

## PDHPE – Sports Medicine

|       |  |    |
|-------|--|----|
| 1     | How are sports injuries classified and managed?.....                                     | 4  |
| 1.1   | Ways to classify sports injuries .....   | 4  |
| 1.2   | Soft Tissue Injuries .....   | 4  |
| 1.2.1 | Tears sprains and contusions .....   | 4  |
| 1.2.2 | Inflammatory Response.....   | 4  |
| 1.2.3 | Skin abrasion, laceration, blisters and calluses .....                                   | 5  |
| 1.3   | Managing Soft Tissue Injuries.....   | 5  |
| 1.3.1 | RICER .....  | 5  |
| 1.3.2 | Immediate treatment of skin injuries .....   | 6  |
| 1.4   | Hard Tissue Injuries .....   | 6  |
| 1.4.1 | Fractures.....   | 6  |
| 1.4.2 | Dislocation.....   | 7  |
| 1.5   | Managing Hard Tissue Injuries.....   | 7  |
| 1.5.1 | Immobilisation .....   | 7  |
| 1.5.2 | Medical Treatment .....  | 7  |
| 1.6   | Assessment of Injuries .....   | 7  |
| 1.6.1 | Sports Injury Flow Chart.....  | 8  |
| 2     | How does sports medicine address the demands of specific athletes? .....                 | 9  |
| 2.1   | Children and young athletes.....   | 9  |
| 2.1.1 | Medical Conditions .....   | 9  |
| 2.1.2 | Overuse Injuries.....  | 10 |
| 2.1.3 | Thermoregulation .....   | 10 |
| 2.1.4 | Matching of opponents .....  | 10 |
| 2.1.5 | Resistance Training.....   | 10 |
| 2.2   | Adult and Aged Athletes.....   | 11 |
| 2.2.1 | Heart Conditions.....  | 11 |
| 2.2.2 | Fractures and bone density .....   | 11 |
| 2.2.3 | Flexibility and Joint Mobility .....   | 11 |
| 2.3   | Female Athletes.....   | 11 |
| 2.3.1 | Eating disorders .....   | 11 |
| 2.3.2 | Iron deficiency .....  | 11 |
| 2.3.3 | Bone density.....  | 12 |
| 2.3.4 | Pregnancy .....  | 12 |
| 2.3.5 | Menstruation.....  | 12 |
| 3     | What role do preventative actions play in enhancing the well being of the athlete? ..... | 13 |

## PDHPE – Sports Medicine

|       |   |    |
|-------|---|----|
| 3.1   | Physical Preparation .....  | 13 |
| 3.2   | Sports policy and the sports environment .....                              | 13 |
| 3.2.1 | Responsibilities of the club, school, sports administrator.....             | 13 |
| 3.2.2 | Rules of Sports and Activities .....  | 13 |
| 3.2.3 | Modified Rules for Children .....   | 14 |
| 3.2.4 | Even Competition .....  | 14 |
| 3.2.5 | Grounds and Facilities .....  | 14 |
| 3.3   | Protective Equipment .....  | 14 |
| 3.3.1 | Apparel and Protective Guards .....   | 14 |
| 3.3.2 | Safe court and field design.....  | 14 |
| 3.3.3 | Safe playing equipment.....   | 14 |
| 3.4   | Thermoregulation.....   | 15 |
| 3.4.1 | Temperature Regulation .....  | 15 |
| 3.4.2 | Environmental Conditions .....  | 15 |
| 3.5   | Taping and Bandaging .....  | 15 |
| 3.5.1 | Preventative taping.....  | 16 |
| 3.5.2 | Taping for isolation of injury .....  | 16 |
| 4     | How is Recovery from Injury Managed?.....                                   | 17 |
| 4.1   | Injury Management Procedures .....  | 17 |
| 4.1.1 | Progressive Mobilisation .....  | 17 |
| 4.1.2 | Stretching.....   | 17 |
| 4.1.3 | Conditioning.....   | 17 |
| 4.1.4 | Total Body fitness .....  | 17 |
| 4.1.5 | Training.....   | 17 |
| 4.1.6 | Taping.....   | 18 |
| 4.1.7 | Use of heat and cold .....  | 18 |
| 4.1.8 | Specific Programs .....   | 18 |
| 4.2   | Return to Play .....  | 18 |
| 4.2.1 | Indicators of Readiness to Return to Play.....                              | 18 |
| 4.2.2 | Monitoring Progress .....   | 18 |
| 4.2.3 | Taping.....   | 18 |
| 4.2.4 | Specific warm up procedures.....  | 19 |
| 4.2.5 | Progressive Involvement .....   | 19 |
| 5     | What ethical questions are raised by the increased use of sports medicine.. | 20 |
| 5.1   | Playing With Injury .....   | 20 |
| 5.1.1 | Pressure to Participate .....   | 20 |
| 5.1.2 | Role of Coach and Sports Medicine Practitioner.....                         | 20 |

## **PDHPE – Sports Medicine**

|       |  |    |
|-------|--|----|
| 5.2   | Use of Drugs .....   | 20 |
| 5.2.1 | Using Drugs for Strength .....                                     | 20 |
| 5.2.2 | For Aerobic Performance (EPO) .....                                | 20 |
| 5.2.3 | To Mask Other Drugs .....  | 21 |
| 5.2.4 | Drug Testing .....   | 21 |
| 5.2.5 | The Use of Performance Enhancing Drugs (Ethical Perspective) ..... | 21 |
| 5.2.6 | What are the pros and cons of drug testing? .....                  | 22 |

# **1 How are sports injuries classified and managed?**

## **1.1 Ways to classify sports injuries**

1. Direct – injuries caused by and external agent
2. Indirect – caused by agents within the body, e.g. sprained ankle or ligament.
3. Overuse injuries – caused by excessive use and strain on body part e.g. tennis elbow
4. Soft tissue injuries – injuries sustained to the skin, muscles, tendons, ligaments, organs and nerves
5. Hard Tissue injuries – sustained to the skeletal bones

## **1.2 Soft Tissue Injuries**

### **1.2.1 Tears sprains and contusions**

- Are classified as acute soft tissue injury
- Ligaments and tendons function to keep muscles and bones stable around bones
- Ligament – attaches bone to bone
- Tendon – attaches bone to muscle
- Tears – occur when ligaments and tendons are stressed beyond the normal range of movement
- Sprain – occurs when a ligament is stretched beyond its normal range of movement and tearing of fibers occurs.
- Strain – occurs when a muscle or tendon is stretched beyond its range of movement
- Contusion – is a bruise that occurs when a player collides with another player, the ground or an object.

### **1.2.2 Inflammatory Response**

- Tear or contusion occurs
- Capillaries within the soft tissue are also damaged which causes bleeding to occur.
- Bleeding within the soft tissue will clot. Tissue damage and the clot form the bruising, if movement continues, bleeding will continue.

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- Injured tissue swells caused by increased blood and tissue fluids
- Secondary tissue damage may occur if movement disturbs the blood clot, or if the damaged capillaries do not provide cells in the area with adequate oxygen and glucose.
- The body begins to break down the blood clot. Healing continues until all clot and tissue swelling are removed.
- As the clot and tissue are removed, scar tissue is laid down as replacement.
- White scar tissue is being laid down; the focus is on regaining function of injured area thru rehab.

### **1.2.3 Skin abrasion, laceration, blisters and calluses**

- Skin abrasion – occur when player falls and scrapes their skin across rough ground or rough surface or another object
- Lacerations – are much deeper injuries than skin abrasions and can expose underlying skin tissue
- Blisters – occur as a result of the skin rubbing up on another surface.
- Callus – forms in areas that undergo continual friction. Tough and inflexible skin surrounds the callus.

## **1.3 Managing Soft Tissue Injuries**

### **1.3.1 RICER**

#### **1.3.1.1 Rest**

- Remove player from play
- Inhibit further movement
- Allow no further participation

#### **1.3.1.2 Ice**

- Apply ice over area for 20-30 min every 2hrs as ice decreases swelling.
- Loose ice in a wet towel works best

#### **1.3.1.3 Compression**

- Apply elastic bandage firmly to the injured area check continually to make sure it isn't cutting off circulation

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### **1.3.1.4 Elevation**

- Elevate injured area above the heart level

### **1.3.1.5 Referral**

- Refer to a doctor or specialist for further diagnosis

## **1.3.2 Immediate treatment of skin injuries**

- Danger – to the patient and first aider
- Bleeding – needs to be controlled immediately
- Assessment – of skin injury will determine if it is a simple injury (cuts, blisters) or complex (cuts which require stitches)
- Cleansing – of the skin injury using clean water, saline or diluted antiseptic.
- Antiseptic – should be applied to the skin
- Dressings – can be adhesive, non adhesive but aren't allowed to become damp
- Referral – to doctor for any complex injury

## **1.4 Hard Tissue Injuries**

### **1.4.1 Fractures**

There are four major types of fractures

- Small crack in bone – stress fracture
- Closed fracture – one which doesn't pierce the skin
- Open fracture – broken bone pierces the skin
- Complicated fracture – bone disturbs tissues and organs

Fractures can be caused by direct contact with a player or a piece of equipment, by large force indirectly to bone, repeated overuse

#### **1.4.1.1 Signs and symptoms**

- Pain and tenderness @ site of injury
- Poor or decreased mobility of site of injury
- Deformity or irregular alignment of limb
- Swelling of the area

Quick on field assessment for a fracture

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S – Stop athlete from participating

T – Talk to athlete and ask him/her questions

O – Observe the injured site for any deformities/bruising

P – Problem, if it appears to be a fracture seek medical attention.

### **1.4.2 Dislocation**

- Where two bones at a joint are completely displaced from each other.
- Same signs and symptoms as a fracture
- 'Stop' procedure should be used
- No touch necessary
- Do Not Attempt To Fix It!

## **1.5 Managing Hard Tissue Injuries**

### **1.5.1 Immobilisation**

- Major objective when managing a hard tissue injury is immobilisation of the joint both above and below the fracture
- Splint – firm smooth object that extends beyond length of the injured joint, e.g. plank of wood. Padding should be place btw splint and body and should fill any natural hollows from curves in the limb
- Slings – immobilize the arm. Low arm sling provides support and immobilization for the forearm. High arm sling provides support for the entire arm.

### **1.5.2 Medical Treatment**

- Med treatment is important if the following are present
  - Severe bleeding
  - Severe pain to touch
  - Deformity of joints or limbs
  - Loss of movement to joints or limbs
  - Any suspected dislocation
  - If in doubt, check it out

## **1.6 Assessment of Injuries**

- To make full assessment of injury TOTAPS should be used

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T – Talk: ask questions how it happened? Medical history?

O – Observe: athlete’s behavior and injury itself

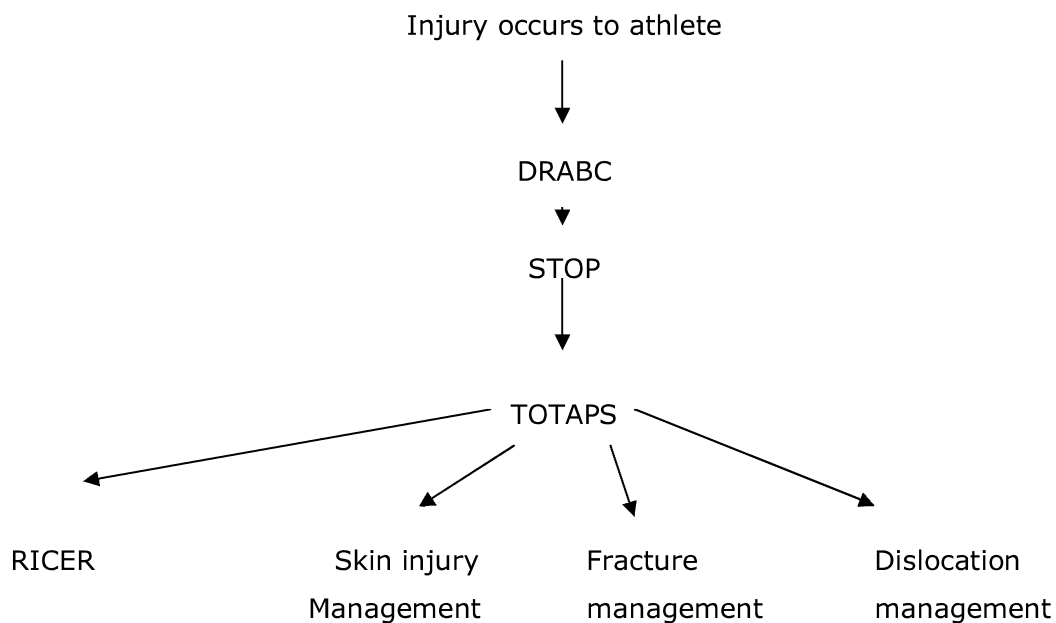
T – Touch: is it tender? Hot?

A – Active Movement: ask athlete to move injured body part as much as poss. till feels pain

P – Passive Movement: first aider moves injured body part till athlete feels pain

S – Skill Test: athlete should run thru some basic movements to see if they are fit to re-enter play.

### 1.6.1 Sports Injury Flow Chart





## **2 How does sports medicine address the demands of specific athletes?**

### **2.1 Children and young athletes**

#### **2.1.1 Medical Conditions**

- Children may have a med condition that can affect their participation in physical activity.
- Coaches and officials should be aware of this in case of any emergencies.

##### **2.1.1.1 Asthma**

- 1 in 4 children and 1 in 7 adolescents. Condition affecting the breathing airways on exposure to certain triggers airways narrow making it difficult to breathe.
- Temp changes, exercise and animal hair
- EIA – exercise induced asthma has symptoms such as coughing and wheezing. It can be managed so a child can return to play
- Treatment 4x4, four puffs every 4 min till improvement

##### **2.1.1.2 Diabetes**

- Condition where the body doesn't produce any insulin or sufficient insulin. Insulin is important for regulation of blood sugar levels
- Exercise along with diet and med help control diabetes. However if athlete is over exerted a drop in blood sugar may occur (hypoglycemia)
- If levels go too low they may go into shock.

##### **2.1.1.3 Epilepsy**

- Brain act becomes irregular resulting in uncontrolled muscular contractions or seizures
- Epilepsy should not preclude anybody from sports participation
- If a seizure does occur:
  - Protect athlete from further damage
  - Don't try to restrain movement
  - Don't place anything in their mouth
  - Place them on their side once seizure has abated
  - Continue DRABC

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- Allow athlete to rest
- Seek med treatment

### 2.1.2 Overuse Injuries

- Mostly occur around growth plates (hip) or @ tendon insertion pts (knee)
- Stress fractures are an e.g. of overuse injuries caused by repeated trauma to bone which leads to a small fracture, very common in tibia, elbow and back
- Rest is necessary to allow healing, anti-inflammatory drugs may be prescribed
- Athlete should still participate in sport but not use the injured area
- May take a # of months to heal

### 2.1.3 Thermoregulation

- Process that controls body temp (37°C)
- Young children are more susceptible to hot and cold as it takes longer for them to acclimatize so they are at risk of dehydration and hyperthermia on hot days.
- Evidence suggests the sweating mechanism doesn't develop till we get older
- In children it does not take long to become hypothermic when immersed in cold water

### 2.1.4 Matching of opponents

- Ensuring young athletes are matched in size, maturity and skill level does not only decrease number of injuries but also leads to an increase in enjoyment
- Contact sports especially carry more risk of injury especially when teams are graded on age alone.

### 2.1.5 Resistance Training

- Must be conducted by properly qualified instructors to avoid risk of injuries
- Young athletes need to be careful of over training due to the risk of injury to growth plates before fusion

## **2.2 Adult and Aged Athletes**

### 2.2.1 Heart Conditions

- People suffering heart conditions should exercise only under supervision and using programs devised by medical professionals
- Hypertension is high Blood pressure; physical activity makes it less likely for them to have a heart attack.
- Coronary Artery disease is narrowing and hardening of artery walls through atherosclerosis and arteriosclerosis. Physical activity increases oxygen delivered to cells in the body.

### 2.2.2 Fractures and bone density

- Bone density decreases with age; this loss of density increases risk of fractures in the elderly. Women decrease faster than men.
- Osteoporosis is a condition that affects both males & females, bones become brittle due to decreased mineral content esp. calcium

### 2.2.3 Flexibility and Joint Mobility

- Flexibility is a health related component of fitness therefore it is important to maintain. Flexibility is lost through ageing as muscles tend to lose elasticity
- Lack of flexibility will limit movement which can lead to instability around joints therefore injury.

## **2.3 Female Athletes**

### 2.3.1 Eating disorders

- Females are involved in sports that require low body fat levels which can lead to eating disorders e.g. ballet, gymnastics and diving
- Being thin in these sports allows greater artistic merit technical merit and in some cases (aerobics) marks are given for physique

### 2.3.2 Iron deficiency

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- Common in women due to loss of iron due to menstruation and increased sporting levels
- Low iron can lead to anemia
- Female athletes should ensure they have a diet full of green leafy vegetables and red meat

### **2.3.3 Bone density**

- Largely result of inadequate calcium
- Maintaining strong bones is important for the defense against osteoporosis through regular intake of calcium and physical activity

### **2.3.4 Pregnancy**

- Women should be able to participate in physical activity unless there are complications
- Adaptations to FITT principle need to be made to ensure the safety of the baby

### **2.3.5 Menstruation**

- Amenorrhea is when period stops for a few months (not pregnant) due to exercise
- Low training intensity and some weight gain can reverse these changes.

### **3 What role do preventative actions play in enhancing the well being of the athlete?**

#### **3.1 Physical Preparation**

- Skill and Technique – relates to efficiency with which we perform regular activity
- Safe sporting movement – Before different skills are practiced, adequate groundwork in fundamentals must be given to ensure the movements are acquired and rehearsed in the safest ways.
- Flexibility – muscles lose elasticity as we age therefore stretching is required
- Endurance – ability to resist physical tiredness and recover quickly from fatigue
- Strength – ability of muscles to exert force against resistance
- Sport specific requirements – demands placed upon athletes in terms of physical preparation will vary
- Individual participants needs – specialised needs of players due to genetic make up and the role in field of play
- Warm up and cool down – warm up causes redistribution of blood flow. Cool down slows our blood flow.

#### **3.2 Sports policy and the sports environment**

##### **3.2.1 Responsibilities of the club, school, sports administrator**

- Safety and well being of participants comes first
- Equip and facilities meet safety requirements
- Rules and game structure meets requirements of ability age and gender
- Proper precautions for injured participants
- Being informed of training techniques
- Promoting rule changes
- Adequate supervision

##### **3.2.2 Rules of Sports and Activities**

- Designed to foster safe participation, players' responsibility to obey the rules of the game. It teaches that there is a consequence for not obeying.

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### 3.2.3 Modified Rules for Children

- Smaller equip size
- Simpler rules
- Shorter games
- More interchanges

### 3.2.4 Even Competition

- Grading of competition according to
  - Age
  - Gender
  - Skill
  - Body type

### 3.2.5 Grounds and Facilities

- Modify size for children
- Eliminate potential hazards i.e. pole guards

## **3.3 Protective Equipment**

### 3.3.1 Apparel and Protective Guards

- Helmet
- Goggles
- Mouth guard
- Footwear – Designed for specific sports and support the foot in different ways to prevent injury. Restrict and allow movements in certain places commonly harmed in the sport. Especially important for children with growing feet.

### 3.3.2 Safe court and field design

- Need to be flat level surfaces that are not slippery
- When possible shade should be available

### 3.3.3 Safe playing equipment

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- All equipment should be fitted properly and modified to suit athlete
- There has been an improvement in sporting equipment e.g. shock absorbing shin guards
- General wear and tear should be monitored e.g. 'dead' tennis balls

### **3.4 Thermoregulation**

#### **3.4.1 Temperature Regulation**

- Convection – heat is lost to the airflow across the body
- Radiation – heat radiates from a warm object to a cold object
- Conduction – heat exchange occurs when two objects of different temp contact each other
- Evaporation – heat is lost when sweat is evaporated from the body's surface

##### **3.4.1.1 How can you support the body's temperature regulation mechanisms?**

- Drinking adequate water assists with sweating
- Light loose cotton clothing
- Athlete acclimatisation

#### **3.4.2 Environmental Conditions**

- Effect of hot humid days on evaporation – difficult for evaporation to occur as the air is already saturated with water
- Effect of cold windy conditions on convection – heat loss is greater as the air temperature is so much lower than the body temperature
- Effect of cold water on conduction – water is an excellent conductor of heat so body heat is lost quickly when immersed in cold water

##### **3.4.2.1 Impact of climatic conditions**

- Exercising in heat and lead to heat stroke, heat stress, heat exhaustion. Condition likely to be more serious due to dehydration
- Heat stroke and hyperthermia conditions where body's core temperature is extremely high, can be fatal body is unable to sweat.

### **3.5 Taping and Bandaging**

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### **3.5.1 Preventative taping**

- Help prevent injuries by restricting the amount of movement possible at a joint
- 'Prophylactic' taping
- Tape is rigid, non-elastic adhesive, strong enough to restrict movement
- Taping steps
  1. Ensure area is clean and dry
  2. If necessary apply adhesive spray +/- or under wrap
  3. Select correct size tape (thinner for smaller areas)
  4. Place joint in position you want it to remain
  5. Overlap the tape by ½ width each layer
  6. Start with anchor strap, finish with lock strip
  7. Once completed check circulation

### **3.5.2 Taping for isolation of injury**

- Beneficial for preventing existing injury from becoming worse
- Taping existing injury shouldn't replace rehabilitation programs which build up strength of joints.



## **4 How is Recovery from Injury Managed?**

### **4.1 Injury Management Procedures**

#### 4.1.1 Progressive Mobilisation

- Used to attempt to regain an athletes full range of movement in the injured area
- Prolonged immobilization can lead to atrophy of bone, muscle, tendons, ligaments and cartilage
- Gentle protective range of motion exercises can be started in most cases
- A gradual increase can occur as movement increases until injured area is back to normal

#### 4.1.2 Stretching

- During healing of muscle tear, muscle length decreases
- Stretching increases elasticity of muscle fibers so further injury does not occur
- Should be gentle and not to point of pain
- PNF is highly recommended during rehab because its so safe

#### 4.1.3 Conditioning

- Refers to keeping in shape during rehab stage
- Athlete should continue to exercise and work on uninjured muscle groups
- Once full range of movement returns re-entering sport is less difficult
- Specific game skills and movement should be pain free

#### 4.1.4 Total Body fitness

- Is when an athlete has returned to their pre-injury state of physical and mental fitness
- Must be confident in ability to complete tasks without any pain
- Strength, flexibility, endurance, agility and balance should all be restored back to pre injury levels

#### 4.1.5 Training

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- Athletes should be able to resume normal training with no adaptations made

### **4.1.6 Taping**

- May be necessary during rehabilitation to allow some exercises to be performed
- Prophylactic taping is encouraged for increased confidence and support and may decrease chances of a recurrence.

### **4.1.7 Use of heat and cold**

- Applying ice immediately after injury is best as cold shrinks blood vessels (vasoconstriction) which decreases bleeding and prevents swelling
- Ice application decreases pain in injury also
- Heat stimulates blood flow and promotes healing while relieving pain
- Heat is recommended once swelling subsides.

### **4.1.8 Specific Programs**

- Specific programs designed by professionals can also assist with healing.

## **4.2 Return to Play**

### **4.2.1 Indicators of Readiness to Return to Play**

- Can complete all movements required without feeling any pain or restriction
- Athlete is mentally prepared with full confidence on their ability to perform

### **4.2.2 Monitoring Progress**

- Monitoring performance levels is important, athlete should be at equal or better health than pre-injury

### **4.2.3 Taping**

- Prophylactic taping may be used to add stability to joint and increase athletes confidence

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### 4.2.4 Specific warm up procedures

- Athlete should spend extra time warming up injured area both stretching and completing sport specific movements

### 4.2.5 Progressive Involvement

- Upon return to play athlete should begin at a lower level and work up to a higher level of involvement

## 5 What ethical questions are raised by the increased use of sports medicine

### 5.1 Playing With Injury

#### 5.1.1 Pressure to Participate

- Elite athletes are often pressured to return to play before injury is sufficiently healed. This is often due to money and sponsorship.
- Pain is a clear indication of something being wrong so playing through pain or taking drugs to mask pain is usually doing a great deal of damage.

#### 5.1.2 Role of Coach and Sports Medicine Practitioner

- Correct diagnosis of injury and referral to medical practitioner if you are unsure
- Health and well being of an athlete should be priority of a coach
- Support to the injured athlete through rehabilitation is important and only when athlete is completely healed can they be allowed to return to play.

### 5.2 Use of Drugs

#### 5.2.1 Using Drugs for Strength

- *Human growth hormone*: a naturally occurring substance that increases the rate at which amino acids are transported to skeletal muscle cells
- Taken to increase muscle size and strength
- Mobilises fat for energy (decreases body fat)
- Long term effects: muscle weakness, gigantism, heart disease, cancer, infertility
- *Anabolic steroids*: synthetic derivatives of testosterone, causes the development of masculine characteristics (including tissue building)
- Effects: liver damage, masculine appearance + infertility in women, aggressiveness
- Esp. in weightlifting, body building etc

#### 5.2.2 For Aerobic Performance (EPO)

- Erythropoietin (EPO)

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- Naturally secreted by the kidneys
- Stimulates red blood cell production
- Effects: headache, joint pain, stroke, high blood pressure

### 5.2.3 To Mask Other Drugs

#### **5.2.3.1 Diuretics**

- Increase amount of fluid (water and urine) passing from the body
- Used in weight reduction sports e.g. boxing, weightlifting
- Can clear evidence of steroid use
- Effects: dehydration, heart + kidney failure, dizziness

#### **5.2.3.2 Alcohol**

- Depressant
- Found in cough mixture
- Effects: vomiting, slowed reactions, blurred vision

### 5.2.4 Drug Testing

- First at the Mexican Olympics 1968
- Sydney: only urine samples (doesn't test for EPO and HGH)
- Can be done: randomly, in bulk, according to positions
- Sample is divided: A and B. If A is positive, they test B. The appropriate sporting organisation is informed of the B result
- Athlete must comply or the test is deemed positive

### 5.2.5 The Use of Performance Enhancing Drugs (Ethical Perspective)

#### **5.2.5.1 Arguments for the Use of Performance Enhancing Drugs (Ethical Perspective)**

- Performance enhancers allow athletes to train better through size and strength gains that they were unable to achieve before.
- Performance enhancement increases the entertainment value of the sport.
- Performance enhancement is part of sports technology that helps to advance the development of sport.

**5.2.5.2 Arguments against the Use of Performance Enhancing Drugs  
(Ethical Perspective)**

- Performance enhancers allow athletes to cheat by artificially increasing size or strength without training.
- Performance enhancement diminishes the integrity of sport.

**5.2.6 What are the pros and cons of drug testing?**

**5.2.6.1 Pros of Drug Testing**

- A uniform code of testing ensures the rules would be consistent from sport to sport and country to country. No sport or athlete could gain an advantage under local rules.
- Random tests are much more efficient than restricted testing periods, which give offenders an advantage in flushing drugs from their bodies and in timing their periodic cycles of use.
- Professional athletes who belong to a union would not face lower standards created in the give-and-take of collective bargaining. Professional leagues would not be able to bargain away higher standards in return for financial concessions.

**5.2.6.2 Cons of Drug Testing**

- Drug testing is inconsistent, and false positives are prevalent. A career could be damaged by a faulty test.
- What is classified as "performance enhancing" in one sport might not provide an advantage in another. One-size-fits-all testing does not take into consideration the actual effects of the substance on athletic performance.
- Professional athletes have a right to bargain with owners over every aspect of their careers. To give up that right gives owners an unfair advantage.