WHAT ETHICAL ISSUES ARE RELATED TO IMPROVING PERFORMANCE?

- use of drugs
- justify the reasons drugs are considered to be unethical and carry a range of risks for the athlete
- argue issues related to drug testing such as:
  - at what level of competition should drug testing be introduced?
  - which drugs should be tested for?
  - what are the pros and cons of drug testing?
  - what should be the consequences of drug use?

The practice of using artificial substances or methods to enhance athletic performance is called doping or using ergogenic aids. Doping is considered unethical by most international sports organisations and especially the International Olympic Committee. The main reasons are:

- the health threat of performance-enhancing drugs
- the equality of opportunity of the athletes
- the exemplary effect of ‘clean’ (doping-free) sports in the public
- the illegal use in the general community.

As far back as ancient Greece and increasing in the 1960s, athletes have often been willing to take any preparation that would improve their performance. They may also misuse drugs to relax, cope with stress or boost their own confidence.

There may be several reasons for athletes to use performance-enhancing drugs. They may want to:

- build mass and strength of muscles and/or bones
- increase delivery of oxygen to exercising tissues
- mask pain
- stimulate the body

Drugs can be injected or taken orally.
• relax
• reduce weight
• hide use of other drugs.

Team physicians for amateur and elite level sports need to understand the drugs in sport policy issued and monitored by the national government under the auspices of WADA (World Anti-Doping Agency). World Anti-Doping Agency:

⇒ www.wada-ama.org

The Australian Sports Anti-Doping Authority (ASADA):

⇒ www.asada.gov.au

FIGURE 3.2
Types of banned substances and methods

There are a number of factors that may contribute to an athlete misusing drugs. These factors can be related to the drug itself, the person and/or surrounding environments, such as the following:
• the drug: effects of the drug, physical dependence and availability
• the person: dissatisfaction with performance or progress, easily influenced by others, self ego
• the environment: pressure to win from coach, parents, media, public, financial reward, unrealistic qualifying standards or performance expectations.

Most of the drugs listed are banned outright in Olympic competitions. However, some of these drugs, such as cortisone and local anaesthetics, are restricted in Olympic competition because they have legitimate clinical uses.

– the dangers of performance enhancing drug use, eg physical effects, loss of reputation, sponsorship and income

Athletes face enormous pressure to excel in competition. They also know that winning can reap them more than just a gold medal. A star athlete can earn a lot of money and receive fame and attention, and they only have a short time to do their best work. Athletes know that training is the best path to victory, but they also understand that some drugs and other practices can boost their efforts and offer a shortcut, even at the risk of their health and athletic careers.

Athletes can be lured into using performance-enhancing drugs because:
• winning can attract lucrative sponsorship deals and endorsements
• society places great emphasis on success in sport, which puts more pressure on an athlete to win
• some banned drugs can speed recovery from injury, which means athletes can be back training and competing more quickly
• some athletes believe competitors are using drugs and that to be competitive, need to take drugs too
• some athletes desire to win so much that they are willing to use any means, including cheating, to gain success
• some coaches may push drug use to enhance an athlete’s chances of winning, which boosts the profile as a successful coach.

For whatever reason an athlete wants to use drugs, performance-enhancing drugs carry serious risks for them, including suspension or banishment from their sport, stripping of their records, diminishment of their reputation and the sport, and life-threatening medical complications.

– for strength (human growth hormone, anabolic steroids)

**Human growth hormone (HGH)**

Human growth hormone (HGH) is naturally produced by the body in the pituitary gland. HGH stimulates the body’s synthesis of the proteins that form bone and muscle tissue, decreases body fat and increases testosterone levels.

HGH stimulates the growth of muscle, cartilage, and bone, and so increases muscle size. As there is a correlation between muscle size and strength, competitors in events that require power and short bursts of explosive strength would be most likely to benefit. It also allows tired muscles to recover quicker, which enables the athlete to train harder and more often.

The side effects of using human growth hormone include:
• overgrowth of hands, feet and face (acromegaly) because of the increased muscle and bone development in these parts
• enlarged internal organs, especially heart, kidneys, tongue and liver
• heart problems.

**Anabolic steroids**

A steroid is a chemical substance derived from cholesterol. Anabolic steroids build muscle and bone mass primarily by stimulating the muscle and bone cells to make new protein. These substances can be injected or taken as pills.

Athletes use anabolic steroids because they increase muscle strength by encouraging new muscle growth. Anabolic steroids are similar in structure to the male sex hormone, testosterone, so they enhance male reproductive and secondary sex characteristics (testicle development, hair growth, thickening of the vocal cords). They allow the athlete to train harder and longer at any given period, and are commonly used in strengths and power events.

Anabolic steroids have a number of possible and well-known side effects, including jaundice and liver damage because these substances are normally broken down in the liver; and mood swings, depression and aggression because they act on various centres of the brain.

In males, the excessive concentrations of the steroids interfere with normal sexual function and cause baldness, infertility and breast development. In females, they cause male characteristics to develop and interfere with normal female functions. The drugs can:
• stimulate hair growth on the face and body
• suppress or interfere with menstrual cycle, possibly leading to infertility
• thicken the vocal cords, which causes the voice to deepen, possibly permanently
• if pregnant, interfere with the developing foetus.

– for aerobic performance (EPO)

Erythropoietin (EPO) is a naturally occurring protein hormone that is secreted by the kidneys during low-oxygen conditions. EPO stimulates the bone marrow stem cells to make red blood cells, which increase the delivery of oxygen to the kidney.

Endurance athletes, use EPO to increase oxygen absorption, reduce fatigue and improve endurance by increasing the rate of red cell production. It is also believed that EPO increases the metabolism and the healing process of muscles because the extra red cells carry more oxygen and nutrients.

In someone who already has normal levels of red blood cells, the use of EPO can lead to increased thickening (or viscosity) of the blood causing clotting, thrombosis, heart attack and stroke.

Blood doping

Blood doping refers to methods of increasing the oxygen-carrying capacity of blood in order to boost aerobic performance. This is typically accomplished by withdrawing blood, isolating the oxygen-carrying red blood cells in a solution, and then re-transfusing the cells prior to competition, thereby increasing the body’s supply of red blood cells. Blood doping is used in endurance sports such as cycling, distance running and cross-country skiing. Blood doping mimics the effects of EPO.

– to mask other drugs (diuretics, alcohol)

Masking agents are prohibited as they are products that have the potential to impair the excretion of prohibited substances, to conceal their presence in urine or other samples used in doping control, or to change haematological (blood) parameters.

Warne recently returned a positive sample to the banned drug Moduretic, a diuretic often used by sports drug cheats to mask other prohibited substances including anabolic steroids, which are often used by sports men and women to promote rapid tissue healing after injury.

Although he admits use of the banned drug, Warne has maintained at all times it was used only for weight loss purposes and was given to him by his mother before a television appearance to ensure he looked his best on TV.
Diuretics

Diuretics are classified as masking agents and can be used to control weight or mask the use of other drugs. They are used by athletes who participate in sports such as weightlifting, horse racing and rowing, where there are weight restrictions. Diuretics increase the amount of urine produced, and have been placed on the prohibited list for some time because of two reasons:
1. Diuretics facilitate weight loss via their ability to enhance rapid water loss via urine excretion.
2. Diuretics have the potential to rapidly dilute the urine by increasing renal flow.

When utilised as a ‘masking’ agent diuretics dilute the urine, which results in lower levels of the banned substance being excreted from the body. This can therefore make it more difficult for the laboratories conducting doping controls to detect. Possible side effects from using diuretics include dehydration, dizziness, cramps, heart damage and kidney failure.

Alcohol

Many athletes perceive alcohol (ethanol) to be a stimulant drug, however, it is a depressant. It slows down activity in the central nervous system, including the brain. Depressants affect concentration and coordination, and slow the response time to unexpected situations. Alcohol can have the same masking affect as a diuretic by diluting urine.

Alcohol is an ergolytic aid to sports performance. This means that it will detract from, not improve, exercise performance. Alcohol intake impacts negatively on a variety of psychomotor skills essential for successful performance, including reaction time, balance and hand–eye coordination. Studies have also shown that drinking alcohol does not improve power, strength or endurance.

In Australia it is important to note that alcohol is banned in some sports during competition, these include:
• aeronautic
• archery
• automobile
• boules
• karate
• modern pentathlon (disciplines involving shooting)
• motorcycling
• ninepin and tenpin bowling
• powerboating.

Although most athletes do not take alcohol immediately before exercise, consuming alcohol in binges during the week or on weekends is likely to affect recovery from exercise and exercise performance on subsequent days. The impact of alcohol binging has a variety of short- and long-term effects for the athlete. Some of the short-term effects include dehydration, slower decision-making abilities, and exacerbation of soft tissue injury.

Some of the indirect effects on athletes from binge drinking following exercise include:
• being distracted from carrying out appropriate recovery strategies to help the body refuel, rehydrate and facilitate muscular repair
• relaxing attitudes towards certain foods athletes usually may not eat
• failing to follow-up appropriate injury rehabilitation and management
• being placed at an increased risk of violence or being involved in a brawl, leading to serious injury and/or adverse publicity.
Sprinter Jones pleads guilty in drug case

US athlete Marion Jones has admitted to lying to investigators about drug use.

The 31 year old had previously denied using performance-enhancing drugs ahead of the 2000 Sydney Olympics, where she won five medals—three of them gold.

In court Marion Jones admitted using a steroid between September 2000 and July 2001, and lying to a federal inquiry in 2003. After leaving court a tearful Ms Jones said she was retiring from athletics.

‘It is with a great amount of shame that I stand before you and tell you that I have betrayed your trust’, she said.

‘I want to apologise for all of this’, she said in a letter to her family. ‘I am sorry for disappointing you in so many ways.’

The US court judge justified her prison sentence because it sent a message to athletes who have abused drugs and overlooked the values of ‘hard work, dedication, teamwork and sportsmanship’.

‘Athletes in society have an elevated status, they entertain, they inspire, and perhaps most importantly, they serve as role models’, the judge said.

Ms Jones was told by her former coach Trevor Graham that she was taking flaxseed oil, a nutritional supplement, when it was actually a steroid known as ‘the clear’. ‘The clear’ is a banned drug linked to the San Francisco-based laboratory at the centre of a steroids scandal in professional sports. Jones said she lied to the authorities when she was questioned about doping allegations in connection with this laboratory. She said she panicked when the authorities presented her with a sample of ‘the clear’, which she recognised as the substance Graham had given her.

In the letter to her family Jones said she didn’t realise she’d used a performance-enhancing drug until she stopped training with Graham at the end of 2002. The prison sentence completes a stunning fall for the woman who was once the most celebrated female athlete in the world.

benefits and limitations of drug testing

Effective drug testing programs are difficult and extremely costly to maintain. One reason is that new performance-enhancing drugs are constantly being developed. These drugs are usually produced in secret and are specifically designed to avoid detection by current testing methods.

Some performance-enhancing drugs are more difficult to detect than others. Elevated levels of EPO, for instance, do not remain in the blood for long, making it particularly hard to test for. Both testosterone and EPO are naturally present in the body, which means that if an athlete has an abnormally high level of these chemicals due to certain physiological factors, the athlete may test positive even though no illegal drug was used.

The Australian Sports Anti-Doping Authority (ASADA) is the primary anti-doping authority in Australia and, as such, is responsible for testing athletes for banned substances. The methods that ASADA officials use to collect samples vary according to whether it is a urine or a blood test. In each case, strict protocols apply in relation to notifying athletes that they are required to provide a sample, how the sample is to be collected and the paperwork that needs to be completed. Athletes under the age of 18 years must be accompanied by a parent or guardian during testing, along with the ASADA representative.

Although there is limited statistical evidence on how widespread doping is, athletes and coaches stress that most competitors do not take drugs. Nonetheless, drug testing is becoming an increasingly integral part of sports competitions. As new performance-enhancing drugs are developed, new tests are developed to detect these drugs, and the struggle to keep sports clean continues indefinitely.

use of technology

describe how technology has been used to improve performance

argue ethical issues related to technology use in sport such as:

– has technology gone too far?

– has access to technology created unfair competition?

Sport is undergoing a global technological revolution. Each year, records are being broken, equipment gets more sophisticated, and facilities improve. These changes are impacting on all areas of sport, from shoes to cycles and stadia. Is this making sport more exciting for participants and spectators? Or are talent and determination becoming secondary to money and technology, devaluing honest competition?

Oscar Pistorius of South Africa was born without a fibula bone in his legs resulting in both legs being amputated below the knee when he was 11 months old. Today, at age twenty, he is setting the track on fire with his specially made prosthetics. After easily winning the Paralympics World Cup 100 and 200-metre dashes, Oscar now dreams of running in the Olympics.

training innovation, eg lactate threshold testing, biomechanical analysis

New training innovations develop every year, with what is regarded as the latest innovation becoming outdated in a very short period of time. Most innovations can all be linked to computer technology. Coaches research, or in the case of elite athletes, have support staff to investigate the latest training methods and vices to improve athletic performance in power, distance and accuracy, and to prevent injury or aid in rehabilitation.

The Australian Institute of Sport (AIS) prides itself in athletic achievements, which have been aided by the AIS Department of Applied Research. However, much of the research is cutting-edge, and designed to give Australian athletes the best chance at international success, and so is not made available.
Some examples of innovative training aids to improve performance include:

- clothing, compression garments—scientifically designed materials to improve aerodynamics, buoyancy, absorption and water resistance
- playing surfaces—synthetic grass pitches, ‘drop-in’ cricket pitch, synthetic athletic tracks
- testing procedures—wind tunnels, sprint gates, climatic chambers
- simulated competition environments—stationary cycling with computerised video simulation of competition terrain or altitude tents
- team and individual performance analysis sheets for objective data
- equipment—heart rate monitors, GPS systems, treadmills, tacklesuits and lactate testing devices
- equipment modifications—graphite shafts for more flexibility in golf clubs, lighter carbon frames for cycles, and streamlining surfboards
- computerised video analysis and photographic equipment for biomechanical analysis.

Coaches are always on the lookout for innovative training methods to complement new training aids.

**Lactate thresholds testing** is an innovative method used to measure lactate levels during training by sport scientists, coaches and athletes to accurately determine heart rate training zones and recovery. Lactate is a metabolic product that can be measured by taking a drop of blood at a fingertip the same way diabetics monitor their blood sugar level. The blood lactate level increases with exercise intensity and shows clearly the transition from aerobic to anaerobic activity. The ability of the muscles to reach a peak performance during an athletic event requires that the energy systems providing energy be ‘fine tuned’ or ‘balanced’ properly so that the athlete can generate the highest amount of energy per unit of time during a race. Proper training is what accomplishes this fine tuning or optimal balance and it is lactate testing that lets the coach know if the balance has been obtained or how each energy system must be trained in order to obtain the balance.

**Biomechanical analysis** is another innovative method used to improve an athlete's performance. The results of a biomechanical evaluation provide valuable information for trainers, coaches and athletes. For example, walking, running, throwing, pitching, hitting, kicking, diving and golf swing mechanics can be compared to normative data in order to pinpoint flaws in the motion; and so performance improvements can then be based on scientific evidence.

Nadine Gelberg: Sport has a dynamic relationship with society, and as societal interests change, so must sport. It is part of society as well as a reflection of society, and its relationship with technology does need to change. But as I would advocate, sport needs to protect the essential elements, the essential challenge. So in tennis for example, it needs to protect the ability to hit a top-spin shot, it needs to limit the innovations that provide the ball with more rotations per second, than other innovations would. So while the relationship with technology will change over time, there needs to be certain protections of the essential skills that should not or will not change over time. Golf is a test of hitting accuracy, driving distance and putting precision. Those are skills that will not change over time, and need to be protected even if other sorts of technologies do change, increased viewer interest, increased participation.

Biomechanical analysis is valuable in the prevention of injuries. Data regarding joint stresses incurred during sport-specific movements, knowledge of joint mechanics and the magnitudes and rates of joint loads, provide sports medicine practitioners with the information necessary to prescribe injury prevention and rehabilitation programs.

Sport scientists and sports medicine professionals can assist the athlete and coach in designing a comprehensive program targeted at injury prevention. All biomechanical evaluations should be completed with two goals in mind: improve performance and reduce the chance of injury.

Athletic Edge: 3-D biomechanical motion analysis:

🌐 www.youtube.com/watch?v=Gpw4knCYiDY

Hi-Tec CDT Superpower Golf Shoe: 4SYS Technology
🌐 www.golfgearonline.com/hi-tec-cdt-golf-shoe/p/GP1022

− equipment advances, eg swimsuits, golf ball

Where the sporting achievement can be gauged in absolute terms, such as in world records, tremendous improvements have been made in those sports where equipment is critical. However, the use of advanced materials in sports equipment presents some ethical questions and how behaviour is enhanced by allowing the use of advanced materials. But where should the line be drawn or should there be no restrictions? To maintain an ‘even playing field’, how much money is spent on these technological advancements and who can afford them?

**Swimsuit**

There are numerous debates in equipment advances in technology; however, one of the most controversial to is that of the Speedo LZR Pulse™ swimsuit. At the beginning of 2008, the suit was worn for 9 out of 9 world records broken in the swimming pool by the end of March, even before the start of the 2008 Olympics.

Characteristics of the suit that improves performance include:
• constructed water repellent material reducing drag by 5% and increasing efficiency compared to older, slower swimsuits
• tighter, corset-like midsection reported to reduce fatigue at the end of races and improve body shape
• seamless, consisting of special panels of the repellent material further reducing drag.

**Golf ball**

Another debate in sport and technology is one that surrounds golf balls. Though a golf ball is small, its size and weight is regulated. Under standard rules, golf balls are to weigh no more than 45.93 grams and have a diameter no less than 42.67 mm. Golf clubs and golf balls and are subject to standards set by the Royal and Ancient Golf Club of St Andrews (the primary governing body worldwide) and the United States Golf Association.
So what is the debate that surrounds golf balls? How can any significant advantage be gained? Within the rules established and maintained by the two associations above, manufacturers have sought to create superior golf balls by varying both the materials and the patterns and combinations on the surface.

For example, why does a golf ball have dimples? Surely, a smooth surface would reduce friction on a golf ball as it travels through the air, reducing drag and helping it to go further. In actual fact dimpled golf balls experience about half the drag as smooth golf balls with no dimples. This is because the main source of drag is not friction but the movement of air around a golf ball. Analysts use computers to model how the air flows around a ball in flight, and can study how this flow is influenced by the size, pattern and depth of a golf ball's dimples. Dimples allow air to flow in a turbulent pattern around the golf ball, and this pattern has been found to be optimal for flight through the air.

As computer technologies and models are developed, manufacturing companies can develop new golf balls with new patterns, accompanied by new marketing campaigns overlaid with scientific jargon. For instance, Callaway Golf replaced traditional dimples with a hexagonal dimple pattern on their golf balls, which they claim further reduces drag for longer, more efficient ball flight. In addition, they offer core constructions with two, three or four layers designed to minimise spin and offer distance control. These tiny adjustments may offer advantages but at a price, not only exploiting the lucrative sports dollar, but also creating an unfair platform for competition.
Water repellent coating limits water absorption resulting in a long lasting durable fabric

Water repellency:
- Unique water repellent coating bonded to the LZR Pulse™ fabric via patented plasma process
- Bonding process produces durable and long lasting water repellent finish
- Limited water absorption creates an incredibly lightweight feel in the water
- Quick drying fabric enhances performance over multiple same day swims

Compression:
- Significantly greater fabric power and compression than any other lightweight suit on the market
- Compression provides core stability and firmness during competition without feeling restrictive or heavy
- Improves muscle efficiency through reduction of excess muscle vibration

Seam and Fit:
- Seams vertically oriented to reduce drag based on CFD analysis (Computational Fluid Dynamics)
- Fit engineered from body scan data of hundreds of elite swimmers resulting in an optimum biomechanic fit
- Seams reinforced through innovative sewing process

Behind the technology: LZR Pulse™ fabric
- A high density microfiber woven from chlorine resistant elastane and ultra fine nylon thread
- 15% more powerful compression than any other lightweight suit on the market
- Significantly improved stretch and shape retention

Source: www.swimmingmatters.ca/competition-suits-lycra/speedo-womens-fs-pro-recordbreaker-bodyskin.html
Activity 1 (Page 291)
As a member of the Australian Sports Anti-Doping Authority (ASADA), you have been asked to deliver a drug report to a professional sporting club, presenting the use of performance-enhancing drugs from a physiological and ethical perspective.

Activity 2 (Page 297)
Select a sport and research its technological advances over the past two decades. Outline aspects that promote the performance of participating athletes.

Activity 3 (Page 297)
Has technology gone too far and created unfair competition?

Activity 4 (Page 297)
Discussion questions:
1. If drugs will always win, do we really have a choice about using them?
2. Will we ever see a Super-Human Olympics?
3. Is modern professional sport more about technology than talent?
4. Can athletes from the developing world ever hope to compete in modern sport?

Activity 5 (Page 299)
If the Fédération International de Natation Amateur (FINA) have approved the Speedo swimsuit, then who is at a disadvantage?

Review Questions
1. **Investigate** the processes used to administer performance-enhancing drugs. **Outline** the dangers associated with each process.
2. **Discuss** the role society has played in the current situation with regards to drug use in sports today.
3. **Describe** the impact of drug testing on sport.
4. **Evaluate** the use of technology in training sessions that are designed to improve skill.
5. **Explain** how technology can be used effectively to improve performance.