Brian Mackenzie's
Successful Coaching

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Letter from the editor

At the start of each season coaches and athletes get together to identify the objectives and training schedule for the coming year, but how many have 'to remain injury free' on their list? Injury is the one thing athletes and coaches dread. If we had an appreciation of early signs and symptoms of the common injuries that athletes experience, we could monitor and perhaps prevent injuries occurring. To help us Jason Schultz in his article 'Is heel pain stopping you training?' explains the signs, symptoms and treatment of plantar fasciitis and Ken Johnson, provides advice on how to be proactive in his article 'Would you like to take control of sports injuries?'

A few months ago the Atkins diet was under scrutiny. Today obesity is under the spotlight with a growing concern in the USA and UK about the eating habits of our younger generation. Brain Grasso, in his article 'What should young athletes eat?' provides advice on appropriate nutrition for young athletes and Charles Remington, in his article 'Seven Reasons why a low carbohydrate diet is wrong', explores health problems that are related to diets which restrict the intake of carbohydrates.

Stretching is a perennial topic of discussion in the coaching fraternity and the debate has focused on whether we should we do it, and if so what do we do and when do we do it? Phil Campbell in his article reviews the research work conducted on static and dynamic stretching and provides advice on the appropriate timing of each type. On the topic of physiology Danny O'Dell explains the impact that exercise has on stimulating bone growth.

Anyone who watched the magic of Jonny Wilkinson's conversions that helped the England Team win the rugby world cup will remember the routine used as he kicked the ball between the posts. So what is he doing when he clasps his hands and looks at the posts? Adam Vile explains the role of 'Doris' in assisting Jonny Wilkinson to stay focused and collect those three points.

Brian Mackenzie, Editor

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Injury Prevention

Would you like to take control of sports injuries?

Ken Johnson explains how coaches can be proactive in the prevention of sports injuries

Athletes of all levels can avoid many sports injuries with prehabilitation (prehab). Even though there is an inherent risk in all athletic activities, many injuries can be avoided. The percentages increase toward a greater likelihood of staying healthier and performing better with a strong prehab programme.

What is prehab?

Prehab is a personalised exercise programme that continually evolves involving strength and conditioning exercises for specific muscles that help to reduce injury *before* an injury actually occurs. It provides sports-specific focused exercises and activities for athlete's needs. The philosophy is simple: to prevent injuries. The development and execution of an effective training programme can be complex. The practice of prehab and its success relies greatly on an athlete's ability to commit to prevention. The development of the programme needs to be progressive and periodically re-evaluated to change with the athlete's needs.

Who should prehab?

Athletes of all levels should include a prehab programme in their training. The more advanced the athlete, the greater the need for a prehab programme. As athletes' bodies mature within a sport, their bodies adapt to the physical demands of training. Too often repetitive movements and the daily stresses of training cause negative

of fibre (ie bran) are taken from wheat during the processing associated with making bread and replaced with artificial colours, synthetic vitamins and chemical additives to ensure freshness. This is just one example and, admittedly, I am certainly not an authority on food preparation or harvesting. Think about this, though: if bread is this 'sketchy', what about things like green ketchup or florescent macaroni? I am not even sure I want to know what goes into that kind of stuff!

Whole foods are surprisingly easy and tasty and here are some of my general ideas and food guidelines:

1. Fish
Fish is grossly lacking in the North American diet. It is a great source of protein and Omega 3 and 6 fatty acids, which serve as a natural anti-inflammatory for athletes.

2. Nuts and seeds
Dietary fat has been shunned to such a degree over the past few decades that folks are now afraid of it. Dietary fat is nothing to be afraid of but the type of dietary fat is! Nuts and seeds are excellent sources of protein, fibre and dietary fat. Be wary, though: I am talking about raw, whole nuts here not roasted, salted, sugared or candied ones.

3. Vegetables
This typically gets put in a category with fruit, but vegetables alone are so important that I had to leave them in a section by themselves. Natural sources of vitamins, minerals, fibre and carbohydrates are available in good-quality vegetable produce. In fact, I feel very strongly that vegetables should be our main source of carbohydrates. Right now pasta, bread, cereal and candy are likely our primary sources. All processed and lacking natural nutrition.

As opposed to the fluorescent artificial colors within processed foods, the wonderful array of colours found in vegetables is natural and indicates the presence of quality nutrients.

4. Lean meats
Pepperoni on pizza, 'meat based' pies in a pastry crust and hamburger patties placed between two processed pieces of bread do not count as lean meats. Chicken breasts, lean steak and quality pork are all wonderful sources of protein and nutrition and the higher the quality of the meat the better.

These are just a few suggestions but do not forget about things like legumes, fruit and whole grains (ie brown rice).

Suggestion Number Two –
Decrease the amount of the wrong carbohydrates daily

This is a very contentious issue but greatly related to my points on whole foods. Let me first point out that this is not an endorsement for dietary guidelines like Atkins or any other form of nutritional science that advocates cutting carbohydrates. My main point here is in relation not to the volume or grams per day of carbohydrates one is consuming, but more specifically the quality of carbohydrates being consumed.

In terms of sheer volume, if you were to consume as many grams (ie. as much volume) of carbohydrates in a day as you likely are now, but instead used vegetables and nuts as your only source for carbohydrate intake, than you would increase the amount of fibre, vitamins, essential fatty acids and antioxidants by exponential figures.

Over-consumption of carbohydrates is very much a quality or selection matter. Unfortunately right now, most young athletes are consuming refined grains or sugars as their main sources. Pasta, bread, cereal and other refined grains should most certainly be replaced by nutrient dense and fibre-rich foods such as vegetables and brown rice.

Suggestion Number Three –
Increase the amount of water daily

This one is just plain common sense, but is still a problem with youth athletics. Without the inclusion of any physical activity whatsoever during the course of a day, the human body is in a constant state of repair and regeneration at the cellular level. Water is both a nutrient and catalyst for all of our biochemical needs. It is the foundation of life and the substance of which our bodies are most made up of. When you add athletic practices, games, tournaments or training sessions into your daily habits, then your need for water will increase tremendously.

In my experience the modern young athlete does not consume enough fluid. Pursuant to that, anytime you ingest coffee, tea, chocolate or other caffeine loaded food, you add to your body's need for water. Consequently, drink plenty of water. Have a water bottle with you at all times and get used to the idea of sipping it throughout the day.

Nutrition is a very involved science and not an 'easy fix' kind of discipline. Starting with these three suggestions, however, would be a great idea.

Brian Grasso
athletics coach, Chicago

Physiology

The truth about stretching

Phil Campbell reviews the research work conducted on static and dynamic stretching

An Australian study about stretching is currently being cited in many articles. The conclusions that some writers draw from it may be harmful to the muscle, ligaments and joints of your athletes.

Is stretching before exercise harmful?

Stretching before athletic training and general fitness improvement exercise is being made out to be a time waster, not needed, and even harmful. This is not true. In fact, there is a recent study that evaluates all the research on stretching, and the study concludes:

'Due to the paucity [small number], heterogeneity [dissimilar study subjects] and poor quality of the available studies no definitive conclusions can be drawn as to the value of stretching for reducing the risk of exercise related injury.'[1]

Essentially, the researchers are saying that there are not enough quality studies to draw conclusions about this issue.

Study in question

The study that is generating all the hoopla was performed by the Kapooka Health Centre, New South Wales, Australia on 1,538 army recruits. It is a creditable study designed to show the occurrence of lower limb injury in a group of young army recruits. Despite what you may have heard about stretching before training, this is what the researchers actually reported:

'A typical muscle-stretching protocol performed during pre-exercise warm-ups does not produce clinically meaningful reductions in risk of exercise related injury in army recruits. Fitness may be an important, modifiable risk factor.'[2]

The statement, 'Fitness may be an important, modifiable risk factor' is very important. It simply means that age, weight, and conditioning of the study subjects may be an important factor in preventing or facilitating the injuries experienced in this study.

Three years after the Kapooka study, another study involving military recruits was conducted and the researchers in this study show that pre-training static stretching can prevent injury involving muscle but not joint or bone injury. The researchers report, 'Static stretching decreased the incidence of muscle-related injuries but did not prevent bone or joint injuries.'[3]

Appropriate conclusions

Based on the way some have written about this study, it is okay to run a 100-metre sprint full speed without stretching beforehand. Now, this may be possible for a small number of lean, young army recruits. However, does anyone believe that a powerful, muscled athlete or a middle-aged and older adult can go out and run a sprint, cold with no warm-up and without increased risk of injury? Do not think so.

Use common sense... and the full body of research

Think about it; if an out-of-shape, untrained young army recruit performs high intensity exercise, he may get injured, pre-stretched or not. And this is why researchers evaluating all the research on stretching conclude: 'No definitive conclusions can be drawn...'

In short, there needs to be a body of research based on age, weight, conditioning, and the study needs to be performed functionally for the specific sport and type of exercise before life-changing conclusions are drawn.

The truth about stretching

New research shows that stretching can aid in the prevention of injury of stress factures that plague distance runners. Researchers conclude:

'Prevention of stress fractures is most effectively accomplished by increasing the level of exercise slowly, adequately warming up and stretching before exercise, and using cushioned insoles and appropriate footwear.'[4]

Stretching offers many benefits. Researchers show that prolonged stretching (in the form of yoga) with moderate aerobic exercise and diet control will reduce cholesterol and significantly reverse hardening of the arteries (20% regression) in adults with proven coronary atherosclerotic disease.

After one year in a yoga programme, participants lost weight, reduced cholesterol, and improved their exercise capacity[5].

Stretching offers many benefits, but there is an issue about the type of stretching and the timing of stretching before athletic competitions.

Use dynamic stretching before games and key practice sessions

There are two main types of stretching, static (holding a stretching exercise in one position without movement) and dynamic stretching, which means moving while stretching (arm swings, knee rotations, neck circles).

Researchers show that athletes should not perform prolonged static stretching before the big game or a key practice session because this slows muscle activation for around an hour afterwards.[6] Using dynamic stretching is a wise pre-competition strategy.

Static stretching builds flexibility and should be performed regularly, just not immediately before a big game or a key practice session.

Warming up prior to a high-intensity, ballistic, athletic event is an absolute rule, never to be broken, and stretching can be combined (multi-tasked) as part of the warm-up. The goal of the warm-up is to get the blood flowing and raise body temperature (one degree) prior to athletic competitions and high intensity training. It is desirable to have the athlete's muscle, ligaments, and joints experience the functional range of motion required of the sport during the warm-up.

Do static stretching with 30 second stretch-holds away from practice

Gains in flexibility are dependent on the 'duration' of stretch-hold position, and researchers show the best 'stretch-hold position' (for time spent) to increase flexibility is 30 seconds.[7] 'Best' means optimal results for time spent. You can get positive results with two-minute stretch-holds, but 30 seconds yields equal results.

This type of stretching is positive for athletes and adults of all ages. Researchers show in one study that longer hold stretching positions are of great benefit for adults over age 65,

'Longer hold times during stretching of the hamstring muscles resulted in a greater rate of gains in range of motion (ROM) and a more sustained increase in ROM in elderly subjects.' [8]

Adults aged 21 to 45 with tight hamstrings also get the best results from static stretching with 30-second stretch and hold positions. Researchers report that static stretching is two times more effective than dynamic range of motion (DROM) for this group of non competitive athletes. Researchers report:

'The results of this study suggest that, although both static stretch and DROM (dynamic stretching) will increase hamstring flexibility, a 30 second static stretch was more effective than the newer technique, DROM, for enhancing flexibility.'[9]

Keep in mind there are important lessons in these studies, but the studies apply to a specific age group (over 65, and ages 21 to 45) and a specific physical condition (tight hamstrings). If we apply the results of a study with these variables to young athletes, we may be wrong.

While it is reasonable to conclude (as I have for training purposes) that static stretching away from practice is an effective strategic for athletes with tight hamstrings, this study does not specifically prove that point. It is clearly a mistake to take the findings of one

study and create an absolute fact. Look at the whole body of research about a topic before making a life changing training decision.

The take-home about stretching

Use dynamic stretching and static stretching at the correct times in the training plan.

Dynamic stretching (arm swings, hip rotations and knee rotations) will aid in the pre-competition, pre-practice warm-up process by increasing flexion in the joints and increasing body temperature. This method is preferred before athletic competition.

Static stretching can be used as part of a warm-up for training. However, static stretching will slightly slow down athletes for an hour afterwards so examine training goals. The best way to improve overall flexibility is static stretching with 30-second stretch and holds performed away from events requiring peak performance.

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Adaptation of bone to exercise

Danny O'Dell explains how exercise is beneficial to bone development.

Bone is considered a connective tissue that when stressed, deforms as a result of the load. To meet the strain imposed upon the external structure caused by the bending, compressive, torsional loads and the muscular contractions at the tendinous insertion points, osteoblasts migrate to the surface of the bone.

At the point of the strain, immediate modelling of the bone begins. Proteins form a matrix between the bone cells. This causes the bone to become denser due to the calcification process occurring during the growth response to the load.

The new growth occurs on the outside of the bone to allow the manufacture of new cells to continue in the limited space with in the bone itself. This outer layer is commonly known as the periosteum.

Adaptations take place at different rates in the axial skeleton (skull/cranium, vertebral column, ribs, and sternum) and the appendicular skeleton (shoulder, hips, pelvis and the long bones of the upper and lower body – essentially the arms and legs). This is due to the differences in the bone types – trabecular (spongy) and cortical (compact) bone.

The stimulus for new bone formations

Minimal essential strain (MES) refers to the threshold amount of stress applied to the structure which is necessary to elicit growth of new bone material. A force exceeding MES is required to signal the osteoblasts to move toward the periosteum and begin this transformation. MES is thought to be 1/10 of the breaking force needed to fracture the bone. Training effects have a positive relationship to bone density just as sedentary living habits play a role in the loss of bone density.

Training to increase bone formation

Programmes designed to stimulate bone growth, also known as bone mineral density (BMS), will incorporate the following characteristics:

- specificity of loading
- proper exercise selection
- progressive overload
- variation.

Specificity of loading

This will see the exercise patterns emphasizing specific areas in need of assistance. New or unusual forces in varying angles of stress will enable your bones to adapt to the greater intensities. Military presses, bench presses, upright shoulder shrugs, push ups, chin-ups, plus other similar exercises would help develop stronger upper-body bones. Lower-body exercises selections would be along the lines of these types of movement patterns: squats, calf raises, dead lifts, and straight-leg dead lifts.

Exercise selection

This will promote osteogenic stimuli (factors that stimulate new bone formation) and will exhibit these characteristics: compound exercise muscle movements consisting of multi-joint, structural loading and varying force vectors. Such exercises are the squat, dead lift, military press and the bench press along with the Olympic-style moves.

Progressive overload

Greater than normal loads force the body to adapt in a positive manner regarding new bone formation. This response is greater if the load changes are dramatic and repetitive in nature. Younger bones may be more receptive to osteogenic changes in the load