CHAPTER 4: Injury prevention and the rehabilitation of injury

Practice questions - text book pages 67 - 68

1) Elevation of an injured body part helps reduce injury by:
   a. helping support the weight of the limb.
   b. allowing white blood cells to be released to fight infection.
   c. reducing blood flow to the area.
   d. increasing blood flow to the area.
Answer: c.
Explanation: Elevation uses the fact that if the injured part is raised above the heart, gravity can send fluid within the swelling, back towards the body core, thus reducing damage caused by the swelling itself.

2) Overuse of tendons in physical activity can cause problems. Which one of the following symptoms is associated with tendon overuse?
   a. inflammation.
   b. arthritis.
   c. hypertrophy.
   d. bruising.
Answer: a.
Explanation: Arthritis is inflammation of a joint. Hypertrophy is the enlargement of an organ or tissue from the increase in size of its cell. Bruising is damage to underlying tissues or bone in which the skin is not broken, often characterized by ruptured blood vessels and discolorations. Inflammation is a localised physical condition in which part of the body becomes reddened, swollen, hot, and often painful, associated with overuse injuries such as tendonitis.

3) Which one of the following is not a method of reducing risks of injury when participating in physical activities?
   a. wearing shin pads when playing hockey or football.
   b. making sure you warm up before participating in an exercise class.
   c. playing with others of similar ability in a rugby match.
   d. wearing fashionable sports equipment when going to the gym.
Answer: d.
Explanation: Choices a, b, and c are all ways of reducing injury risk, whereas wearing fashionable sports equipment is not.

4) A sprain during a sport activity is to be immediately attended to by:
   a. application of ointment.
   b. elevation of affected body part.
   c. cold compression.
   d. massage.
Answer: c.
Explanation: The key word in the question is immediately and applying cold compression will reduce internal bleeding, swelling and protect the injury.

5) Which one of the following would you recommend to prevent inflammation of the joints during or after physical activity?
   a. rub massage oil into your joints before and after exercise.
   b. use carbo-loading to increase energy levels.
   c. stretch your muscles thoroughly before exercising.
   d. do not do too much activity at any one time.
Answer: d.
Explanation: Stretching prepares joints for physical activity, thus reducing injury potential associated with inflammation.
6) Why are joint sprains a particular problem?  

**Answer:**  
2 marks for two of:  
- Most common sprains are in the ankle and wrist joints where several ligaments are involved depending on the severity of the sprain.  
- There is an immediate loss of functional range of motion.  
- Prolonged immobilization delays the healing of a sprain.  
- And this usually leads to muscle atrophy and a stiff joint, particularly in weight bearing ankle joints.

7) Sports injuries can be broadly classified as either acute or chronic injuries.  

Explain what is meant by these two classifications, using examples where appropriate.  

**Answer:**  
- **Acute injuries** refer to sports injuries that happen in a moment.  
  - For example, a hamstring pull during a sprint race.  
- **Chronic injuries** develop over time and so are characterised by a slow, sustained development of symptoms.  
  - That culminates in painful inflammatory conditions.  
  - For example, patellar tendinosis or jumper’s knee, which is caused by inflammation of the bottom of the patella.

8) Playing kit and equipment are major factors that an athlete needs to consider in injury prevention.  

Identify the key factors that affect the selection of their use.  

**Answer:**  
4 marks for four of:  
- **Equipment** needs to be appropriate to the playing surface. For example, selection of appropriate hockey sticks to playing surfaces.  
- **Shoes or boots** are the most important item of clothing. They should be selected to meet the demands made on the foot. For example, running shoes provide both support and shock absorption for hard running surfaces, squash shoes provide closer contact with the court therefore have less support.  
- **Ski boots** are extremely robust, supporting high above the ankle joints.  
- **Equipment needs to be checked for possible defects prior to use.** For example, safety check for fibreglass poles.  
- Choosing **protective clothing** is important for potentially dangerous sports such as cricket, boxing and fencing.  
- **Kit needs to fit well.**

9) Discuss the principles and guidelines for injury prevention.  

**Answer:**  
2 marks for principles:  
- **Well-planned fitness programmes** to include FITT principles of training.  
- **Frequency** or the number of sessions.  
- **Intensity** of the session.  
- **Type of training.**  
- **Time taken to train.**  

3 marks for guidelines:  
- **Overload** and **progression** result from training activities getting harder.  
- In order to stress physiological adaptations required.  
- **Moderation** implies that note is taken of the sportperson’s state of physical health.  
- And when signs of deteriorating performance are detected training loads must be reduced.  
- **And recovery time increased.**  
- **Rest or recovery between sets and training sessions must be adequate.**  
- **Warm-up** prepares the musculo-skeletal systems for exercise by raising muscle temperature, oxygenating active muscle tissue, stretching muscle tissue, mobilising joints and meeting the demands of sport-specific drills.  
- **Cool-down** is a way of reducing DOMS by flushing out lactic acid and increasing flexibility of joints.  
- **Diet** is aimed at refuelling depleted energy reserves.
10) Why should stretching be part of an injury preventative training programme?  

**Answer:**
- The **stretch reflex** limits flexibility.
- Stretching over an extended period of time **inhibits** the activation of the stretch reflex.
- Causing an increase in the resting length of soft tissues such as ligaments, tendons and muscles.

11) Hyperbaric oxygen chambers and ice baths are aids to rehabilitation for elite performers. 

Briefly describe how each of these therapies assist in this process. 

**Answer:**

**3 marks for three of:**
- A **hyperbaric oxygen chamber** is pressurised with increased amounts of oxygen.
- Aims to reduce the injury recovery time.
- By **stimulating** the growth of new blood vessels.
- By increasing the oxygen concentration to damaged tissues such as in pulled muscles or stress fractures.
- Aids the treatment of infection by boosting white blood cell activity around the damaged tissues, thereby controlling infection.

**3 marks for three of:**
- Ice baths use the fact that local tissue inflammation can be reduced by **chilling** the affected area.
- The athlete remains in the ice bath for 5-10 minutes.
- During this time the cold water causes the blood vessels to **vasoconstrict**.
- Thereby draining blood and any lactic acid away from the immersed body parts.
- On leaving the ice bath, the immersed body parts fill up with freshly oxygenated blood as blood vessels **vasodilate**, thus aiding recovery.

12) Warm-up and cool-down are useful in preventing injury and in aiding the recovery process after intense exercise. 

a) What activities would you include in the warm-up and why? 

**Answer:**
- **5-10 min light cardiovascular activity** to raise body temperature and enhance elasticity of muscles, tendons, ligaments and joint structures.
- Range of **dynamic exercises** to addressing key major muscle groups.
- Ensure that exercises are sports **specific**.
- Gradual **increasing of intensity**.

b) What would you include in the cool-down and why? 

**Answer:**
- **Light cardiovascular activity** to prevent blood pooling and to deal with excess muscle lactic acid.
- Static stretching to help muscles and tendons relax, stopping them becoming tight.
- Cool-down helps prevent delayed onset muscle soreness (DOMS).

13) Screening is a key part of the professional sportspersons daily life. 

How can it be used in injury prevention? 

**Answer:**

**4 marks for four of:**
- Screening **is a search for a specific condition that can help to detect health risk factors**, for example, undetected cardiac abnormality.
- Standard screening tests are used to assess strengths and weaknesses in key areas, such as strength, flexibility, core control and balance.
- This information can be used for **exercise prescription** for musculoskeletal conditioning thereby decreasing the risk of getting injured.
- Regular screening provides information about physical changes over time, which is particularly important in the growing athlete and for an athlete following long hours of training/competition.
14) Rapid recovery from injury is vital for elite performers and they now use a wide range of injury recovery techniques. For each of the following methods describe the treatment and its purpose.

a) Cryotherapy. 3 marks
Answer:
• Cryotherapy is the general or local use of cold temperatures in the treatment of injury.
• Ice baths and cryogenic chambers are often used as part of post-match recovery.
• Stops internal bleeding to reduce swelling and aid recovery.

b) Proprioceptive retraining. 3 marks
Answer:
3 marks for three of:
• Proprioception is the body’s awareness of position, movement and changes in state of balance.
• Proprioception capabilities are impaired when joints are injured, such as with ligament sprains.
• Resulting in poor balance.
• Balancing exercises teach the body to control the position of a deficient or an injured joint.
• Proprioceptive retraining is aimed at rebuilding the performer’s proprioceptive sense.
• For example, low level single leg balance work on unstable surfaces, such as a wobble board, provides an unstable surface that develops knee/ankle stability.

c) Therapeutic massage. 3 marks
Answer:
• Therapeutic massage is the application of massage techniques to the muscle and connective tissues to enhance sports performance.
• Used to increase range of movement/flexibility and to relieve muscle soreness.
• May help injury prevention and promote faster recovery.

15) Explain how the use of an ice bath can help to reduce the delayed onset of muscle soreness (DOMS). 4 marks
Answer:
• Involves sitting in ice cold water for between 5-20 minutes.
• Causes blood vessels to tighten/decreases metabolic activity/vasoconstriction.
• Restricting blood flow to the area.
• Reduces swelling/tissue breakdown/aids muscle repair.
• After leaving the ice bath, area is flooded with new blood/vasodilation.
• Fresh re-circulating oxygen removes lactic acid (when out of the ice bath).
16) Discuss the importance of sleep and nutrition for improved recovery after training and competitions. 15 marks

Answer:
7 marks for seven of:
Sleep and recovery
- Two main types of sleep: rapid eye movement (REM) and non-rapid eye movement (NREM).
- NREM is deep sleep when most of the recovery from the day’s activities occurs.
- During NREM sleep, blood flow is redirected towards muscles and organs carrying nutrients, such as oxygen, amino acids and glucose.
- That support substantial tissue repair and muscle and liver glycogen restoration.
- During sleep the body produces extra protein molecules that help strengthen the body’s immune system.
- Sleep requirements vary depending on age and activity level.
- Most elite athletes will train twice a day and have an afternoon nap, aimed at giving the body short-term recovery before the second training session of the day.
- In addition to 8-9 hours sleep each night.
- Sleep deprivation is linked to heart disease, diabetes, poor immune systems and poor mental health.

8 marks for eight of:
Nutrition and recovery
- The right food and supplements can speed injury and recovery from exercise.
- Glycogen depletion and dehydration occur following a hard training session.
- A hypertonic sports drink, immediately after exercise, will help to restore fluid and electrolyte losses, in addition to starting the process of glycogen repletion.
- A high CHO meal, eaten as soon as possible, continues glycogen replenishment.
- For optimal recovery protein mixed with CHO will aid protein resynthesis.
- Protein supplements, such as whey protein, will support muscle hypertrophy.
- During a hard training session micro muscle tears occur and can cause local inflammation.
- Some foods contain anti-inflammatory agents as found in avocados, fish (mackerel and salmon), mixed nuts, seeds and garlic.
- Avoid pro-inflammatory foods, such as processed foods high in saturated fats, and foods containing trans fats found in cakes, pies and cookies.
- Eat foods that are rich in vitamins and minerals.
- For example, vitamin D is found in fatty fish, eggs and dairy produce, aids the absorption of calcium and phosphorus needed for skeletal recovery and repair.
- Iron, found in dark green vegetables such as spinach. Is a constituent of haemoglobin.
- Helps the transfer of oxygen in red blood cells.