

how is INJURY REHABILITATION managed?

This chapter examines the process of managing rehabilitation from sporting injury. It also explores the determinants or indicators that show when an athlete is physically and psychologically ready to return to play.

Rehabilitation procedures

Rehabilitation after injury can take some time depending on the type and severity of the injury. A qualified doctor or physiotherapist should supervise the process. The aims of any rehabilitation program are to:

- restore optimal function of the injured area
- return the athlete to competition quickly and safely
- prevent re-injury.

The injury management procedures that follow will assist the achievement of these aims.



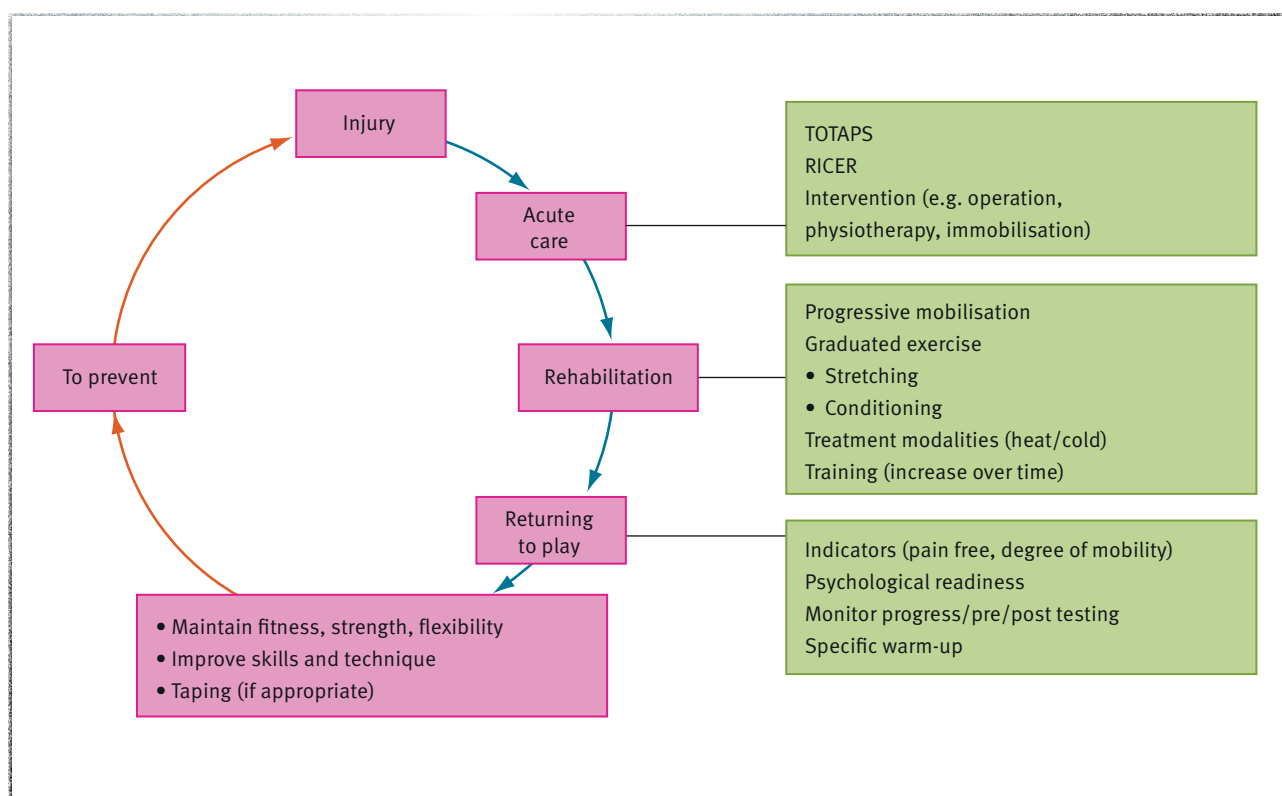


Figure 19.1 Rehabilitation procedures

Progressive mobilisation

Any injury involving the muscular or connective tissues surrounding a joint will restrict movement of that joint. Joint **mobilitation** is the freeing of hindered joints to allow improved range of motion.

Joint mobilisation can be achieved through *active* exercises (performed by the athlete) or through *passive* methods (manipulation of the injured part by another person). Mobilisation of the injured part should begin soon after the injury because joint inactivity can increase the formation of scar tissue. The process is known as *progressive mobilisation* because the range of movement is gradually increased over time until the full range of movement is restored.

To ensure the safe mobilisation of injured body parts, the following precautions should be noted:

- Thorough checks should be made to ensure that there is no fracture at the site—an X-ray may be required.
- Mobilisation should not be commenced during the acute inflammatory phase.
- Circulation to the injured area should be increased before commencing mobilisation.
- The athlete should be relaxed before and during mobilisation.
- Movements should be slow and progressive, rather than sharp and rapid.
- Movements should remain within a pain-free range.



TOTAPS stands for talk, observe, touch, active movement, passive movement and skills test.

Graduated exercise

Part of rehabilitation procedure involves the use of graduated exercise. This incorporates the use of stretching, conditioning and maintenance of total body fitness.

Stretching

Loss of **flexibility** occurs as a result of injury to muscle and connective tissue, and the formation of scar tissue. A degree of flexibility will be returned to the site through progressive mobilisation. However, attention needs also to be paid to stretching exercises. If completed correctly, these will enhance rehabilitation by:

- reducing muscle tension
- increasing circulation
- increasing muscle and tendon length
- increasing the range of motion.

Flexibility, in common with mobilisation, is restored gradually to the injured area through the use of slow static stretches and proprioceptive neuromuscular facilitation (PNF) stretching early in the repair phase. The advantage of PNF stretching is that it does not require the injured site

to be moved extensively. It also stimulates proprioceptors within the muscle and connective tissue. The stretching is gradually made more active, and is increased in time from 5–10 seconds to 20–30 seconds. Stretching should be performed regularly after a warm-up, and should always remain within the pain-free range.

Passive stretching—with machines, a partner or a physiotherapist—is very common in sports rehabilitation.

The purpose is to lengthen soft tissue beyond its normal resting length by applying an external force. The stretch should be held for approximately 15 seconds. The patient, physiotherapist or machine controls the direction, intensity and speed of the contraction. Passive stretches need to be explained and demonstrated carefully to ensure safety, and are good to use in a team setting.

Conditioning

The restoration of muscular strength is essential in injury rehabilitation. Muscles that are active will increase in size and endurance whereas those that remain passive will decrease in size. Even if the area is immobilised (for example, in a cast or brace) a program should be designed to prevent muscle atrophy (wasting of muscle tissue). A program of isometric exercises can be used. These exercises involve no movement at the joints, but develop strength in the position exercised. This will prevent muscle atrophy until movement is possible.

As swelling and pain lessen, exercises involving pain-free movement can be introduced. As strength is slowly regained, further resistance can be applied. The introduction of weight-bearing exercises can be considered if the injured area is thought to be capable of support. Isokinetic exercises are considered beneficial at this stage because they will develop strength through the full range of movement using uniform resistance. It is important to monitor the increase in strength of both the agonist muscles and antagonist muscles; that is, both the muscle being treated, and the muscle that moves in the opposite direction. This will ensure that an appropriate ratio of strength is being developed.



Stretching should be performed regularly after a warm-up, and should always remain within the pain-free range.

Figure 19.2 Passive stretching with physiotherapy is very common in sports rehabilitation



Total body fitness

A program of rehabilitation involves not only the restoration of the injured part to full function, but also the maintenance of overall body fitness. With some injuries this can be a difficult task because the injury might require immobilisation. However, the maintenance of flexibility, strength and endurance should be promoted with activities that are specific to the sport or activity, and that do not endanger recovery from injury.

The choice of exercises to maintain total body fitness will depend on the type and severity of injury. Examples of activities that can be used to promote total body fitness during rehabilitation include:

- using treadmills
- using rowing or cycling ergometers
- swimming and water-resistance activities
- weight training
- walking or light jogging.



Figure 19.3 Treadmills can be used during rehabilitation to promote total body fitness

practical application

Rehabilitation procedures

Construct a total body fitness program for each of the following athletes:

- a water-skier with a gastrocnemius tear
- a softball player with a rotator cuff strain
- a gymnast with a lower back injury.

Consider strength, flexibility and aerobic endurance of non-injured parts.

Training

An athlete who has finished a treatment and rehabilitation program is not ready to return to full competition. Even though the athlete might have a full active range of movement and flexibility, and even though the person's strength might have returned to normal and total body fitness might have been maintained, the athlete is not ready for competition. If the athlete were to return to competition at this stage there would be a significant risk of re-injury because movement skills, specific game skills and confidence have not been re-established. Timing, speed and coordination are affected by rest from competition. In preparation for the physical and psychological demands of competition the athlete must undertake active training.

The final stages of rehabilitation involve developing muscle coordination and speed to full capacity. The athlete must be able to display skill proficiency equal to that of the athlete's pre-injury performance standards, including the ability to delay fatigue and to perform required skills under pressure. An athlete who 'favours' the injured part (that is, attempts to protect it) increases the risk of re-injury to the site or a new injury to a different site.

Training before recommencement of competition must be aimed at re-establishing all skills in an environment that is as close as possible to competition conditions. Only when the athlete can display full fitness and coordinated movements and skills should he or she be permitted to resume competition. A graduated, progressive sport-specific program will allow an athlete to develop the physical and psychological skills required for competition. Some athletes may be asked to play at a lower level prior to resuming at the level they were competing at prior to injury. For example, an AFL player may play reserves prior to re-entering the senior team. To determine their readiness to return, most athletes will undergo testing that is specific to their sport.

Use of heat and cold

Heat, cold, pressure and electrical stimulation are some of the modalities (forms of treatment) used in sports rehabilitation. These modalities are delivered by ice or by hot packs or by a number of machines, including ultrasound. Most modalities are used to break down the pain, muscle spasm and ischaemic (absent or reduced blood flow) responses of the body to an injury. In general, the choice of heat or cold modalities after the acute phase is dependent on the type of injury and, often, the patient's preference.

Heat

Heat modalities are used to increase circulation, either generally (in a large body area) or locally (at a given site). Superficial heating is heating to a depth of about 1 centimetre, whereas deep heating occurs to a depth of greater than 1 centimetre.

The general physiological responses of the body to heat are:

- decreased pain
- increased ability to stretch
- relaxation
- increased blood flow
- reduced joint stiffness
- decreased muscle spasm
- enhanced inflammatory response (increased flow of blood/fluid to area)
- increased tissue healing.



Heat should not be applied to acute injuries.

Heat is applied superficially via heat packs, hydrotherapy, infra-red lamps and contrast baths. Deep heat can be applied using ultrasound, shortwave and microwave machines. Heat should not be applied to acute injuries.

Cold

The application of ice to an injury is one of the most common cold modalities. The term used to describe the use of cold for treatment is '**cryotherapy**'. The most common ways of applying cryotherapy during rehabilitation are through the use of an ice pack (frozen gel), an ice bag (ice-filled plastic bag wrapped in a towel), an ice massage, ice immersion, a contrast bath (hot and cold) or a topical cold spray.

These cold modalities are commonly used:

- in the acute phase of injury treatment
- after therapeutic exercise of injured sites.

They reduce pain and swelling related to chronic and/or overuse injuries. Cold treatment also cools overheated participants.



RICER reduces swelling and pain for acute injuries.



Figure 19.4 Ultrasound: heat can be applied superficially to assist in rehabilitation



Figure 19.5 The application of ice to an injury is commonly used to reduce pain and swelling

The application of cold to an injury site has the physiological effects of decreasing:

- swelling
- circulation to injured site
- acute inflammation
- pain and discomfort
- muscle spasm
- tissue metabolism.



Care should be taken in the use of cryotherapy to avoid frostbite and other skin and nerve damage.

When used with rest, compression and elevation, cold treatment is especially effective in the treatment of swelling and pain associated with acute injuries. Stiffness is increased after cold treatment. Cold should be applied at regular intervals during the first 24–48 hours of an injury, but not for longer than 30 minutes at a time. Care should be taken in the use of cryotherapy to avoid frostbite and other skin and nerve damage.

Critical inquiry

Explain the safety considerations that need to be observed in the use of heat and cold.

practical application

Use of heat and cold modalities

- 1 a** Contact your local physiotherapist to determine the current techniques and practices in the use of heat and cold modalities for various injuries. If it can be arranged, it would be helpful to visit a local physiotherapist or invite one as a guest speaker.
- b** **Discuss** how techniques have changed over time.
- c** With assistance from your teacher or a physiotherapist, conduct a practical session that uses a variety of heat and cold modalities. **Assess** each in terms of:
 - its cost
 - its effectiveness
 - the feelings of the patient
 - its ease of use.

Be sure to take appropriate precautions.

- d** **Summarise** your findings in an article that could be used in a sport magazine as a feature story. Use Publisher or a similar program when writing and presenting your article.

practical application

Rehabilitation program

- 1** Consider the following individuals:
 - a soccer player with a hamstring tear
 - a tennis player with tendonitis of the elbow
 - a gymnast with a fractured tibia and fibula
 - a rugby league player with a shoulder dislocation.
- a** Plan a rehabilitation program for each of the four individuals above. Consider:
 - appropriate initial and ongoing treatment
 - surgery options
 - progressive mobilisation, graduated exercise (stretching, conditioning and total body fitness)
 - length of time recommended for full recovery.
- b** **Justify** the procedures you have chosen.
- c** With a partner, role-play the treatment procedures you have devised for each individual.

Research and Review

- 1** **Outline** the important factors to remember when mobilising a joint.
- 2** **Describe** the benefits of maintaining total body fitness while injured.
- 3** **Clarify** the circumstances in which cold modalities are used.
- 4** **Clarify** the circumstances in which heat modalities are used.

Return to play

Returning to play or competition is not just a matter of waiting for the required time to pass. Active rehabilitation, as suggested earlier in this chapter, will ensure that the athlete's injury has recovered and that fitness and skills are close to pre-injury levels. It is important that the athlete, medical staff and coach agree on the athlete's readiness to return. Lack of confidence in the injured site will hinder psychological and physical performances. If the athlete believes that he or she is not ready, the person should not be pushed. Conversely, the athlete should not push the coach and/or medical staff to make a hasty or inappropriate decision.

Indicators of readiness to return to play

Being pain free and having mobility return to the injured area are indicators of readiness for return to play. There are many physical tests of an athlete's readiness to return to play after injury. Many of these tests are basic fitness and skills tests that are used throughout the season and measure an athlete's readiness and ability to resume play in a specific sport. These are useful because they provide a point of comparison of the athlete's previous test results; for example, in pre-season.

An athlete returning from injury should be put through a sports-specific fitness test. Some general skills that may be tested include sprinting, tackling, side-stepping, throwing, passing and jumping. For example, a netballer returning from an ankle injury would be tested on her ability to sprint (forward and backward) and her agility with no opponent through a variety of drills that include dodging and side-stepping. The netballer would then be tested under pressure with an opponent in a one-on-one situation, such as breaking for a centre pass. Her match fitness would also be tested in a practice game situation. Any weaknesses that are detected during such testing can then be worked on and improved. The athlete will also be monitored post training and testing to determine pain and degree of mobility.



Figure 19.6 An athlete returning from injury should be put through a sports-specific fitness test

Monitoring progress (pre and post-test)

The physical condition and the psychological condition of the athlete should be monitored when the athlete returns to play. This might involve:

- visual observations of the athlete
- interviews and discussions with the athlete
- ongoing testing (comparison of results pre-injury to current status)
- observation of video footage of the athlete
- use of performance-evaluation sheets.

The athlete will also benefit from feedback about performances. Appropriate visits to medical professionals to monitor the injury are also advisable. The athlete should continue to follow the advice of coaches and medical staff until recovery is complete, and until performance has returned to pre-injury levels. Ongoing therapy is advisable until such levels are reached. For instance, cryotherapy might be useful after work-outs.

Psychological readiness

The psychological readiness of the athlete to return to play can be measured by less informal means, such as discussion and observation of behaviour. Anxiety levels can also be monitored to ensure the athlete is not feeling pressure (whether internal or from external sources) to return to play before being fully ready to do so. The athlete, coach and medical staff should all feel confident in the physical and psychological readiness of the athlete to return to play. Taping the injured area, if appropriate, can also provide support and proprioceptive awareness to the athlete. It might also act as a psychological form of treatment long after the injury is recovered.

Specific warm-up procedures

An athlete who has been injured might need to go through a longer, harder or more specific warm-up and stretch routine than other athletes. Extra time and care might be needed at the injury site and surrounding tissues to ensure adequate flexibility, blood flow and readiness to perform. Many athletes develop their own specific warm-up, or have one designed by a coach or physiotherapist, to minimise the chance of re-injury.

Return-to-play policies and procedures

Coaches, sport administrators and sports medicine practitioners play an important role in establishing guidelines for athletes who are managing injury and deciding whether to play with injury and when to return to the sporting arena. Return-to-play policies and procedures vary with sports. They may be determined by overall governing bodies or by individual sporting clubs themselves. Who determines this may depend on the nature and severity of the injury itself. Priority must at all times be given to player welfare with medical advice guiding decisions and policy.

practical application

Return to play

- 1** Consider the following scenarios:
 - soccer player with a hamstring tear
 - a tennis player with tendonitis of the elbow
 - a gymnast with a fractured tibia and fibula
 - a rugby league player with a shoulder dislocation.
- a** For each athlete above, design three suitable field tests or drills to gauge the athlete's readiness to return to play.
- b** **Evaluate** the physical tests that could be used to indicate each athlete's readiness to return to play.

Research and Review

- 1** **Discuss** the factors that will determine an athlete's readiness to return to play after injury.
- 2** **Outline** examples of progressive involvement for a basketball player after receiving an ankle injury.



Ethical considerations

Ethical considerations can play a significant role in determining when an athlete returns to play.

Pressure to participate

The issue of determining when an athlete returns to training and competition can be very difficult. The decision has short-term and long-term health consequences. Athletes who do not allow for an appropriate recovery period after injury place themselves at risk of further complications. Unfortunately, there is a temptation for some athletes to return to competition before they are ready. Various internal and external pressures push them towards such a decision.

Internal pressures include:

- boredom
- a drive for success
- a fear of losing one's position in the team
- a sense of letting down the team.

External pressures include:

- financial pressures
- pressure from the media
- pressure from sponsors
- expectations of other players, family or the coach
- pressure from spectators.

If an athlete returns prematurely after injury it might cause the injury to become further established. This will extend the necessary recovery time, and the athlete ends up losing more time than would have been the case if the appropriate time had been spent in recovery initially.



- A boxer who is unconscious for **less than 1 minute** is not to be permitted to take part in competition boxing or sparring for a period of at least 3 months post injury.
- A boxer who is unconscious for **more than 1 minute** is not to be permitted to take part in competition boxing or sparring for a period of at least 6 months post injury.
- Before resuming boxing after any medically recorded non-competition period, a boxer must first be cleared by a qualified medical practitioner.

Figure 19.7 Guidelines determined by Boxing Australia in relation to loss of consciousness

Before being allowed to return to training or competition, three questions should be addressed:

- Is the injured area free of all pain?
- Is it possible to move the injured area through a full and normal range of motion?
- Has the injured area regained full strength?

In many cases, an experienced medical practitioner is needed to answer these answers.

Serious injuries, such as those affecting the head, require assessment by a medical practitioner before an athlete is allowed to compete again. In particular, athletes who lose consciousness, or who are suspected of being concussed, should not be allowed to participate further until medical advice is sought.

Use of pain-killers

The use of pain-killing drugs is becoming more common in many sports. The pressures on athletes to return to performance increase the use of these medications. The use of pain-killing drugs is attractive for athletes, and for the sporting clubs who rely financially on their athletes taking the field. With financial and various other pressures increasing, and with advances in drug technology, the use of medications to allow athletes to return to play before full recovery is an increasingly important issue.

The management of concussion in Australian football

Summary

- Concussion refers to a disturbance in brain function caused by trauma.
- Complications can occur if the player is returned to play before having fully recovered from injury.
- **The key components of management include:**
 - a** suspecting the diagnosis in any player with symptoms such as confusion or headache after a knock to the head
 - b** referring the player for medical evaluation
 - c** ensuring that the player has received medical clearance before allowing a return to play or a graded training program.
- The cornerstones of medical management include rest until symptoms have resolved; cognitive testing to ensure recovery of brain function; and then a graded return to sport program with monitoring for recurrence of symptoms.
- In general, a more conservative approach (i.e. longer time to return to sport) is used in cases where there is any uncertainty about the player's recovery (**'if in doubt, sit them out'**).
- Difficult cases, such as those involving prolonged symptoms or deficits in brain function, require a more detailed, multi-disciplinary approach to management.

A player with suspected concussion must be withdrawn from playing or training until medically evaluated and cleared.

'The Management of Concussion in Australian Football', AFL Research Board, AFL Medical Officers' Association

Figure 19.8 AFL Medical Officers' Association Position Statement on the Management of Concussion in Australian Football

Table 19.1 Concussion rehabilitation

Early rest (do nothing!)	
Graduated return to activity (to commence 24–48 hours after resolution of symptoms)	
1	Light aerobic exercise e.g. stationary bike
2	Running
3	Non-contact training drills
4	Full contact training
5	Game play

'The Management of Concussion in Australian Football', AFL Research Board, AFL Medical Officers' Association

Critical inquiry

- 1** Examine the guidelines determined by Boxing Australia in relation to loss of consciousness (see Figure 19.7, page 342). After loss of consciousness, a boxer is subject to the Boxing Australia guidelines regarding a return to competition.
 - a** **Outline** why the guidelines are in place.
 - b** **Justify** their appropriateness and suitability.
- 2** Examine Figure 19.8 and Table 19.1 (page 343), then complete the following tasks.
 - a** **Assess** these guidelines in terms of player welfare.
 - b** **Compare** these guidelines to those published by Boxing Australia.
- 3** Research whether similar regulations exist for other contact sports. **Summarise** your findings in a table.
- 4** **Discuss** why there are no universal policies across all sports governing the return to competition after experiencing a head injury.
- 5** **Discuss** who should have ultimate responsibility for deciding when an athlete competes after injury.
- 6**
 - a** Debate the following topic: 'Should athletes be allowed to use pain-killers in order to compete with an injury?'
 - b** **Summarise** the discussions and opinions presented during your debate using a three-column PMI chart (P for pluses or points for, M for minuses or points against and I for interesting or controversial points).

Research and Review

- 1** **Identify** the internal and external pressures that may be experienced by an injured athlete when deciding whether to return to play.
- 2** **Outline** measures an athlete should utilise to know when he or she is ready to return to play after an injury.

how is injury rehabilitation managed?

chapter summary

- Rehabilitation procedures aim to return an athlete back to the playing field and safely restore the full range of movement of the injured area.
- Rehabilitation procedures include progressive mobilisation, graduated exercise (stretching and conditioning), training (active participation) and use of heat and cold.
- When the decision to return to play is being made, the main priority should be the athlete's welfare and safety. Medical staff, coaches and the player should all be consulted in the decision-making process.
- Physical indicators of readiness to return to play include being pain free and experiencing a return of mobility to the injured area.
- Player progress can be monitored via physical testing that is sport specific and by comparing results pre and post injury.
- A player needs to be psychologically ready to return to play.
- Athletes who sustain an injury may need to alter warm-up procedures to reduce the risk of re-injury.
- Relevant return-to-play policies and procedures need to be examined. They vary from sport to sport and by nature and severity of injury sustained.
- To ensure athlete well-being, careful examination must be made of ethical considerations, such as use of pain-killers and internal and external pressures on an athlete to return to play before being physically and psychologically ready to do so.

revision activities

- 1 **Justify** the use of rehabilitation procedures post sporting injury.
- 2 **Outline** what may determine whether a player is psychologically ready to return to play.
- 3 **Describe** procedures that can be utilised to monitor athlete progress during rehabilitation to assist in making the decision to return to play.
- 4 **Discuss** the possible consequences for an athlete who returns to play prematurely.

extension activities

- 1 Research a variety of physical skill tests that could be used to indicate readiness to return to play. **Evaluate** each of these.
- 2 **a** **Discuss** who should be responsible for deciding whether an athlete continues to play with an injury.
b **Outline** the problems that can be associated with leaving this decision to the athlete.
c **Explain** the problems that can be associated with leaving this decision to people other than the athlete.
- 3 Collect various policies and procedures from sporting clubs and organisations in relation to return to play post injury. **Compare** each of these in terms of timing and the decision-making process for return to play.
- 4 Research painkillers that may be used in a sporting situation to mask pain associated with injury.
a **Identify** what each painkiller is and how it works, the reasons they are used in sporting situations and any side effects that may be associated with their use.
b **Clarify** your stance on the use of painkillers by athletes to compete when injured.

exam-style questions

- 1 **Describe** the rehabilitation procedures an athlete would undertake after tearing a hamstring. (12 marks)
- 2 **Justify** the use of cold and heat modalities as part of rehabilitation procedures. (8 marks)
- 3 **Explain** how graduated exercise can assist an athlete to return to play. (8 marks)
- 4 **Discuss** the indicators of readiness for return to play for an athlete in a sport of your choice. (8 marks)
- 5 **Assess** the impact of ethical considerations on an athlete's timing and readiness to return to play. (12 marks)

outcomes★

A student:

- H7 explains the relationship between physiology and movement potential
- H8 explains how a variety of training approaches and other interventions enhance performance and safety in physical activity
- H9 explains how movement skill is required and appraised
- H10 designs and implements training plans to improve performance
- H16 devises methods of gathering, interpreting and communicating information about health and physical activity concepts
- H17 selects appropriate options and formulates strategies based on a critical analysis of the factors that affect performance and safe participation.



option

4

Improving performance

coming up★ This Option acts as an extension of Core 2: Factors Affecting Performance. The theory and practice developed in Core 2 are expanded and developed so that you are able to examine the factors that directly influence the physiological and psychological preparation of athletes.

FOCUS QUESTIONS

- ★ How do athletes train for improved performance?
.....[page 348]
- ★ What are the planning considerations for improving performance? [page 374]
- ★ What ethical issues are related to improving performance?
.....[page 390]

