, to look at the level of logo exposure worldwide. For example, Mazda athletes had 758 starts in 1987, in terms of worldwide track & field meets, and they won 550 international medals. Now that represents very high visibility when you realize that you have UPI writers in addition to a multitude of other writers printing photographs of Mazda all over the world. In addition there are T-shirts, sweat shirts etc., so that the cumulative exposure for Mazda is very high indeed. You also have clinics held in conjunction with track meets. In reality Mazda's investment in sports gives it hundreds of millions of separate viewings of the Mazda name. For their million dollars sponsorship Mazda is receiving superb marketing value.

**What other sponsors are you able to involve?**

Among others, we have had adidas as a corporate sponsor and most recently Ben had signed a contract with Diadora, an Italian shoe and sportswear company.

**What is the nature of Canadian corporate involvement?**

You have Canadian subsidiaries such as the Mazda dealers. The distributors put in at least one half of the money so that there is both Canadian and International involvement. The same situation occurs with Adidas.

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### With what efficiencies are your club funds spent?

I would estimate that out of every \$10.00 raised we spend only \$1.00 in administration with the remaining \$9.00 being applied directly to the needs of coaches and athletes.

### When you signed a contract with Charlie's athletes in 1986, what was their financial status compared to 1988?

At that time Ben was earning modest appearance fees, and had a modest shoe and clothing arrangement with the Adidas company.

My first task at that time was to re-negotiate the existing agreements based on Ben's increasing value. I was able to line up some small contracts with a manufacturer of drink supplements and with a manufacturer of boat outboard motors. The conceptual linkage we were trying to make with the products of corporate clients was with speed and strength.

By 1988 things had obviously changed dramatically for Ben — he was clearly the fastest man in the world and had captured the imagination of people all over the world. He became a marketing and promotional class unto himself. People seem to be drawn to Ben because of what can best be described as his quiet strength and a significant physical presence which Ben exudes.

#### Athlete Marketing Overview

Steps followed by an agent in researching and developing a marketing arrangement:

1. The 'Red Book' is utilized as a key reference document which lists all North American companies including — names of chief executive officers, contact addresses, product lines and categories.
2. Identify companies with which marketing linkages relating sport/event/athlete to a product category are possible.
3. Identify any personal characteristics peculiar to the athlete in question. For example, Ben is seen to be quiet, unassuming, powerful, gets the job done with little or no wasted effort or verbiage.
4. Develop a proposal which includes options for marketing and/or name linkage(s).
5. Communicate with the company and in particular the person who has the responsibility for marketing/promotional decisions. Ensure that you deal through the company rather than the advertising agency wherever possible.
6. Describe your proposed theme and marketing linkage complete with ideas of visual images ( e.g. VISA — Ben dressed in black tuxedo pictured in starting blocks). Some critical aspects of maintaining the marketability of your athlete at an optimum level: Ensure that the image conveyed to the public via the press and television is a positive one, take Ben as an example:
  - a human being who is simply doing his job — he is obviously not an egotist;
  - people of all ages, races seem to pull for him instinctively;
  - he is agreeable to giving interviews and making public appearances; however, this has to be controlled and managed as it is a significant energy drain;
  - a man of few words;
  - his phenomenal success has apparently left him unchanged;
  - he does not brag or make ill-advised statements;
  - he is even tempered - not a 'prima donna.'Ensure that the athletes honor commitments which they have agreed to:
  - autograph sessions;
  - public appearances;
  - corporate obligations.

## Q & A

With Larry Heidebrecht

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*I would estimate that out of every \$10.00 raised we spend only \$1.00 in administration with the remaining \$9.00 being applied directly to the needs of coaches and athletes.*

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To what degree does the fact that you have been an athlete and coach yourself help you to be sensitive to the problems of balancing the marketing/appearances realities with the energy/training realities of the athlete?

Obviously it helps to have been on both sides of the fence, both as a coach and as an athlete. Each athlete has different abilities as well as different tolerances when it comes to dealing with the media and the public at large. Having been through the mill myself as a coach and an athlete gives me a sense for balancing the training and competitive realities with the marketing realities.

Charlie and I work very closely together and the planning which we do covers a number of areas:

### **Selection of Competitions**

With the size of the meet fees involved, the nature of the problem is to select the dates and location of competitions based on the phase of the year, which meets are used as part of the peaking process, and which meets represent absolute peaks. As an example, in the month prior to the 1987 World Championships in Rome the meet schedule was as follows:

August 8	Malmö Sweden — relative peak
August 13	Koblenz West Germany — relative peak
August 16	Cologne West Germany — relative peak
August 19	Zürich Switzerland — absolute peak

### **Location of Competition — Promotional Obligations**

I am trying to control the significance of the date and location of the meet with respect to marketing agreements which the athlete is currently under. For example, a meet which occurs in Japan will have special significance to the Mazda and Visa contracts. As a result the public appearances which are required of the athlete have to be selected and scheduled very carefully so as not to have a negative impact on the athlete's ability to compete optimally while in that country.

### **Marketing — Promotional Integrity of the Athlete**

You don't promise something that you either can't deliver or that is unrealistic to deliver. You have to be co-operative but firm with whomever you are dealing. At the same time you must be sensitive to the motivation which is driving people to want to see the athlete or obtain their autograph, and to the companies wanting to strike promotional arrangements.

**In reality then, the planning and periodization format for a financially successful world champion takes on some critical new dimensions?**

Absolutely! The athlete's whole range of commercial and public relation activities outside of actual training and competition have to be planned very carefully. In this regard the coach and athlete must have the final say. Charlie and Ben screened all the proposals I put in front of them, and their decision was final.

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**It is one thing for the coach and agent to have some opinion of what is good for the athlete — but do you find that the athlete has a different opinion on occasion, particularly when he or she is in the process of becoming financially successful?**

The situation can get fairly complex but for any individual athlete the motivation for being in sport in the first place was based on something other than monetary gain. Look at the number of years athletes train under very difficult financial circumstances. If money were the main motive they would drop out of sport at a much earlier stage. I think most athletes readily recognize that if their focus shifts to money rather than on training and performance everything begins to unravel. In spite of this, most athletes at this level will experience at least one meet where they focused and were distracted by the sums of money involved and suffered a poor performance as a result. Athletes are, after all, human beings.

**What is the reality in terms of time, contacts and skill required for a coach who is trying to maximize and manage the financial affairs of his/her athletes?**

It is virtually impossible for a coach, on his or her own, to effectively generate corporate dollars. This would simply be too great a burden on the coach in terms of time, expertise and research. Charlie and I are in touch by telephone every two or three days, or 10-15 times during a typical month. We meet on an average of twice a month, even though I live in Virginia and Charlie lives in Toronto.

An athlete's corporate image must be developed and nurtured over time, and the magnitude of this task, at least in Charlie's case, can be appreciated when you think of the needs of up to 30 athletes at various stages of development. A general rule might be that the coach consider retaining an agent as soon as his or her athlete is capable of winning a medal at a major international meet.

**Elaborate on the process of dealing with meet promoters.**

The agenda guiding the negotiations with a meet promoter might include:

1. The lane in which the athlete will run.
2. What other athletes (competitors) will be in the competition.  
This is an important consideration because when Ben is in a training/recovery microcycle vs a peaking microcycle you do not want him to race against an athlete who is peaking for the specific purpose of recording a win against your athlete. The psychological and financial implications of such a loss are self evident.
3. Whether there will be heats and how many heats, or only a final.
4. Whether your athlete(s) will be featured on publicity posters or have their photographs appear on the cover of the event program.
5. Negotiating the number of developing athletes from Charlie's club that you want to compete in the event - when you have world champions you are usually able to include developing athletes who might not otherwise be given consideration.

For example — In preparing for a meet in Spain in 1987 we

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successfully negotiated the inclusion in the meet of Ben and Angella in addition to 13 other athletes. For the developing athletes the international competitive experience and European exposure are important developmental factors. Organizing the participation of 15 athletes of course meant that a considerably greater amount of energy had to be expended on negotiating: hotel costs (for 15 athletes and 5 support staff); plane fares (for 15 athletes and 5 support staff). Corporate jets are sometimes required to expedite travel between European meets.

Note: virtually every major meet in Europe has a corporate sponsor. Meet fees for each athlete basing the meet fee on the athlete's talent. All the above negotiations are based on the estimated total revenue from the gate, from corporate sponsorships, and from television coverage.

**What is the difference in dealing with European promoters and North American promoters?**

The differences begin with the popularity of track and field in Europe vs the relatively lower profile of the sport in North America. The European public and the media are much more knowledgeable of the competitors and of the times and distances of track and field athletes. There seems to be a widespread recognition by the European public that track and field is one of the most popular sport in the world, with some one hundred and sixty five nations taking part.

As a result, the revenues generated by a meet in Europe, are significantly larger than revenues generated in North America. North American and European meet promoters both know the market value of individual athletes but since there are many more meet opportunities in Europe the resulting competition for athletes in Europe is considerably more intense than in North America.

Given that European fans are more knowledgeable, this translates into higher ticket prices and television revenues. In contrast, the North American market is typified by fewer meets held indoors during the winter months, and by lower ticket and television revenues.

**Can you comment on the promotional benefits you are able to provide to the coach?**

There are a number of areas in which I can help Charlie directly. These include:

- negotiating clinics which would be given by Charlie either in conjunction with competitions or unto themselves;
- negotiating and scheduling of speaking engagements to sport, corporate or community groups and of consulting opportunities to corporations, professional and amateur sport;
- developing a marketing profile for Charlie through various exposure opportunities;
- negotiating books and magazine/newspaper articles;
- marketing books/articles either nationally or worldwide;
- negotiating television interviews or documentaries.



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### Meet Promoter Planning Sequence

1. Charlie and Larry meet to finalize a proposed schedule of meets, e.g. 1988 plan will centre on the Olympics in Seoul, Korea and the number of meets required to prepare for that peak will be selected:
  - identify competition periods
  - identify training periodsKey dates:  
May 13 to June 27, 1988 — meets in Japan and Europe  
August 4-5 — Canadian Outdoor Track & Field Championships  
August 8-26 — meets in Europe. Possible 'tune up' meet in Japan in the second week of September, immediately before the Seoul Olympics.
2. Once the meets are identified, negotiations are begun with the individual meet promoters — 10-13 athletes are included with Ben — there is normally no option given to promoters.
3. Determine which 'group' of athletes will make each trip, e.g. the August group of athletes will have been selected to represent Canada on the Olympic team and will be different from the June group of athletes which will include developmental level athletes.
4. The specific needs of each athlete are identified:
  - quality of hotel;
  - air and ground transportation;
  - meet fees e.g. regeneration specialist requires a massage and regeneration area (sauna baths etc.) at each hotel
6. Confirming telex.

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