



## PHYSICAL SCREENING AND GENERAL PRINCIPLES OF TRAINING

### Introduction

A physical examination is an evaluation of the body and its functions using inspection, palpation (feeling with the hands), percussion (tapping with fingers), and auscultation (listening). A complete health assessment also includes gathering information about a person's medical history and lifestyle, doing laboratory tests, and screening for disease.

The annual physical examination has been replaced by the periodic health examination. How often this is done depends on the patient's age, sex and risk factors for disease. The United States Preventative Task Force (USPDTF) has developed guidelines for preventative health examinations that health care professionals widely follow.

### PHYSICAL SCREENING

Physical screening is used to ascertain the current musculoskeletal condition of the athlete and should usually be performed early in the pre-season phase of training. Screening can also involve the use of sport specific fitness testing to ascertain the athletes' preparation for that particular sport. A physical assessment of the athlete allows your sport physiotherapist to obtain data base which can:

- Highlight past and current injuries, which can result in specific exercise prescription for managing the condition and preventing further injury
- Identify inter-player differences – direct conditioning training programs to be set for various levels of fitness
- Monitor physical changes over time, which is particularly important in the growing athlete and athlete participating in high training load and/or multiple sports
- Ensure effective physical conditioning – allowing for measurement, review and modifications to exercise training programs involving sport science and sport physiotherapy

A typical physical screening of athletes includes analysis of:

- Posture
- Gait assessment
- Muscle length and joint flexibility
- Neuromuscular assessment
- Task-specific testing.

Even the junior team or recreational player who does not consider themselves to be an 'athlete' can greatly benefit from a base-level screening from a sport physiotherapist on posture and muscle tightness/ weakness.

## **PRE-PARTICIPATION PHYSICAL EXAMINATION (PPPE)**

The pre-participation physical examination (PPPE) is an important step toward safe participation in organized sports. The purpose of the PPE is not to disqualify or exclude an athlete from competition, but rather to help maintain the health and safety of the athlete in training and competition.

### **Goals and objectives**

The goals of a pre-participation sports evaluation can be summarized as follows:

- Determine that the athlete is in general good health.
- Assess the athlete's present fitness level.
- Detect conditions that predispose the athlete to new injuries.
- Evaluate any existing injuries of the athlete.
- Assess the size and developmental maturation of the athlete.
- Detect congenital anomalies that increase the athlete's risk of injury.
- Detect poor pre-participation conditioning that may put the athlete at increased risk.

## **IMPORTANCE OF PRE-PARTICIPATION PHYSICAL EXAM (PPPE)**

This is the time of year when hundreds of young athletes are lining up for pre-participation physical exams (PPPE). Pre-participation physical exams are required for athletes to participate in middle school and high school sports and summer camps.

With the increased media attention on including electrocardiograms as part of PPPEs for the purpose of detecting hypertrophic cardiomyopathy, the leading cause of sudden death in young athletes, pre-participation physical exams are receiving more consideration. Specifically, sports medicine personnel are reviewing the quality and what is required in these exams to ensure that they are sufficient to identify young athletes who may be at risk for further injury or possible sudden death.

## **WHAT IS THE PURPOSE OF A PPPE?**

The purpose of the PPPE is to identify athletes that may be at risk for further injury or illness and to refer these athletes for additional medical evaluation prior to allowing them to participate. The specific purposes include the following:

- To identify athletes at risk of sudden death
- To identify medical conditions that may require further evaluation and treatment before participation
- To identify orthopedic conditions that may require further evaluation and treatment, including physical therapy, before participation
- To identify at-risk adolescents and young adults who are at risk for substance abuse, STDs, pregnancy, violence, depression, and so on
- To satisfy legal requirements of athletic governing boards

Identification of athletes who may be at risk for sudden death is currently a hot topic in the world of sports medicine. Recent studies have indicated that the addition of an electrocardiogram would identify athletes with hypertrophic cardiomyopathy and that this test should be a requirement of the PPPE.

## **GENERAL PRINCIPLES OF PHYSICAL TRAINING**

The aim of physical training is to expose the body safely to stimuli that cause physiological and structural adaptations to take place. Positive benefits include an increased capacity to work for longer periods before the onset of fatigue and a rapid return to normal once activity has ceased.

However, there is still much to be understood by sport scientists regarding training and, although new training techniques appear frequently, there are several fundamental, and well established, guidelines which should form the basis for the development of any training programme.

Training to improve an athlete's performance obeys the principles of training i.e., specificity, overload, rest, adaptation and reversibility (SORAR).

## **SPECIFICITY**

Specificity is an important principle in strength training, where the exercise must be specific to the type of strength required, and is therefore related to the particular demands of the event. The coach should have knowledge of the predominant types of muscular activity associated with his/her particular event, the movement pattern involved and the type of strength required. Although specificity is important, it is necessary in every schedule to include exercises of a general nature (e.g. power clean, squat). These exercises may not relate too closely to the movement of any athletic

event but they do give a balanced development and provide a strong base upon which highly specific exercise can be built.

## **OVERLOAD**

When an athlete performs a mobility exercise, he/she should stretch to the end of his/her range of movement. In active mobility, the end of the range of movement is known as the active end position. Improvements in mobility can only be achieved by working at or beyond the active end position.

- Passive exercises involve passing the active end position, as the external force is able to move the limbs further than the active contracting of the agonist muscles
- Kinetic mobility (dynamic) exercises use the momentum of the movement to bounce past the active end position

A muscle will only strengthen when forced to operate beyond its customary intensity. The load must be progressively increased in order to further adaptive responses as training develops, and the training stimulus is gradually raised. Overload can be progressed by:

- increasing the resistance e.g. adding 5kg to the barbell
- increasing the number of repetitions with a particular weight
- increasing the number of sets of the exercise (work)
- increasing the intensity- more work in the same time, i.e. reducing the recovery periods

## **RECOVERY**

The rest periods between physical training are just as important as the training itself, as muscle damage is repaired and waste is metabolized during these times. The optimum recovery time is between 24 and 48 hours after exercise. Recovery also can be achieved by alternating more difficult training days with easier training days, or alternating muscle groups so you're not working the same muscles continually. Improper recovery can lead to muscle fatigue, increasing the potential for subsequent injuries.

## **ADAPTATION**

The rate of adaptation will depend on the volume, intensity and frequency of the exercise sessions. In their recent investigation Burgomaster et al. (2008) reports that 6 weeks of low-volume, high-intensity sprint training induced similar changes in selected whole-body and skeletal muscle adaptations as traditional high-volume, low-intensity endurance workouts undertaken for the same intervention period.

Hawley (2008), states that the time of adaptation may be quicker for high-intensity sprint training when compared to low-intensity endurance training, but that over a longer period, the two training regimens elicit similar adaptations.

## **REVERSIBILITY or Detraining**

Improved ranges of movement can be achieved and maintained by regular use of mobility exercises. If an athlete ceases mobility training, his/her ranges of movement will decline over time to those maintained by his/her other physical activities.

When training ceases the training effect will also stop. It gradually reduces at approximately one third of the rate of acquisition (Jenson and Fisher, 1972). Athletes must ensure that they continue strength training throughout the competitive period, although at a much reduced volume, or newly acquired strength will be lost.

According to Michael Brent, the general principle of physical training is divided into seven principles, which are also known as PROVRBS, an acronym for progression, regularity, overload, variety, recovery, balance and specificity.

## **WHY IS A SPORTS PHYSICAL IMPORTANT?**

A sports physical can help you find out about and deal with health problems that might interfere with your participation in a sport. For example, if you have frequent asthma attacks but are starting forward in soccer, a doctor might be able to prescribe a different type of inhaler or adjust the dosage so that you can breathe more easily when you run.

Your doctor may even have some good training tips and be able to give you some ideas for avoiding injuries. For example, he or she may recommend certain stretching or strengthening activities that help prevent injuries. A doctor also can identify risk factors that are linked to specific sports. Advice like this will make you a better, stronger athlete.

## **CONCLUSION**

General health checks, including physical examinations performed when the patient reported no health concerns, often include medical screening for common conditions, such as high blood pressure. A Cochrane review found that general health checks did not reduce the risk of death from cancer, heart disease, or any other cause, and could not be proved to affect the patient's likelihood of being admitted to the hospital, becoming disabled, missing work, or needing additional office visits.

Sports physical which is also known as a pre-participation physical examination is a check-up to assess a teen's health and fitness as it relates to a sport. It is not the same as a

regular physical concept. During the sports physical, the health care provider looks for any diseases or injuries that could make it unsafe to participate in sports and reviews the family's medical history to ensure additional tests are performed if necessary.