



IAAF @-Letter

for CECS Level II Coaches

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IAAF Academy Concept Project

SPECIFIC THEME: Avoidance and treatment of overtraining

GENERAL THEME: Physiological basis and diagnosis of overtraining

IAAF Academy Concept Project

The Mission: "The IAAF Athletics Academy will provide a high level of services to all the Athletics Key Personnel: coaches, technical officials, administrators etc."

Academy Concept Project

The Development Commission appointed in 2002 a working group to study the feasibility of an IAAF Academy.

Description

The working group was formally commissioned to:

- Design an IAAF Academy to provide high quality programs of professional development opportunities and other services for coaches *and* other key personnel in the sport.
- Integrate the Academy's work with that of existing IAAF structures

(Member Services Department, Regional Development Centres, Coaches Education and Certification System, etc.).

- Integrate the Academy's work with that of the IAAF Coaches Commission.
- Integrate the Academy's work with that of the six Area Coaches Associations.
- Design a system to measure coaching effectiveness.

Preparation of Coaches for Key Roles

Independent of the CECS and the issue of Level III, there are those, both inside and outside the IAAF, who have been considering the lack of training available for the key roles of coaches who reach the highest level of their profession:

- National Technical Director or Chief Coach, which requires specialist leadership and administrative skills that most technical-

practical oriented coaches education programs did not cover.

- Elite Coach, which requires the type of high level preparation originally planned for Level III but delivered in a very individualized and flexible way.
- Educator of professional development coach, which the IAAF itself requires for operating the CECS (particularly to address the lack of suitable Level II Lecturers) and every country requires to run a domestic coach education system. The third role was given additional importance when the IAAF President announced his vision that each Member Federation would have a qualified coaching lecturer.

It is important to note that in most cases it is very difficult for a coach to fill more than one of these roles at a time. The lack of personnel to fill these roles is a barrier to federations producing well-prepared athletes to represent their countries and participate successfully in the IAAF World Athletics Series events. The specialized training required has been seen as a key development to reach the objective expressed in the Athletics World Plan of increasing “the level of competence in the sport of Athletics”.

Coaches Education

In practicality the global coach’s education may take the following course:

A coach works with athletes on a regular basis and is involved in a coach development/education/certification program recognized by his/her

National Federation. Such programs include IAAF CECS.

The coach chooses to apply for membership of his/her Area Coaches Association directly or indirectly via his/her National Coaches Association (where this exists).

The application is accepted on condition that it is endorsed by the National Federation in confirming:

- The coach is an active/practicing coach.
- The coach has completed a basic coach development/education/certification program recognized by the Federation **or** is acknowledged by the Federation as having a strong understanding of basic coaching principles.

The coach will also pay an annual membership fee to the Area Coaches Association and sign up to the IAAF Code of Ethics for Coaches. The “Bronze” Initial/Basic/Annual Membership package of entitlement is:

- Access to Annual Coaches’ Association Conference.
- Area Coaches’ Association Newsletter.
- Area Coaches’ Association Report.
- CECS and update digest.
- Relevant support services and products.
- Registration in the IAAF Coaches’ Database.

As part of building a sense of partnership and interdependence in the coach development process there will be regular communication between all parties involved. For example, dia-

logue between the National Federation and/or M.S.D. will be initiated soon after a coach's application is received, on matters relevant to coach development/education/certification programs. The dialogue will include alignment or equivalence of program components, using IAAF CECS I as a reference standard. This will take the sport, in time, to a parity of standards in basic coach development/education/certification.

The coach who becomes a member of an Area Coaches' Association and who is committed to higher levels of coaching knowledge and certification, may move on to the next level ("Silver") of Association Membership package entitlements.

This package is designed not only to assist the coach in his/her pursuit of greater coaching effectiveness and of achieving higher coach certification status, but also in preparing for IAAF Academy entrance, should this be the coach's goal.

The coach will pay the "Silver" Area Coaches Association membership fee and sign up to the IAAF Code of Ethics for Coaches.

The "Silver" membership package of entitlement is:

- All "Bronze" package entitlement.
- Access to other Areas' Coaches Association Conferences.
- Annual Area/Coaches' Associations Conference Proceedings digest.
- Access to High Performance Training Centres.

- Relevant support services and products in the "Coach 2 Coach" program.
- Sponsored IAAF publications, e. g. *NSA*.

Again, as part of building partnerships in the coach development process, dialogue will be initiated to work towards equivalence of those coaching awards at the top end of National programs, using CECS II as a reference standard. This dialogue will also contribute to the process of agreeing criteria for admission, to the IAAF Academy and how to supplement coaches' education where this is required, via the "Silver" package to provide a bridge to Academy entry. In effect, this means shaping the coach's preparation with one of the three IAAF Academy courses.

The Area Coaches' Association member who meets the criteria CECS II equivalent, or for Academy entrance, may move into the next level ("Gold") of the Area Coaches' Association Membership package entitlement. This package is designed to support the coach in meeting the challenge of the chosen Academy course and/or continue to assist the coach in pursuit of greater coaching effectiveness.

Application for Academy entrance is accepted on condition that it is endorsed by the National Federation and by the Area Coaches' Association confirming:

- The coach is an effective, active/practicing coach.
- The coach has met the necessary criteria for Academy entrance.

Academy-related administration, etc. is dealt with by the Academy. The coach will pay the “Gold” Area Coaches’ Association membership fee and signs up to the IAAF Code of Ethics for Coaches.

The “Gold” membership package of entitlement is:

- All “Silver” package entitlements.
- Access to the World Class Coaches Club.
- Relevant support services and products.

Partnership built, at this level is based upon continuing consultation on, and review of, the relevance and value of all aspects of structure and function in the process of development from beginner to Academy levels, in meeting the changing needs of athlete, coach, club, federation, Areas and IAAF.

The detail of operation and of product and service offering is currently being addressed, but broadly speaking, the concept includes the following:

There will be three courses: i. E. Coach in a leadership role.

- Chief Coach (e. g. Performance Director, National Coach, etc.)
- Elite Coach (e. g. coaching specialist at higher level)
- Professional Development Coach (e. g. Coach Development/Education Director, IAAF Lecturer etc.)

There will be a coaches’ development resource “market place” of modules and resource materials entitled “Coach 2 Coach”. This will be employed on a “pick and mix” basis to suit the development needs of

coaches at “silver” and “gold” package levels and to those graduated as Academy Coaches via “Platinum” Area Coaches Association membership package of entitlement (see below).

- There will be a service to coordinate Research and Development projects.
- There will be a database focused on performance development and coaching effectiveness.
- There will be a continuous review program to monitor the coach development process.

A coach qualifying in any of these courses becomes an “Academy Coach”.

A coach who has graduated as an Academy Coach is invited by his or her Area Coaches Association to accept entitlement of the “Platinum” package. The only conditions which apply here are that the coach remains actively involved in coaching and/or its development and support at National and/or Area and/or World levels, and the coach signs up to the IAAF Code of Ethics for Coaches. The “Platinum” membership package of entitlement is:

- All “Gold” package entitlements.
- Honorary Membership.

At the discretion of the Academy, on the recommendation of its award Panel, Academy Coaches may be accorded Academy membership or Fellowship status for outstanding contribution to the advancement of coaching theory and practice in athletics.

IAAF Academy Chief Coaches Pilot Course

An MOU was signed recently between the IAAF and the University of Loughborough in order to start operations.

The first Pilot Course for Chief Coaches will be held in Loughborough from 30th June to 11th July and 19th to 26th September 2004. The course will be structured in two parts:

- Part A: General – The lecturers will be drawn from the Professors at Loughborough University.
- Part B: Specific – The lecturers will be chosen from amongst the most experienced and successful Chief Coaches of the recent past.

15 Coaches representing all six Area Coaches Associations will be invited to participate in this Pilot Course.

AVOIDANCE AND TREATMENT OF OVERTRAINING

1 Introduction

Overtraining is something that particularly affects middle- and long-distance runners, and it has been reported that at least 60% of elite distance runners have experienced it. In contrast, overtraining appears to occur much less frequently in athletes who participate in explosive sports lasting for less than two minutes, perhaps because it is more difficult during training for these events to do too much (cf. Newsholme, Leech & Duester, 1994, p. 268).

The earlier the symptoms of overtraining can be identified and managed, the more rapid and successful will be a return to effective progress and the less likely will be the development of staleness (for a definition see p. 11 of this Letter). This often is not easy to do. It is unfortunate but evident that a peculiar tunnel vision frequently impairs the perception of outstanding athletes and their coaches regarding total work load management. They cannot imagine that doing too much will happen to them. Too often an individualized training plan has not provided periodic rest. Training is pushed into the realm of excess, either unknowingly or simply because of a work ethic that continually promotes the attitude that more is better, that there is no gain without pain, and that the need for rest is a sign of weakness.

2 Training circumstances setting the stage for overtraining

Three primary circumstances in the training environment most frequently set the stage for the kind of fatigue that elicits either overtraining or over-use injury:

- One is the conclusion that performance in either training or racing has started to deteriorate because the athlete simply has not been training enough in quantity, quality, or both. The logic behind this conclusion seems simple, but is incorrect: Because training should bring improvement in performance, and no training should result in no improvement, then a falling-off in performance can be caused only by inadequate training. This logic is incorrect because at the point of performance deterioration, the athlete is no longer capable of responding in the usual manner to a training stress. No longer does more beget more; here, more will beget less and less will beget more. The third variable in the developmental equation – recovery/rest in addition to quantity and quality – needs to be greater.
- The second circumstance occurs following a successful series of races or a few quality mesocycles of training. A feeling of invincibility or a feeling that better results would accrue through more training, particularly because the athlete achieved good results without feeling overtaxed from a previous difficult training load, helps ingrain the belief that more work can be tolerated. In fact, as stated, the situation may be quite the oppo-

site. The excellent results probably resulted from just the correct balance of quantity, quality, and recovery. Very slight increases in work load may continue to raise the athlete to a new plateau. Substantial increases may very likely be excessive.

- The third circumstance occurs when an athlete has recovered from a setback such as an injury or illness, particularly when relatively little time remains for proper preparation for an upcoming important competitive period. Instead of not competing and adjusting goals for a later competitive period, the athlete rapidly increases the quantity and quality of training without incorporating adequate rest. Initially the athlete is fresh, both physically and mentally, from the layoff. But the body is inadequately prepared to manage the training load. Enormous improvements occur initially, but benefits do not accrue because of either inadequate rest or excessive loads (cf. Martin & Coe, 1997, pp. 413-416).

3 Strategies to avoid overtraining

Athletes and coaches find themselves in a dilemma when they devise a training plan. Three crucial questions need to be answered:

- (1) How much training can be done so that improved performance will occur but overtraining will not?
- (2) What kinds of training or other lifestyle patterns pose increased risks of overtraining?
- (3) Are there any telltale early-warning signs that mark the onset of overtraining and staleness?

The first question is the most difficult to answer, because for each athlete it is different. The three major groups of variables that contribute to stress as training volume begins to increase are lifestyle, genetic factors, and initial fitness level. One suggestion for identifying optimal manageable training loads resides in careful examination of training logs from similar training periods to identify the combination of lifestyle and training loads previously manageable for favorable progress. A rule of thumb suggests that no more than a 5% increase in training load each week can be managed effectively over a period such as a micro-cycle with healthy and progressive homeostatic adaptation. Also, volume and intensity of training should not be increased simultaneously.

The second question about training and lifestyle patterns is a little easier to answer, again provided that adequate documentation of training records and responses is available for perusal. Several kinds of activity patterns should be red-flagged because of their high risk of causing the kind of overwork that brings an overtraining. These include the following:

- Too many competitions closely spaced without adequate recovery between them or without a well-defined rest break after the series.
- A sudden rather than a gradual increase in quantity or intensity of training.

- Increased emphasis on one training format, so that certain muscle groups are challenged excessively.
- Increased non-training-related, extraneous stress factors (travel, irregular daily schedule, inadequate sleep, emotional confrontations, negative energy or water balance, etc.).

Athletes often fail to realize the magnitude of both the inhibitory and summing effect of these extraneous factors in optimal recovery from hard training. They very definitely increase the total lifestyle load. Conversely, however, the enhancement of recovery and thereby a possibility for absorbing even more difficult training as a result of having these extraneous stressors removed underlies the desire of many athletes to adjourn periodically to training camp environments. Nutritious food at regular intervals, excellent training facilities, massage and other recuperative therapeutic modalities, recreational diversions, and minimal outside influences form an ideal environment for a motivated athlete. However, the risk of excessive training in such a camp is very great. Therefore, these training camp sessions should usually be restricted to no more than two weeks, and recovery, tapering, and some form of small competition or time trial should be scheduled in the following week.

The best way to minimize the risk of overtraining is to follow cyclic training procedures, alternating easy, moderate, and hard periods of training (cf. Wilmore & Costill, 1999, p. 395). Although individual tolerance varies tremendously, even the strongest ath-

letes have periods when they are susceptible to overtraining. As a rule, one or two days of intense training should be followed by an equal number of easy aerobic training days. Likewise, a week or two of two of hard training should be followed by a week of reduced effort with little or no emphasis on anaerobic exercise.

Endurance athletes must pay particular attention to their carbohydrate intake. Repeated days of hard training cause a gradual reduction of muscle glycogen. Unless these athletes consume extra carbohydrate during these periods, their muscle and liver glycogen reserves can be depleted. As a consequence, the most heavily recruited muscle fibers would not be able to generate the energy needed for exercise.

The mental approach of those athletes most likely to become overtrained is such that they train principally so that they can train harder, in the mistaken belief that the race always goes to the athlete who has suffered the most in training. In reality, however, the most successful athletes are likely to be those who consistently train less hard than their competitors believe is necessary.

4 Treating overtraining

If an athlete has developed the full-blown overtraining syndrome (OTS), it is essential for him or her to rest for 6-12 weeks (cf. Noakes, 2003, p. 509). However, Newsholme et al. (1994, p. 273) warn that during such long rest periods, particularly in response to overtraining, psychological problems

(e. g. depression) may occur which can further delay recovery.

A suggested program for recovery over six weeks is as follows:

- 1-2 weeks almost complete rest, only very light exercise.
- 2-4 weeks – a very slow increase in training volume.
- 4-6 weeks – increase training towards a normal volume, but high-intensity training should be completely avoided (see Newsholme et al., 1994, p. 273).

Continued training or racing when one is seriously overtrained is counterproductive, because the athlete's racing performance will be poor and the continued exertion will probably result in

injury or a major infection. Continued training when overtrained only prolongs the period one will ultimately have to rest. The sooner one accepts the inevitable, the better.

Overtrained runners should only start running again when they have the desire, and then only slowly. All athletes need to appreciate the true nature of the human body, which is one of fragility, even though it can be trained to achieve remarkable feats. Therefore, it is essential for athletes to match their mental desires to the frailty of their bodies so that their minds do not repeatedly demand more of their bodies than they can deliver.

A carefully designed training program, with adequate time for rest and recovery, especially during periods of intense training, is essential in preventing overtraining. Athletes need to 'listen to their bodies' carefully, record their impressions in a daily training diary, and be able to communicate freely with their coach. The coach may need to take the lead, ask "how do you feel today?" and be willing to tailor the training program appropriately. In addition, the coach and athlete must be sure that the athlete is receiving proper nutrition, with adequate calories to meet the demands of the workload and a balance of macro- and micronutrients to maintain health. Given the time pressures of training, school and work, finding the time to prepare meals and to eat properly may suffer. In these situations, a post-training glucose-electrolyte replacement drink can be useful, as well as between-meal snacks. Vitamin and mineral supplements may be needed, but should not be a substitute for a balanced diet. Good hydration must be stressed as well. The athletes should monitor their weight to assure that their nutrition is adequate, and that they are rehydrated after training. Adequate sleep is also essential for recovery from heavy training. The athlete should be refreshed from a night's sleep. Persistent lassitude may suggest an inadequate quality or amount of sleep, or may be a harbinger of overtraining (Brown, 1999, p. 70).

The Major Warning Signs of Overtraining

(cf. Martin & Coe, 1997, p. 410)

Training-related

- Unusual muscle soreness the day after a training session.
- Progressive increases in soreness with continued training.
- Performance plateau or decrement despite increased training.
- Inability to complete previously manageable training loads.
- Elevated effort sense; delay in recovery from training.
- Thoughts of quitting training, skipping training

Lifestyle-related

- Increased tension, depression, anger, fatigue, confusion; inability to relax.
- Decreased vigor in completing daily activities; things once pleasurable now are not.

Health-related

- Swelling of lymph nodes.
- Constipation, diarrhea.
- Increased incidence of illness (fever, head colds, etc.).
- Increased blood pressure; increased morning pulse.
- Loss of weight; loss of appetite.

General Theme

PHYSIOLOGICAL BASIS AND DIAGNOSIS OF OVERTRAINING

1 Introduction

Many athletes are obsessed with training. Some attempt to do more work than they can physically tolerate, they train excessively.

Excessive training refers to training that is done with an unnecessarily high training volume, training intensity, or both. It leads to no additional improvements in conditioning or performance and can lead to chronic fatigue and decreased performance because of muscle glycogen depletion (Wilmore & Costill, 1999, p. 388).

The state when the stress of training has exceeded the body's ability to recover and adapt, which results in more catabolism (breakdown) than anabolism (buildup), is called overtraining. The symptoms that result from overtraining are collectively referred to as overtraining syndrome (OTS).

2 Definition of overtraining and nomenclature

Overtraining is an increase in training volume and/or intensity of exercise or an accumulation of training-related stress resulting in persisting decrement in performance capacity, with or without various other physiological and psychological symptoms. Overtraining can also be seen as an imbalance between training and recovery.

Overtraining is "an accumulation of training and nontraining stress resulting in long-term decrement in performance capacity with or without related physiological and psychological signs and symptoms of overtraining in which restoration of performance capacity may take several weeks or months." (Kreider, Fry & Toole, 1998, p.viii).

Other names of overtraining are overwork, chronic fatigue, or sports fatigue syndrome. In this context the terms *staleness* and *burnout* are also often mentioned.

Staleness is commonly defined as the end result or outcome of overtraining. It is a state in which the athlete has difficulty maintaining standard training regimens and can no longer achieve previous performance results. While overtraining can be viewed as a stimulus, staleness can be regarded as a response. The primary psychological feature of staleness is depression (Weinberg & Gould, p. 431).

Burnout is an exhaustive psychophysiological response exhibited as a result of frequent, sometimes extreme but generally ineffective efforts to meet excessive training and competitive demands. Burnout involves a psychological, emotional, and sometimes physical withdrawal from an activity in response to excessive stress or dissatisfaction. Once a person experiences burnout, withdrawal from the stress environment is often inevitable (Weinberg & Gould, p. 431).

The term *overreaching* refers to a shorter or less severe variation of overtraining, which the athlete easily

recovers from in just a few days. Since athletes must push their limits in quest of the minimal differences in performance that separate the champion from the also-ran, overreaching (or short-term overtraining) will remain a common part of training. Only if overreaching is too great, too monotonous, continued for too long a time, or coupled with too many competitions and non-training stress factors, an OTS may result and the athlete's performance may fail to return to expected levels, even if the regeneration is extended.

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Because of the absence of clearly identifiable medical causes, overtraining may more accurately be called the *Unexplained Underperformance Syndrome (UPS)*.

Although the condition is normally secondary to the stress of training, the exact etiology and pathophysiology of the OTS are not completely understood, and many factors other than overtraining may lead to failure to recover from training or competition. The OTS is therefore clearly a multisystem disorder and may actually represent more than one pathologic alteration

3 History of overtraining

One of the earliest scientific references to overtraining was made by McKenzie (1923, p. 66), who noted that exhaustion after physical exercise was of three kinds:

- Acute exhaustion accompanied by marked breathlessness, from which recovery is rapid.
- Fatigue of the whole muscular system, which requires 1-2 days of rest.
- Chronic fatigue, caused by "slow poisoning of the nervous system" (p. 66).

McKenzie called the latter form of fatigue staleness, and he added that recovery from this type of fatigue was very prolonged and could last weeks or even months. His description of staleness is almost as detailed as those by modern researchers:

"The vitality declines as the day progresses. He [the athlete] is unable to concentrate on study or work and takes but little interest in the world about him. He awakens tired after sleeping and his sleep is frequently broken. He finds it difficult to hold his attention on any subject. The physician notes that the eye is sunk deep in its socket, the face is pinched, the appearance dejected, the temper peevish and distrustful, aggravated by little things. Wounds and scratches heal slowly. Sudden rise to the standing position shows an increase in the pulse-rate of 20 beats or more ... There is gradual loss of weight from day to day, and the weight lost during exercise is not replaced within twenty-

four hours as it should be.” (McKenzie, 1923, p. 67)

4 Causes and development of the overtraining syndrome (OTS)

There are a lot of indications that the OTS originates at the level of the hypothalamus and higher brain centers. The OTS seems to be the result of a failure of the hypothalamus to cope with the total amount of stress, or, in other words, dysfunction of the hypothalamic pituitary axis caused by repeated stress of a physical or non-physical nature.

According to the cytokine hypothesis of overtraining (Smith, 2000), high-volume or -intensity training with insufficient rest will produce muscle and/or skeletal and/or joint trauma. Circulating monocytes are then activated by injury-related cytokines, and in turn produce large quantities of pro-inflammatory IL-1beta, and/or IL-6, and/or TNF-alpha, producing systemic inflammation. Elevated circulating cytokines then co-ordinate the whole-body response by:

- communicating with the central nervous system and inducing a set of behaviors referred to as “sickness” behavior, which involves mood and behavior changes that support resolution of systemic inflammation;
- adjusting liver function to support the up-regulation of gluconeogenesis, as well as the de novo synthesis of acute phase proteins, and a concomitant hypercatabolic state; and

- impacting on immune function.

Theoretically, OTS can be viewed as the third stage of Selye’s general adaptation syndrome, with the focus being on recovery/survival, and not adaptation. From this point of view, overtraining is “protective,” occurring in response to excessive physical and physiological stress.

Clinically, a sympathetic and parasympathetic form of overtraining has been distinguished.

- *Sympathetic overtraining* is easy to diagnose and is typically observed in young athletes at the start of their careers.
- *Parasympathetic overtraining* is considerably more difficult to detect because some of its symptoms are also seen in people who are not overtrained. Parasympathetic overtraining mainly occurs in more experienced athletes and usually develops very slowly.

5 Markers of overtraining

Due to the confusion regarding the causes of the OTS, the markers of overtraining are difficult to identify. Apart from performance, markers of overtraining may be categorized as:

- physiological,
- biochemical,
- immunological,
- traumatological, and
- psychological.

Physiological markers of overtraining are often confusing because symptoms such as decreased heart rate

and position of the lactate inflection point, are frequently similar to those seen with improved fitness. Changes in both body mass and the feeling of well-being are perhaps the best physiological markers of overtraining.

Some suggested *biochemical markers of overtraining* include endocrine imbalances (testosterone, cortisol, pituitary and hypothalamic hormones), disturbances of protein and amino acid metabolism (glutamine, nitrogen balance) and cell damage (creatine kinase).

There have been major advances in immunological technique over the past decade, and significant changes in a number of elements of the immune response can be identified in athletes during periods of heavy training. The most promising *immunological marker of overtraining* state seems to be a decrease in salivary immunoglobulin A (IgA) concentration.

However, no single change occurs with sufficient consistency to identify the individual competitor who is at risk of overtraining. Mechanisms can be conceived that convert a sequence of excessive training bouts into an acute and then a chronic inflammatory process, but the syndrome of overtraining has a complex overlay of biological and psychological influences. It remains more easily detected by decreases in physical performance and alterations in mood state than by changes in immune function.

Much of the scientific literature on overtraining is based on aerobic activities, despite the fact that resistance exercise is a large component of many exercise programs. Chronic resistance exercise can result in differ-

ential responses to overtraining, depending on whether either training volume or training intensity is excessive. The neuroendocrine responses to overtraining brought about by high volume resistance exercise overtraining, appear to be somewhat similar to those seen in overtraining for aerobic activities. On the other hand, excessive resistance training intensity produces a distinctly different neuroendocrine profile. As a result, some of the neuroendocrine characteristics often suggested as markers of overtraining may not be applicable to some overtraining scenarios.

The musculoskeletal system also responds to overtraining with overuse injuries. The three most common overuse injuries associated with overtraining – and thus *traumatological markers of overtraining* – are: posterior tibialis syndrome, lower limb stress fractures, and tendinitis conditions in the lower extremities. However, it is unclear whether overuse injuries associated with overtraining are the result of excessively high training loads or the body's impaired ability to recover from training bouts (Black Johnson & Thiese, 1992, p. 352).

The psychological factors associated with overtraining are more difficult to detect than the physiological ones. *Psychological markers of overtraining* are: sleep disturbances (and associated drowsiness), prolonged excessive weariness, chronic fatigue, and loss of vigor. In addition, loss of self-confidence, apathy, irritability, depression, anxiety, and confusion are also exhibited. An overtrained athlete may exhibit emotional and motivational imbalance, anger, and hostility, and mood swings are common. Eat-

ing disorders and generalized loss of appetite are also observed (Black Johnson & Thiese, 1992, pp. 352-353).

6 Diagnosis of overtraining

According to Black Johnson & Thiese (1992, p. 353), there are a number of scientific assays and measures that can indicate overtraining in an athlete. Many of the tests that can be employed are either too expensive or too invasive to be practical. There are, however, several simple ways the coach can watch for signs of overtraining.

Maintaining a written record will help the coach detect psychological and physiological overtraining. This involves keeping current and regular records of weight (particularly pre- and post-practice weights), as well as periodic measures of percent body fat and blood pressure, especially post-exercise recovery blood pressure.

The athlete should maintain records of morning heart rate and records of fluid and dietary intake throughout the training and competitive seasons. The amount and quality of sleep the athlete gets each night should also be recorded. These records should be reviewed regularly by the coach, as changes in established baseline levels of these measurements could signify an increased risk of overtraining for the athlete. In addition, the athlete should be encouraged to maintain a diary assessing his or her emotional outlook. This can be accomplished using psychological tests such as the Profile of Mood States (POMS, see Weinberg & Gould, p. 431).

References:

- BLACK JOHNSON, M. & THIESE, S. M. (1992). A review of overtraining syndrome – Recognizing the signs and symptoms. *Journal of Athletic Training*, 27 (4), pp. 352-354
- BROWN, H. (1999). Over-training: A brief review. *New Studies in Athletics*, 14 (1), pp. 67-70
- KARVONEN, J. (1992). Overtraining. In J. Karvonen, P. W. R. Lemon & I. Iliev, *Medicine in sports training and coaching* (pp. 174-188), Basel: Karger
- KREIDER, R. B., FRY, A. C. & TOOLE, M. L. (1998). Overtraining in sport: Terms, definitions, and prevalence. In R. B. Kreider, A. C. Fry & M. L. Toole (Eds.), *Overtraining in sport* (pp. vii-ix), Champaign (Ill.): Human Kinetics
- LEHMANN, M., FOSTER, C., NETZER, N., LORMES, W., STEINACKER, J. M., LIU, Y., OPITZ-GRESS, A. & GASTMANN, U. (1998). Physiological responses to short- and long-term overtraining in endurance athletes. In R. B. Kreider, A. C. Fry & M. L. Toole (Eds.), *Overtraining in sport* (pp. 19-46), Champaign (Ill.): Human Kinetics
- MARTIN, D. & COE, P. N. (1997). *Better training for distance runners* (2nd ed.). Champaign (Ill.): Human Kinetics
- MCKENZIE, R. T. (1923). *Exercise in education and medicine*. London: Saunders
- NEWSHOLME, E., LEECH, T. & DUES-TER, G. (1994). *Keep on running: The science of training and performance*. Chichester: Wiley
- NOAKES, T. (1991). *Lore of running* (3rd ed.). Champaign (Ill.): Human Kinetics

NOAKES, T. (2003). *Lore of running* (4th ed.). Champaign (Ill.): Human Kinetics

SCHIFFER, J. (1994). Selected bibliography 32: Overtraining (part I). *New Studies in Athletics*, 9 (3), pp. 93-106

SCHIFFER, J. (1994). Selected bibliography 32: Overtraining (part II). *New Studies in Athletics*, 9 (4), pp. 67-86

SCHIFFER, J. (2001). Selected and annotated bibliography 57: Overtraining. *New Studies in Athletics*, 16 (4), pp. 79-122

SMITH, L. L. (2000). Cytokine hypothesis of overtraining: A physiological adaptation to excessive stress. *Medicine and Science in Sports and Exercise*, 32 (2), pp. 317-331

WEINBERG, R. S. & GOULD, D. (1995). *Foundations of sport and exercise psychology*. Champaign (Ill.): Human Kinetics

WILMORE, J.H. & COSTILL, D.L. (1999). *Physiology of sport and exercise* (2nd ed.). Champaign (Ill.): Human Kinetics