

**NORTH AMERICA, CENTRAL AMERICA AND CARIBBEAN  
TRACK & FIELD COACHES ASSOCIATION**

**NACACTFCA BULLETIN Vol. 5 Number 1 – Jan. 2007**



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**NACACTFCA Regional Information:**

***USATF Junior Heptathlon Development Clinic***

May 25-26 in Houston, Texas. For more information, go here:

<http://www2.sjs.org/Mercado/2007%20Jr.%20Regional%20Heptathlon%20Clinic.doc> or email [rmercado@sjs.org](mailto:rmercado@sjs.org)

***Edmonton IAAF-ATC Site:***

The Edmonton High Performance Training Academy is in the process of being designated as an IAAF- ATC (Accredited Training Center). Check info at: [www.athleticscoaching.ca](http://www.athleticscoaching.ca)

***IAAF Academy Website:***

The IAAF Academy has a site to help promote the regional coaches associations of the IAAF and for development of World Class Coaches. Go here for more info: <http://www.iaafacademy.com/>

***Regional Calendar Information:***

Go to CAC and NACAC sites for regional calendars: <http://www.athlecac.org/>  
<http://www.nacac.sportcentric.com/>

***NACACTFCA Members info:***

NACACTFCA members, including members of the USTFCCA, are entitled to important benefits. Details on page 3.

***Technical Coaching Sites:***

[www.athleticscoaching.ca](http://www.athleticscoaching.ca) has great sport science articles and [www.coaches-eye.com](http://www.coaches-eye.com) is a great interactive technical site.

***New Color Logo for NACACTFCA:***

Check out the new color logo at the top of the page!

***Next Congress planned for Aruba October 11-14, 2007***

**In This Issue:**

- USATF Jr. Heptathlon Clinic
- Edmonton IAAF-ATC Site
- IAAF Academy info
- Regional Calendar Info
- NACACTFCA Member Benefit Info
- Great New Athletics Coaching Sites
- New NACACTFCA Logo
- 2007 Congress in Aruba
- Summary of 2006 Congress in Carolina, Puerto Rico p. 4

**Articles:**

- Two Styles of Pole Vaulting  
By David Butler p. 7
- Pushing the Envelope  
By Peter Thompson p. 9





Published quarterly  
by

North America,  
Central America and  
Caribbean Track &  
Field Coaches  
Association

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## Articles on the NACACTFCA Website

Access to most of the articles on the NACACTFCA Website ([www.nacactfca.org](http://www.nacactfca.org)) is now restricted to active members. To become a member or renew membership, go to the website and look on the left frame for the link to the Membership Information. This will download a WORD file that can be completed and emailed to [rmercado@sis.org](mailto:rmercado@sis.org) and [victorlp8@aol.com](mailto:victorlp8@aol.com); check may be sent to Victor Lopez at address listed. Direct link to file: <http://nacactfca.org/NACACTFCA%20MEMBERSHIP.doc>

Articles online are drawn from sixteen years of NACACTFCA Congress presentations and other articles by some of the best international coaches in Athletics.

## Contributions to the NACACTFCA Bulletin and the Electronic Athletics Journal

Please submit articles and information to [rmercado@sis.org](mailto:rmercado@sis.org) for inclusion in this NACACTFCA Bulletin and on the Electronic Athletics Journal online through the site. We especially desire original research and work based on training and technical analysis.



World-Class coaches Don Babbitt, Les Gramantik, Carmyn James, and Dan Pfaff on the beach in Santo Domingo



# North America, Central America, and Caribbean Track & Field Coaches Association Member Benefits



**NOTE:** USTFCCCA members are affiliated with *NACACTFCA* and enjoy full member privileges:

- Access to website: [www.nacactfca.org](http://www.nacactfca.org)
- Full Electronic Bulletin article access:  
<http://nacactfca.org/articles/nacactfcabulletin.htm>
- Receive email *NACACTFCA Bulletins* quarterly
- Receive a copy of 2007-2008 IAAF Competition Rules Handbook
- \$35.00 USD Member rate for IAAF *New Studies in Athletics* subscription
- Member registration rate for Annual Congress each October (2007 Aruba)
- Part of World Class Coaches Club at World Championships
- Previous Congress locations: *2007 in Aruba???*
  - 2006 – Carolina, Puerto Rico
  - 2005 – Dominican Republic
  - 2004 – Bonaire, Netherlands Antilles
  - 2003 – Monterrey, Mexico
  - 2002 – San Juan, Puerto Rico
  - 2001 – Montego Bay, Jamaica
- Previous Congress Presenters: Günter Tidow (GER) / Don Babbitt (USA) / Dan Pfaff (USA) / Santiago Antuñez (CUB) / Tom Tellez (USA) / Rudiger Harksen (GER) / Stephen Francis (JAM) / Cliff Rovelto (USA) / Eladio Hernandez (CUB) / Elio Locatelli (ITA) / Les Gramantik (CAN) / Amy Deem (USA) / Frank Dick (GBR) / Loren Seagrave (USA) / Nelio Moura (BRA) / Luis Miguel Landa (ESP) / Ramona Pagel (USA)

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## 16<sup>th</sup> NACACTFCA CONGRESS IN CAROLINA, PUERTO RICO



The Congress Presentation Staff

The 16<sup>th</sup> NACACTFCA Athletics Congress was held in Carolina, Puerto Rico in October, 2006. The Congress theme was Technical Skill Development, and the tone was set well by the keynote presenter, Professor Günter Tidow (GER). Almost 120 coaches were present from 17 countries, including Puerto Rico and other Caribbean nations, Mexico, Canada, USA, Venezuela, Spain and Japan. NACAC President Dr. Amadeo Francis and NACACTFCA President Victor Lopez both stressed the need for the national coaching associations in all countries and the cooperation between national federations and coaching associations to stimulate coaching education programs and delivery of services. The NACACTFCA plans to encourage the support of all NACAC area federations and coaches' associations to allow more coaches to enjoy the resources and benefits of the Congress, the website ([www.nacactfca.org](http://www.nacactfca.org)), and its electronic technical bulletin. Overall, this was perhaps the finest congress in terms of quality of presentations, general program and theme, attendance, and quality of the hotel, local support staff, and cultural enhancements. More thorough summaries and detailed presentations will be posted on the website and distributed through future electronic NACACTFCA Bulletins.

### Presentation Abstracts:

- Günter Tidow (GER) developed the idea for “set values” for model technique and corresponding analysis sheets for the various skill events in Athletics several years ago. Since then he has published several articles which identify the model technique and its development - including visual analysis tools - in sprints, hurdles, jumps and throws. Tidow discussed the development of this systematic approach to technical models and analysis, and the practical development of technique. He presented evidence from several of his studies, including a study of visual analysis trends in his sport science students and recommendations for improving the skill of coaches' analysis! Tidow also used several examples of specific technical skills such as variations in the penultimate step in the long jump, plant position in the pole vault, and the takeoff stride in the hurdles to demonstrate the styles variants within the technical model. The technical analysis sheets are constructed to allow coaches and athletes to use visual and video assessment to evaluate and develop technique based on this concept of the “set value.” The presentation set the stage for the discussion of technical development in the specific disciplines by other coaches, who addressed the basic issue of a technical model and style variations in their respective events.



- **Ramona Pagel (USA)**, four-time Olympian and American record holder in the shot put, discussed the basic principles of throwing and focused on specific applications to the individual disciplines. These specific components allow a coach to reach an optimal end result only “after much repetition and cognitive understanding of the events and how to apply them to a particular athlete.” Primary are the concepts that forces are applied from the ground up, that a long range of motion from slow to fast creates acceleration to a maximal release velocity, and that the hips are the link that chains lower and upper body power. Javelin training emphasis is on running efficiency and transfer of velocity into smooth crossover and plant at a speed that can be controlled for delivery of the implement. Core work and motions that enhance dynamic hip, shoulder, and trunk strength are used to develop specific strength, and Pagel’s American record holder, Kim Kreiner, has benefited greatly from the run, transition, and specific strength training. In the discus, Pagel emphasized the transfer phase from the turn and sprint to the power position, noting that athletes with stronger core development will better handle and profit from the long range of motion and great rotational forces going into the power position and block. Pagel noted the importance of the left side block for right-handed putters, which transitions the horizontal forces to vertical forces. The “left off” drill exaggerates the driving of the hip from the right side, making a left side block even more effective.
- **Ricardo Guardarrama (CUB)** discussed the technical training of developing young athletes in the horizontal jumps, focusing on rhythmic runs and takeoff drills, bounding, and the whole movement. Strength is developed through these natural drills as technique improves; Guardarrama does not believe that it is necessary or advisable to begin weight training at this early stage, especially specific strength through weights. Drills for the long jump include short run takeoffs into the pit with emphasis on takeoff extension and a progression towards more complete flight and landing movements. Triple Jump drills included bounding on the grass to develop strength and the technical patterns for the event such as alternating bounds (LRLR) and triple jump bounds (LLR-LLR) and modified triple jumps into the pit. In both the long and triple jump, Guardarrama and his progressions emphasize the smooth rhythmic transition from the approach run into the jump, and video was used effectively to demonstrate the progressions with athletes from 15-18 years of age.
- **David Butler (USA)** discussed the fundamental importance of 1) efficient pole carry to enhance the plant motion; 2) an early, high plant with both arms; 3) preserving proper swing mechanics. The front elbow should be tucked down with the wrist and V of the hand up under the pole instead of the elbow out to the side and the wrist down. This allows for smooth transition of the pole upward into the plant. Keeping the back elbow up and closing the angle of the arm also enhances the smooth upward motion of the plant. Beginning the plant on the third to last step by moving both hands upright ensures an early, efficient, and high plant with both arms extended upward. Driving the front arm upward through the plant creates an open angle between the body and an elastic response through the shoulder complex that enhances the swing. This allows for a natural swing to the top of the pole, but only if the athlete - and coach - do not destroy the swing by pulling down or rowing forward with the hands! Butler, who coaches successful male and female vaulters, used several video examples of takeoff drills and swing drills in the training of his athletes, with examples of intra-athlete development of technical skills over time. The identical technical skills were also demonstrated by video analysis of the performances of world class vaulters to reinforce his “technical model,” one very much influenced by his mentor Vitali Petrov.



- Tom Tellez (USA) focused on the natural aspect of sprinting.** The coach of Carl Lewis, Leroy Burrell and countless other world-class sprinters argued that the window of opportunity to develop proper motor patterns in the early adolescent period is actually a time when many coaches and athletes damage the natural running patterns by improper cues and understanding of running technique. If a sprinter keeps the toe dorsiflexed and fires the hip downward through the ground, then the recovery occurs naturally and sets up the next stride motion. According to Tellez, too much focus by coaches and athletes on upward knee action and unnatural heel recovery through drills and cues leads to unnatural sprinting mechanics and reduced force into the ground – i.e. reduced stride length, leg recovery, and maximum velocity! Arm motion is also over-coached and the major problem is that contrary to the model of keeping the arms at 45° for the entire motion, 100-200 meter sprinters need to open the angle on the backswing to allow for complete stride extension. Arm action controls the rhythm and range of motion of the leg stride – i.e. short arm action, reduced leg extension. Tellez used videotape to demonstrate the near identical technical movements of two world-class sprinters training side by side, and analyzed the natural technique a very young athlete (the son of Joe DeLoach) to demonstrate technical points of sprinting and to show the natural ability of un-coached youth to run properly!
- Wynn Gmitroski (CAN) on skill development for endurance events stressed a holistic approach to develop postural stability and efficient movement and thus achieve optimal performance.** He defined skill as “the ability to carry out a task with maximum certainty and minimum expenditure of energy and time.” Most of Gmitroski’s remarks concerned the trainability of youth between the ages of 8-12+- in terms of a skill development window, beginning with fundamental movements before developing more specific sport skills. The years 12-16+- should focus on “building engine and sport specific skills” and 16-23+- devoted to “optimizing the engine and sport / event / position skills.” From 19 years up the focus is on “maximizing” skills and getting to the podium! The critically sensitive period for skill development is often missed by coaches / programs, leading to over-competition and under training, damage done between ages 6-16 that is not fully correctible, and general sport skills going unlearned before 11-12 years: “Specializing early in a late-specialization sport contributes to one sided preparation, injuries, early burnout and early retirement.” Gmitroski argued that the LTAD principle has been reversed; coaches tend to make players first and then attempt to make an athlete out of that player, instead of making an athlete and then turning the athlete into a player. Creating an athlete requires special attention to that early window of skill trainability, postural development, and movement optimization. This will prevent major problems later, as dysfunctional posture and movement lead to impaired motor control, increased tension, poor technique, poor performance and injury!



Tom Tellez on the Sprint Start



**TWO “STYLES” OF POLE VAULTING: PUSH OR PULL?  
A DISCUSSION OF THE VAULTER’S REACTION TO THE PLANT**



*David Butler, Rice University - Presenter at 2006 NACACTFCA Congress, Puerto Rico*

*How many times have you been at a track meet and heard a coach yell, “PULL”! We are taught to pull in the “tug-o-war” or as we fish for that whopper with our father. If you were falling off of a cliff, you would reach out to grab that branch to save your life. However, if you were swinging the vines with Tarzan, you would hang from extended straight arms until the upswing of the vine takes you to that tree, and then, and only then, would you pull yourself onto the platform of the tree-house. We have something to learn from Johnny Weismueller.*

*The natural reaction of any beginning pole vaulter (or jungle swinger) is to bring the pole close to their body at takeoff. It is a “fear factor thing” that forces the vaulter to “hug Momma”. You will see “fiberhead” or “fibernose”, even “fiberchin” position, where the bottom arm is flexed and the fist stops at the chin, nose or forehead. A “pulling” vaulter stops the free extension of the shoulders by “locking them in” at the plant. The vaulter that reacts negatively to the plant tenses as if he or she is climbing a rope, hunched shoulders, flexed arms. Even as vaulters learn the bend the pole, they still “practice what they preached” and make the same mistakes they make on a non-bending pole : stopping the movement of the arms to vertical by pulling short of extension!*

*The negative result of “a pulling vaulter” is deceleration of pole rotation and the inability of the vaulter to get inverted, move their grip up, or get on stiffer poles. Can’t get upside down? You have got to be pulling! Can’t raise your grip? You are pulling! Can’t swing your body up to the tree-house? Pulling! A “pushing vaulter” keeps the arms and shoulders stretching towards vertical and moving to full extension just before or at least just as the pole tip strikes the box. A couple of crucial points apply here and make this “pushing” make sense, even when everything tells you, “I’ve got to hold on for dear life!”*

*Crucial Point 1 - PLANT TIMING: The vaulter must move the pole towards vertical three steps out from takeoff! By the time he/she is pushing off of the penultimate step, the pole needs to be pushing off the head of the vaulter. Both arms move to full extension from this position through the takeoff! Plant timing is always thrown off by a pole dropping too early, tip parallel to the ground or lower. This “longer” distance for the hands to travel to the vertical causes a late plant!*

*Crucial Point 2 - MAKE SPACE: With the full extension of the arms towards the vertical, the shoulders continue to move, as if the deltoids become part of the vaulter’s ears! Make as much space between the vaulter and the pole as possible, towards the crossbar! If you don’t reach to full extension, then you will probably pull! The shape the arms make resembles a “tipped V.”*

*Crucial Point 3 - ELASTIC: The arms and shoulders do not stop their movement as the vaulter leaves the ground! Rather, they continue to plant into the air, stretching and moving “elastically” as the vaulter “pushes” the pole*



towards vertical. From full extension, the bottom arm's elbow slightly flexes out as the vault runs through his/her arms. There is a subtle resistance "Up" as the vaulter drives his/her head, chest, knee, and hips through his/her arms and the pole. If your arms are "clockhands" then the arms move elastically to one o'clock, then drive back up to 12 o'clock as the vaulter swings. If the vaulter hits this "elastic" position and does not pull down or forward, then the swing will ballistically accelerate to invert and vertical, almost seemingly without effort and with force!

Many fiberglass vaulters "force-bend" the pole by "blocking"; stopping their shoulders and locking out arms. Alas, the only way a "blocker" can get upside-down is by breaking or collapsing the bottom arm to allow the hips to pass through towards vertical! This "style is called " blocking and breaking", but it is negative because the block causes the swing to buckle or break at the hips.

Other vaulters are taught to "row" their arms forward and down to help the vaulter get inverted faster. Again, this negative movement causes a break in the acceleration of the swing! It is a "pulling way" of getting inverted, but swinging to the tophand involves all direction of pressure "Up" and above the vaulter's head, arms pressing up at 12' o'clock . It is similar to the subtle "hollow" position in gymnastics. A good way to think of it is "Elastic to Immediate Up Pressure", at the very moment the downswing accelerates!

Both the "block & break" and "row & tuck" are ways to pole vault, but are "quick fixes" or shortcuts to vertical. The vaulter will clear higher heights if he/she swings to the top hand! The problems with "block & break" or "row & tuck" are that the vaulter will reach a point of NO IMPROVEMENT!

Are you frustrated with "a lack of PR's" lately? Go back to Straight poles and find out what you are doing with the pole carry, drop, plant, and reaction to the box. If little things are important (they are!) and a little improvement means at least an inch, isn't it worth it to take the time to "grind away at correctness". "SOME SEE, MANY UNDERSTAND, BUT VERY FEW GRIND AWAY AT CORRECTNESS" (Golubstov).

I have found that if a pole vaulter, in the least, gets their bottom fist above their forehead, then they will allow themselves to swing! If the bottom hand's fist is in front of the vaulter's face or lower, they will "pull". If the bottom arms releases this pressure and goes elastic, then the continuous pushing of the arms in an active, stretching, and elastic manner will assure movement to vertical!

All athletes hit "plateaus" in their endeavors. Pole vaulters who use a "pulling style" of vaulting will discover that they get "stuck" at the same PR height. They will be unable to move to stiffer or longer poles (unless they have a tremendous tail-wind). "Pullers" will experience frustration and wonder why they can't vault higher. The ages-old statement of "run fast, hold high, get on a big stick" doesn't work any more. A vaulter that "pushes the pole off the ground with his/her whole body" will make improvements and become a more consistent pole vaulter. It's the attention to small little details that matter in the long run. It takes concentration and focus in practice to make these small movements become more perfect. Most vaulters just want to experience the wonderful emotional release of "bending the pole" or seem intent on "holding higher on longer poles" rather than dropping their grip, and learning to not just "bend the pole" but to "move the pole" in an accelerating rotation to vertical.

The best drill to learn how to "push the pole to vertical" is the six step straight pole, non-bending pole vault. If a fiberglass vaulter is struggling, you must go back to non-bending vaulting to find the solution. Watch a vaulter perform a simple, but complex, drill called "walking slow motion plant".

If a vaulter cannot move the pole slowly and with fluid motion through the positions of the plant, then how do we expect them to perform under stress (competition) with speed (from a long run). We practice the vault always from "slow to fast".....short run takeoffs to long run. A lot can be learned from 4, 6, 8, 10 step work with both non-bending and bending poles. As the vaulter becomes a "pushing rather than pulling" pole vaulter, he/she is launching his/her way to higher heights!

For information on Coach Butler's DVD:

[stavhop@houston.rr.com](mailto:stavhop@houston.rr.com)



# Pushing the envelope

Planned strategies of recovery can boost your performance and make your training more efficient reveals international coach PETER THOMPSON



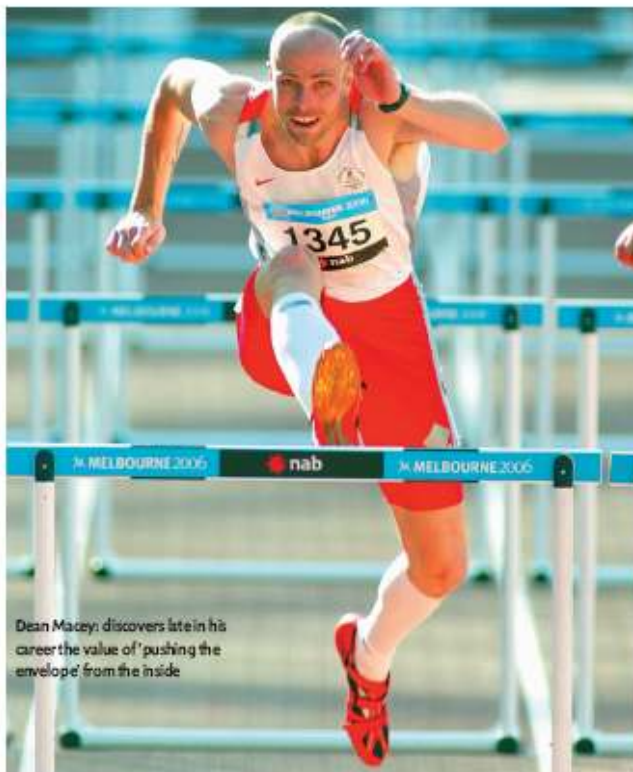
Reprinted with permission from *Athletics Weekly* by the author, Peter Thompson.

**T**HE pilot turned the nose of his craft towards the stars and punched the jet ignition which would send him hurtling towards the very edge of the black void of space. Whether he would return or not, he was not sure since this was the 1950s and the first time an attempt had been made to travel so high in a plane. Chuck Yeager was the pilot and, in advance of such people as astronauts, he was challenging the boundaries of technical knowledge and capability by 'pushing the envelope'.

Before this attempt to fly to where the distinction between atmosphere and space blur, Chuck Yeager had been part of the American programme to fly as fast as possible, and had been assigned to test an experimental rocket-powered fighter plane, the X-1. At that time, no one knew if a fixed-wing aircraft could fly faster than sound, or if a human pilot could survive the experience. Many experts believed the so-called 'sound barrier' was impenetrable and that any plane attempting it would surely disintegrate. With this background, Chuck Yeager in successive flights took the X-1 closer and closer to the magic 'Mach 1', finally breaking through the sound barrier on October 14, 1947.

As you're reading this you might be thinking of the parallels with attempts to break the 'sound barriers' within athletics. Every event has, or has had, a barrier such as the four-minute mile for men, the four-minute 1500m for women and the 6m and 5m pole vaults and the 10 and 11 second 100 metres for men and women respectively. Think back to the athletes edging closer and closer until the barrier is finally broken.

Immediately one barrier is achieved, another is identified, so that from the early 1950s when some doubted that a man could run under four minutes for the mile we now have a world record for the two-mile which is faster than two successive four-minute miles. As well as each event, each of



Dean Macey discovers late in his career the value of 'pushing the envelope' from the inside

you have your own 'sound barrier' to break, a demanding and challenging personal target or goal which is 'out there' but should be realistically achievable for you.

If we go back again to the early days of flying we find that with each attempt to break the sound barrier Yeager continued to 'push the envelope'. This evocative phrase has its origins in this world of aviation, where 'envelope' had the technical meaning of 'a set of performance limits that may not be safely exceeded'. Test pilots were, and still are, called upon to 'push' a new aircraft's performance envelope by going beyond known safety limits, which included determining just how fast an airplane could be flown. Initially, the pilots in the 1950s and 60s called this 'pushing the edge of the envelope' but this was soon shortened to simply 'pushing the envelope'.

In 1979 Tom Wolfe's best-seller

'The Right Stuff' vividly described the life of these test pilots during the 50s and 60s, and this book, along with the subsequent film, did much to popularise the notion of 'pushing the envelope'. The first recorded use in the more general sense of going, or attempting to go, beyond the limits of what is known to be possible came in the late 1980s. Now, the phrase crops up in everyday language and to 'push the envelope' is used to mean figuratively to 'stretch the boundaries'. It retains, however, that essential goal of those early test pilots – to go somewhere where no one has previously been and, most importantly, to return safely.

Each athlete is required to 'push the envelope' as an essential part of the training process. Without regularly doing a little more volume or intensity in training than has been previously done, there is no 'overload' and therefore no improvement in fitness or capacity

The essential thing for athletes to realise is that they must fulfil the same requirement as test pilots when pushing the envelope, and that is to 'return safely'. If the envelope is challenged too much then it is likely that the athlete will not only push the envelope but break through the envelope, resulting in injury, sickness or, if it really has been a major breaking of the envelope, over-training syndrome with possible injury and sickness.

Training programmes for all athletes should never be 'maximal' but always 'optimal', which is the most training an athlete can do at any time, and 'return safely'. The 'return safely' here means that they are able to adapt to what they have done, because we understand that it is the adaptation that follows training that improves our fitness, not the training itself. The 'envelope' for athletes is the combination of the four elements of training: the volume of training, the intensity of training, the frequency of training and the recovery from training. Of these it is the recovery that creates the time to 'return safely', to adapt to what we have done. And, as was said previously, it is not the active part of training that makes us fitter but the positive adaptations that occur in the recovery.

Let us look a little more closely at the role of recovery and adaptation in making you fitter. Each of us is a biological organism made up of millions upon millions of cells, all with a specific role or task. It has been said that there are more cells in the human body than there are grains of sand on a beach. I don't know how we can ever verify that other than it emphasises the incredibly complex nature of our bodies. All cells in our body, with the possible exception of brain cells, are capable of both regenerating and adapting. But this process of regeneration and adaptation takes time. As you are sitting reading this article the cells in your body are changing; with some dying, some adapting and some



being created. When ever we train we stress or do more specific damage to the cells and this requires more time for the cells to recover.

While planning time in your training specifically for recovery is essential, time alone is not the only thing you can do to help your recovery. There are many additional things we can do to actively and positively aid the recovery process. These things will ensure that you are able to optimise the return from your training. In simple terms it means that by planning recovery time and activities you will experience a four-fold benefit. Firstly, you will get better performance from the same training; secondly, you will be able to progress your training at a faster rate because both your performance and training capacity have improved; thirdly you will actually begin to train the adaptation process as the cells respond more quickly and more profoundly to the volume, intensity and frequency of your training and, finally, you will be less susceptible to injury and illness.

Remember, the moment you finish a session your body starts recovering and the training effect only then commences. Since the majority of your fitness adaptations occur through recovery, the goal of your training programme should be to optimise recovery. In other words, instead of 'recovering to train', as many athletes do, you should 'train to recover'. This is an important distinction in emphasis and is more than merely manipulating words. Those athletes who 'recover to train' have a focus entirely on the sessions that they do and rest is seen, at best, as a necessary evil. These athletes are still stuck in the mind-set that merely completing a session is sufficient to improve performance, which we have seen isn't true. When you 'train to recover', however, each session is seen in the context of the recovery opportunities that follow them. Training for recovery should never be confused with training less. Instead, these athletes create a better way of balancing the train/rest/recovery conundrum, making their training more efficient.

It is frequently said that determining your optimal recovery time is an experiment of one but specific steps can be taken to speed up recovery time for anyone. In the total training plan, even when training to recover,



Yelena Isinbayeva: the first woman over five metres has taken the pole vault to new heights

we can see that it is difficult for athletes and coaches to gauge what is the 'correct training' – what is optimal for any individual – but what is certain is that a group that regularly trains together risks having a situation where the majority of the group are doing the incorrect training. If your group sessions are, say, Monday, Wednesday and Saturday, unless there is a differentiation in the training load, not all athletes will have adapted to the previous training by the time the next session comes around.

What are the things that we can do to aid the recovery process? One of the most important aids is nutrition. Being optimally hydrated is obviously important during recovery since all our cells require water. You can be proactive and start a session well hydrated and this will lead to better performance in the session as well as helping the later recovery. If the session is particularly long and demanding there may be a need to hydrate during the session but, in general, if you are well hydrated going into a session there should be no need to drink until the session is completed. Immediately after a session, however, small amounts of water should be taken regularly to begin the optimal rehydration process.

To refuel the muscles, it used to be recommended that an athlete should consume between 300 to 400 calories of carbohydrate in the 15 minutes following a session; and then another 300 to 400 calories of carbohydrate within the following two hours. This two-hour window of opportunity is still recognised, with research suggesting that waiting for longer than two hours to eat or drink

after your training results in 50 percent less glycogen stored in the muscle. More recent research has shown that combining protein with carbohydrate in the two hours after a session, nearly doubles the insulin response, which results again in more stored glycogen. The optimal carbohydrate to protein ratio for this effect is said to be 4:1, four grams of carbohydrate for every gram of protein. Taking in too much protein after training, however, has a potentially negative effect since it slows both glycogen storage and rehydration.

The key to meeting the two-hour window is preparation and each athlete will have personal preferences in how they achieve a 4:1 combination of carbohydrate and protein. There is no evidence that solid food is better than liquid in providing this carbohydrate-protein combination but, immediately after exercise, a drink may be easier to ingest and digest. For every session you do, even if you meet the two-hour window and are careful with the optimal replacement of muscle energy stores, and are an athlete with a high training age, you will still probably require up to 36 hours between very intense sessions. If you don't hydrate and refuel to recover in the optimal way it could take 72 hours or even longer before you're ready for the next harder session.

Nutrition can help the recovery process and so can doing 'recovery sessions': light, active sessions which stimulate the body's recovery processes. In their simplest expression your training days may be hard/easy/easy, or if you are an experienced athlete, a mixture of this

with hard/easy days. Other positive things you can do include using ice and cold water, particularly immediately after a session; massage, at appropriate times; stretching; swimming; aqua-running; relaxing and sleep. The good news is that the two most effective things you can do to aid your recovery are free. These are, being optimally hydrated at all times and having a regular habit of sufficient, quality sleep, preferably in a room with an open window.

Develop the habit of monitoring your recovery from training, in addition to your training. You can use your performance in a session to monitor your recovery status by assigning and recording a 'grade' to how it felt. Some athletes make this grade a numerical scale of 1 to 5, with '5' representing feeling fantastic, the best possible feeling, and '1' being the worst feeling, where each moment of the session has been an effort and unenjoyable. Others find it easier to express how they feel by using a verbal scale, say, from 'great' through 'good', 'fair', 'struggle' to finally, the worst, 'bad'. Three consecutive days of 1s and 2s, or 'struggle' and 'bad' indicate that you are not recovering from the training load and this would be a good time to have a complete and inactive rest day. Similarly, if you go a whole week without a 4 or 5, or a 'good' or 'great' it suggests that the training load should again be adjusted with an additional complete rest day.

Ask yourself now a simple question, "Is it better to train maximally, or optimally?" If you are 'training to recover' you should be training optimally and pushing the envelope from the inside. If you caught Dean Macey's interview after his recent superb Commonwealth Games performance, you would have heard him say that he has finally learnt that it is better to train within his capacity rather than to keep doing too much. He expressed it as, "better to do 80% of what I can do for three months, rather than get injured."

If you enjoy your training and look forward to the more challenging sessions with high energy and enthusiasm, you are recovering well. If you learn to 'push the envelope' wisely the efficiency of your training will improve, your performance will be boosted and you will really enhance your chances of adapting well to training and to life in general.

