

## Topic 1.5

# How do technology, substances, and environmental factors affect human health?

### Key Concepts

- Medical imaging technologies are used to explore, diagnose, and treat the human body.
- Exposure to various technologies, substances, and environmental factors can impair health.
- Technology will affect human health in new ways in the future.

### Key Skills

Inquiry  
Literacy  
Research

### Key Terms

medical imaging technologies

The ability to see inside the body using technology such as an X ray machine is little more than 100 years old. Before then, doctors had to trust their senses and their wits to infer what might be happening inside a patient's body. If direct observation of an organ or other internal body part was necessary, doctors had only one option. They had to cut the body open. In the early 1800s, the prospect of dealing with serious wounds from accidents or the battlefield carried an additional challenge—anesthetic was not used in surgery until the 1840s!

Today, with X ray machines and other medical imaging technologies such as CT scans and ultrasound, doctors can observe, diagnose, and treat patients without ever opening the body. In some cases, with the addition of optical fibre technology, doctors can perform delicate surgery with only the tiniest of incisions.

A medical kit from the 1800s. Notice the bone saw, which was used in amputation procedures.



In the past, as in this depiction of a field hospital during the 1800s, severe injuries often had only one life-saving procedure: amputation.

## Starting Point Activity

Before modern imaging technologies were developed, doctors relied on one main set of diagnostic tools—their senses. Use your sense of touch to try to feel the organs in the model digestive system that your teacher has set up.

1. Visit the “digestive-system-in-a-box” model that has been set up. The box represents the part of the digestive system that is found in the abdomen.
2. Try to feel the organs in the model digestive system through the layer of foam. What does the foam represent in the body?
3. Draw a diagram to show the shape and placement of the organs based on what you discovered by touch.
4. Find the figure in Topic 1.4 that you can use to check your diagram for the correct placement of the organs. How correct was your diagram?
5. Technology for “seeing” inside the body, such as X ray machines, was invented only in the twentieth century. In what ways do you think such technology has helped improve the life and lifespan of people who are sick or injured?

A modern surgeon repairs a leg injury using a specially designed scope that lets her see inside and operate on a leg through a tiny incision.



# Medical imaging technologies are used to explore, diagnose, and treat the human body.

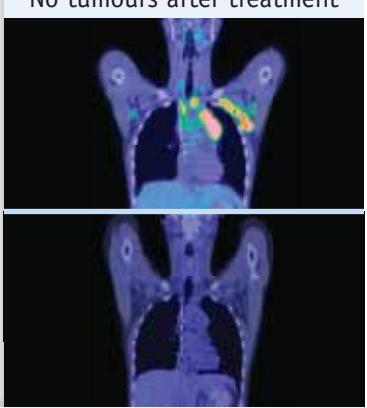
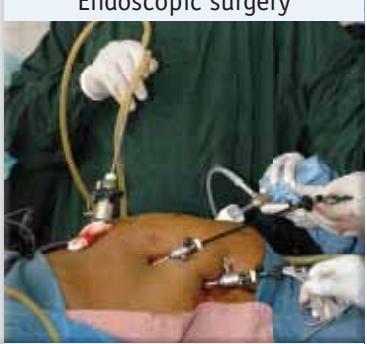
## medical imaging technologies:

technologies that are used to make images of cells, tissues, and organs

Medical diagnosis has come along way since the 1800s. We now have a variety of **medical imaging technologies** that allow doctors to observe what is going on inside a patient. **Table 1.4** shows common medical imaging technologies that are currently used to explore, diagnose, and treat injuries and disease.

**Table 1.4** Medical Imaging Technologies

Technology	Description	Purposes	Image
X ray	<ul style="list-style-type: none"><li>Involves sending electromagnetic radiation through the body to make an image</li></ul>	<ul style="list-style-type: none"><li>To view hard tissue, such as bone</li><li>To diagnose bone injuries and malformations</li></ul>	A broken wrist
CT scan (computerized axial tomography)	<ul style="list-style-type: none"><li>An X ray source and sensor rotate around the body while slowly moving along the length of the body. A computer converts the data from the sensor into a 3-D image that looks like slices of the body.</li></ul>	<ul style="list-style-type: none"><li>To view hard tissue, such as bone</li><li>To diagnose bone injuries and malformations</li></ul>	A fracture in the hip
Ultrasound	<ul style="list-style-type: none"><li>Involves directing sound waves at a body part and measuring reflected sound waves to make an image</li></ul>	<ul style="list-style-type: none"><li>To view soft tissue</li><li>To monitor fetal development, observe organ function, and detect cancer</li></ul>	A 23-week-old fetus
MRI scan (magnetic resonance imaging)	<ul style="list-style-type: none"><li>Involves passing radio waves through a magnetic field around the body, creating multiple images on a computer</li><li>Produces images that are similar to those produced by a CT scan, but shows soft tissue in much greater detail</li></ul>	<ul style="list-style-type: none"><li>To contrast soft tissue (such as organs) and hard tissue (such as bones)</li><li>To diagnose disease in organs and soft tissues</li></ul>	Brain cancer (orange areas)

Technology	Description	Purposes	Image
PET scan (positron emission tomography)	<ul style="list-style-type: none"> <li>Involves scanning small amounts of radioactive materials, which have been taken into the body</li> <li>Reveals details of tissues and organs</li> <li>Produces more detailed images if combined with another imaging technology, such as a PET-CT scan or PET-MRI</li> </ul>	<ul style="list-style-type: none"> <li>To view soft tissues</li> <li>To diagnose cancer or track cancer treatments</li> </ul>	 <p>No tumours after treatment</p>
Endoscopy	<ul style="list-style-type: none"> <li>Is conducted with a scope made up of a tiny camera and a light, which are attached to a flexible tube that is inserted into the body</li> </ul>	<ul style="list-style-type: none"> <li>To view internal body parts without cutting open the body</li> <li>To diagnose diseases, take tissue samples, and perform surgeries</li> </ul>	 <p>Endoscopic surgery</p>
Microscopy	<ul style="list-style-type: none"> <li>Is conducted using a variety of microscopes including light microscopes and electron microscopes, which provide much greater enlargement and resolution</li> </ul>	<ul style="list-style-type: none"> <li>To view small objects, such as cells</li> <li>To diagnose various diseases</li> </ul>	 <p>Blood cells</p>

### LEARNING CHECK

- Why was the development of medical imaging technologies important?
- Identify three general purposes of using medical imaging technologies.
- A 16-year-old female patient comes to your walk-in clinic with a suspected bladder infection. Which medical imaging technology from **Table 1.4** would you use to check her urine for white blood cells, which indicate an infection?
- A 44-year-old male is brought to the emergency room after a fall. He cannot put weight on his ankle. Which medical imaging technology from **Table 1.4** would you use to determine the extent of his injury?

### INVESTIGATION LINK

Investigation 1E, on page 86

### ACTIVITY LINK

Activity 1.24, on page 84

# Exposure to various technologies, substances, and environmental factors can impair health.

Air pollution, pesticides, loud noise—it seems that just waking up in the morning can be harmful. Exposure to various technologies, substances, and environmental factors can indeed affect your health. However, the health risk posed often depends on the degree or length of exposure. The images and text below explore some of the possible effects of exposure to several harmful technologies, substances, and environmental factors. As you read, keep in mind that some of these agents also have positive effects. It's up to you to weigh the risks.

## Inquiry Focus



### Activity 1.22

#### WHAT ARE THE HEALTH RISKS?

Analyze the health risks that you are exposed to. Then create a plan to reduce your exposure.

1. Examine the activities in the following list. In your notebook, record the activities that can be applied to your life over the past year.
  - You smoke.
  - You use a cellphone.
  - You had an X ray or CT scan.
  - One of your friends or family members smokes.
  - You listen to music at a high volume.
  - You go out in the sunlight without sunscreen.
2. As a class, discuss and assess the health risks of each activity listed in step 1.

3. Based on the results of your discussion, rank the activities in order, from highest to lowest health risk, as a class.
4. Assess your personal risk level by applying this ranking to the activities you recorded in step 1. Develop an action plan to reduce your health risks due to these activities.



### Harmful Technologies

- Studies suggest that extensive cellphone use may be linked to brain damage and cancer, especially in children. However, more research is needed to determine how much exposure results in a significant threat to health.
- Despite their benefits, X rays and CT scans emit radiation. The radiation levels are generally considered to be safe. Pregnant women, however, should avoid these technologies.



### Harmful Substances

- Smoking and second-hand smoke increase the risk of lung, heart, throat, and mouth disease. This is especially true for heavy and long-time smokers. Smoking is also a contributing factor to atherosclerosis. As atherosclerosis develops, the arteries are increasingly blocked by a build-up of fatty deposits, slowing blood flow. If blood flow becomes very limited or blocked, a heart attack can result.
- Pesticides are chemicals that are used to control and kill weeds and insects. Unless you eat foods that are certified organic, they are likely to contain at least some pesticide residue. Pesticides have been linked to skin, eye, and lung irritations. They may also affect the nervous and reproductive systems.



### Harmful Environmental Factors

- While some exposure to sunlight is essential for good health, prolonged exposure brings the risk of too much radiation. This can damage the skin and eyes, as well as increase the chance of developing skin cancer.
- Even if you do not live in an urban area, it is difficult to escape the effects of air pollution. Particles and other contaminants in the air irritate the eyes, throat, and lungs. They can also trigger life-threatening attacks in people with asthma.



### LEARNING CHECK

- How might smoking affect the circulatory system's ability to function?
- Why might some people engage in risky behaviour, such as smoking or sunbathing, even if they know the risks?

### INVESTIGATION LINK

Investigation 1F, on page 88

# Technology will affect human health in new ways in the future.

Many of the health-care technologies that you may encounter in the next few decades are still literally in the lab today. Extensive development and testing are required before a new technology is ready for use. This means that the technologies described below may not be available for some time. However, they will most likely be worth the wait. These technologies hold great potential for treating diseases. Some may even cure diseases that we're struggling with today.



▲ **Figure 1.30** The i-pill helps to target the delivery of medication.

## The i-Pill

The i-Pill or “intelligent pill” will soon let doctors control the delivery of medication electronically. This could be especially helpful for treating diseases such as Crohn’s disease. Crohn’s disease causes inflammation of the digestive system. Large doses of the medication used to treat Crohn’s disease can make patients very ill. The i-Pill is shown in [Figure 1.30](#). It can deliver the medication directly to where it is needed. It then releases a pre-measured amount at that location. To do all this, the i-pill contains a microprocessor, battery, pH sensor, temperature sensor, wireless transceiver, fluid pump, and reservoir for the medication.

## Regenerative Medicine

Imagine re-growing a severed fingertip or growing a kidney in the lab to replace a kidney that has been damaged! This may well be the future of regenerative medicine. Regenerative medicine involves producing new cells, tissues, and organs to replace damaged body parts. These cells are grown in the human body or in a lab. For example, scientists can already apply a powder that is a mix of protein and connective tissue (often used to repair tendons) to a fingertip to re-grow tissue. The powder activates cells that are capable of regenerating. Scientists believe that in the future it will be possible to actually re-grow entire arms and legs.

Scientists can also grow tissues (such as heart valves) and organs (such as bladders) from human cells in a lab. Once the techniques are mastered, you may be able to have a new heart valve grown from your own tissue if a replacement becomes necessary. This means that your body will not reject the new valve.

## Artificial Blood

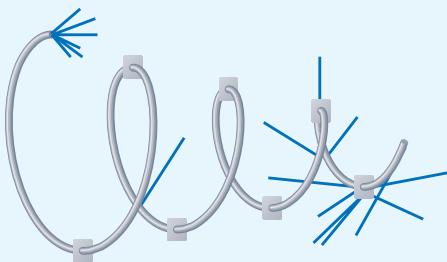
The human blood supply is limited by how much is donated. To solve this problem, scientists are researching artificial substitutes for real blood. The “fake blood” currently being developed does not carry out all the functions performed by real blood. Instead, it only transports oxygen. As a result, artificial blood products are classified according to the way that they transport this gas. One type of artificial blood actively being researched is fluorocarbon-based. Fluorocarbons are chemicals that are closely related to the non-stick coating on frying pans. They carry and release large amounts of oxygen. Another type of artificial blood imitates how real blood carries oxygen, by using specific proteins. Recently, scientists have also started exploring stem cells as a way to produce blood.

### Inquiry Focus

#### Activity 1.23

#### MEDICAL TECHNOLOGY BREAKTHROUGH!

The device shown below is used to treat blood clots. It was an important medical technology breakthrough. Make your own medical technology breakthrough. Choose a disease or disorder and design a technology to diagnose or treat it.



This device is inserted into a blood vessel as a straight wire and placed in a blood clot. Once it heats inside the body, it reshapes into a coil and attaches to the clot. Then the coil and the clot are removed and blood flow is restored.

1. Choose a disease, disorder, or injury that you are familiar with. You may also choose one of the conditions listed below:

- |                  |                          |
|------------------|--------------------------|
| • amputated limb | • collapsed vein         |
| • broken toe     | • cut that will not heal |
| • paralysis      | • severe burn            |

Identify the problem that you want to solve. For example: A blood clot in an artery can block blood flow and cause a heart attack. A clot buster is needed to remove the clot.

2. Design a technology that solves the problem you identified.
3. Describe your medical technology in detail using words, pictures, or a graphic organizer.

#### LEARNING CHECK

1. How do you think the i-pill will change medical treatment?
2. What is artificial blood?
3. Many scientists research how to grow tissue. Why might other scientists research how to destroy tissue?

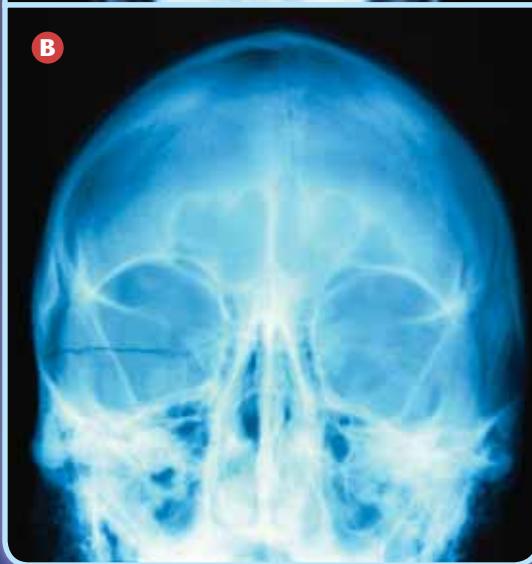
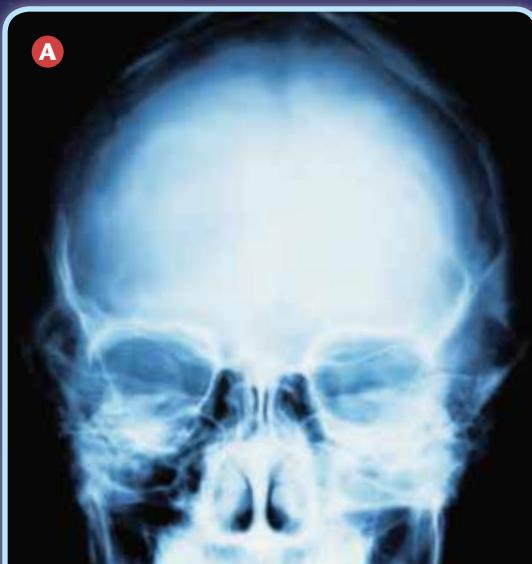


## Activity 1.24

### INTERPRETING X RAYS

On an X ray, bone appears white, air appears black, and other structures appear in various shades of grey. Test your diagnostic skills by interpreting the X rays below.

1. Compare images A and B. Which image shows a fracture?



2. a) Compare images C and D. Which image shows damage?  
b) What do you notice about the bones and joints?  
c) What do you notice about the tissues around the bones?



3. What does this X ray show?



4. Identify the image(s) that you would use to
  - decide on a treatment for a problem
  - assess the success of the treatment



## Activity 1.25

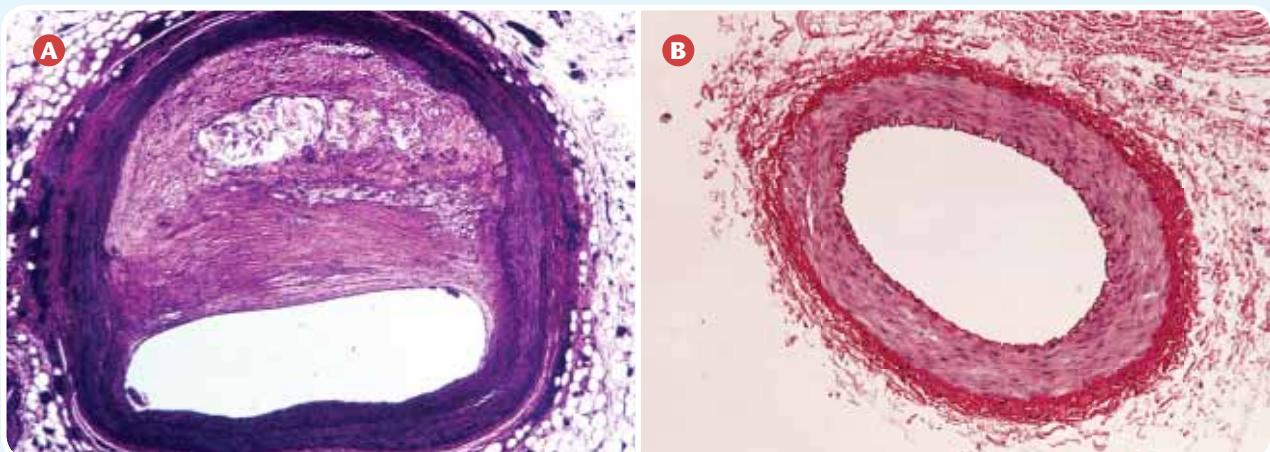
### DETERMINING THE DIAGNOSIS

You are the chief pathologist in a large urban hospital. You are provided with the following information about a 57-year-old female patient who died under suspicious circumstances. You are asked to determine the cause of death and provide your reasoning.

1. Read the following notes from the treating emergency physician:

June 5: A 57-year-old female admitted at 2:17 P.M. died immediately upon arrival before treatment was possible. The patient's brother, who brought her to the hospital, reported that the patient had felt fine in the morning. However, she had been extremely stressed by outbursts at a family lunch when she announced that she had changed her will. At about 1:30 P.M., the patient began complaining of chest pain. She had discomfort described as pressure on the chest, pain in both arms, shortness of breath, and nausea. The patient's brother stated that he believed she had been poisoned. He also stated that the patient was a smoker but had no other health problems.

2. Examine the microscope image (A) of a cross-section taken from one of the patient's arteries. For comparison, also examine the microscope image (B) of a cross-section taken from a healthy artery.



3. Try to determine the condition that probably led to the patient's death.
4. Research this condition using the resources suggested by your teacher. Describe the causes, symptoms, and risk factors for this condition.
5. Complete a brief pathologist's report to identify the cause of death. You must describe the cause of death using information from step 4. You must also explain how you came to your conclusion.

**Skill Check**

- ✓ initiating and planning
- ✓ performing and recording
- ✓ analyzing and interpreting
- ✓ communicating

## Advances in Medical Technology

Advanced medical imaging technologies are changing how doctors practise medicine. These technologies allow doctors to diagnose and treat diseases earlier, more easily, and more safely than in the past. However, there are some health and safety concerns associated with these technologies. In this investigation, you will research a medical imaging technology and present your findings.

### What To Do

1. Choose one of the following medical imaging technologies. Refer to the descriptions of these technologies on pages 78 and 79.
  - CT scan
  - endoscope
  - PET scan
  - ultrasound
  - microscope
  - MRI scan
  - X ray
2. Write down what you have already learned about the medical imaging technology you chose.
3. Use library and/or Internet resources to research this technology. Focus on the questions you want answered. For example:
  - When and where was the technology developed?
  - What does the technology do?
  - How does the technology work?
  - What is the technology best used for?
  - What are the benefits of the technology?
  - What are the limitations of the technology?
  - What, if any, health and safety concerns are associated with the technology?
  - How are health and safety concerns reduced or eliminated?
  - What, if any, alternative is available to perform the same function or make the same diagnosis as this imaging technology? What are the benefits and limitations of this alternative?

### What Did You Find Out?

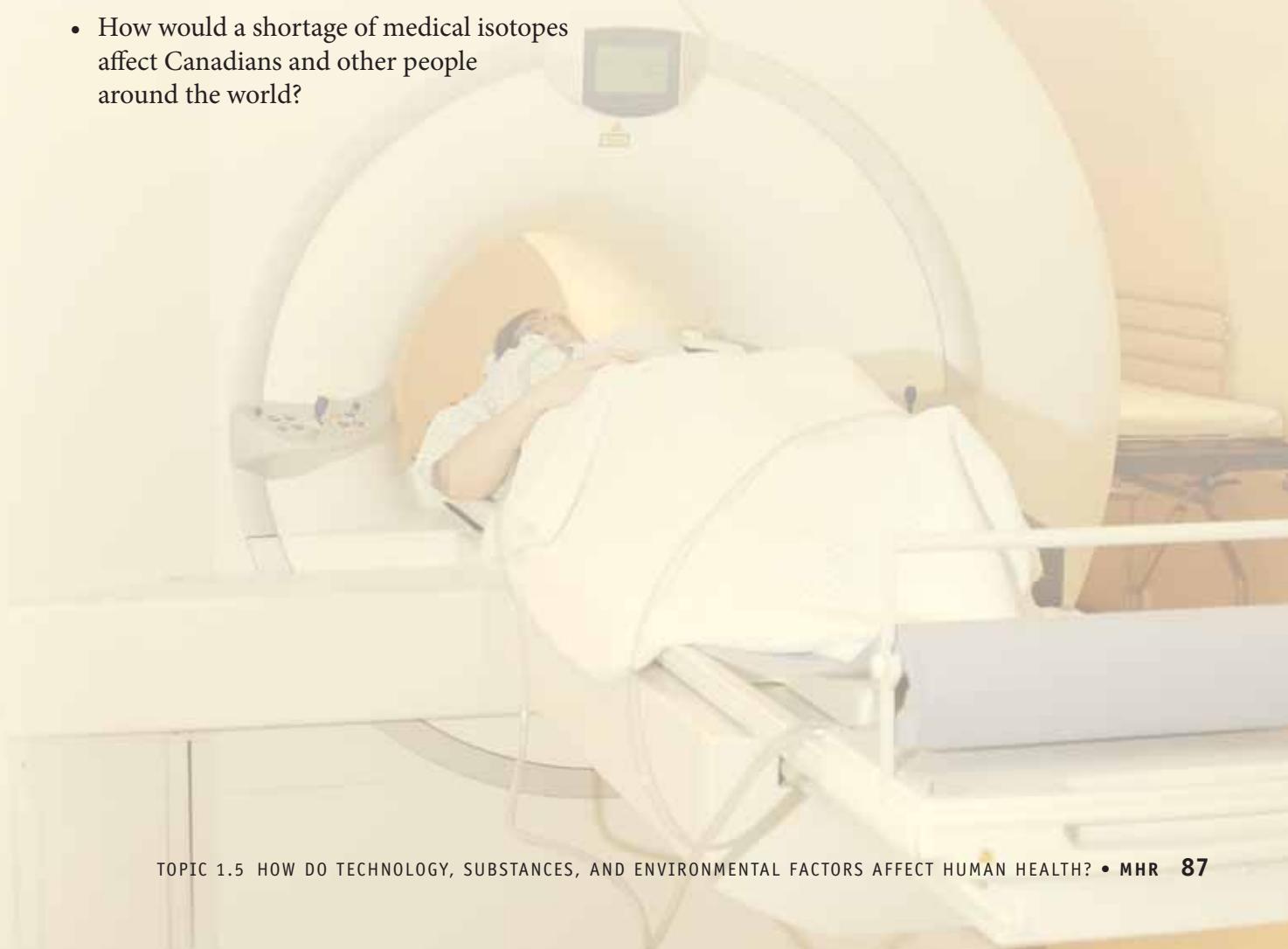
1. What are the main features of the medical imaging technology you chose?
2. Based on what you learned about the health risks, what is your opinion about using this technology? Support your opinion with information from your research.

3. Use your findings to create a pamphlet, poster, or Web page that will educate patients about the pros and cons of treatment with this medical imaging technology.
  - Summarize your findings.
  - Decide on your audience.
  - Use words and graphics that appeal to your audience.
4. If a friend was advised to use the medical imaging technology you chose, what advice would you give about its features and safety?

### Inquire Further

Canada is a world leader in the export of medical isotopes. Use library and Internet resources to answer the following questions about this technology:

- What are medical isotopes?
- How are medical isotopes used?
- What process is used to make medical isotopes?
- In which other countries are medical isotopes made?
- What are the costs and benefits of using medical isotopes to treat diseases?
- How would a shortage of medical isotopes affect Canadians and other people around the world?



**Skill Check**

- ✓ initiating and planning
- ✓ performing and recording
- ✓ analyzing and interpreting
- ✓ communicating

## How Much Exposure Is Too Much?

Create a presentation about the health effects of exposure to a technology, substance, or environmental factor.

### What To Do

1. The chart below lists a variety of technologies, substances, and environmental factors that can affect health. Choose one of these potentially harmful agents.

cellphone	food additives	preservatives	electricity lines
personal audio player	pesticides	cigarette smoke	air pollution
exposure to sunlight	tanning beds	X ray or CT scan	heavy metals

2. Write down what you already know about this technology, substance, or environmental factor, including any health risks.
3. Research the substance, technology, or environmental factor you chose. Look for information about its impact on the tissues, organs, and organ systems in the human body. Create a bibliography of the resources you use as you carry out your research.
4. Plan a presentation to share your findings. You might write a blog, record a podcast, or design an advertising campaign. Include the information you think is important to share with students in your school. Your presentation should describe what you researched and any potential health risks linked to exposure.

### What Did You Find Out?

1. Analyze the results of your research. How does the subject you chose pose a threat to human tissues, organs, and systems? Be specific about the amount of exposure and the related health risks.
2. Draw conclusions about the effects of this exposure. Justify your conclusions.

3.
  - a) In your opinion, what do most students know about the effects of this exposure? Explain.
  - b) What do most students *not* know about the effects of this exposure?
  - c) How aware do you think most students are about their exposure to potentially harmful agents? Explain.
  - d) What do you think is important for students to know about the technology, substance, or environmental factor you researched?
4. Explain how the following factors could affect students' choices and decisions about exposing themselves to potentially harmful agents.
  - a) peer pressure
  - b) popular media
  - c) lack of knowledge about health risks

### Inquire Further

Your health depends on the food you eat. How safe is your food? Food can be exposed to heavy metals, pesticides, preservatives, colouring agents, and other additives. To what substances is your food exposed? What are the potential effects of this exposure on human tissues, organs, and systems? Do additional research to find answers to these questions.

Note: There is a lot of incomplete, misleading, and false information about food and food safety on the Internet. With your classmates and teacher, discuss how to tell a reputable source of information from one that is not. Be sure to find and use at least three sources of reputable information to help you answer these questions.

# Case Study Investigation: What's the Price of Peak Performance?

## What's the Issue?

In today's society, the pressure to be the best can be intense. When Canadians between 12 and 17 were asked if they would take performance-enhancing substances that would make them faster, stronger, or simply more buff, one out of five said they would, despite the risks involved. These substances have the potential to seriously harm the human body. Would you take a chance with your health to be the best?



Some people involved in athletic activities take performance-enhancing substances to be the best.

## The Science behind the Issue

What are the risks of using performance-enhancing substances? How can these substances affect your cells, tissues, organs, and systems? The answers to these questions vary depending on the substance. Three of the most popular performance-enhancing substances are creatine, steroids, and human growth hormone.

### Creatine

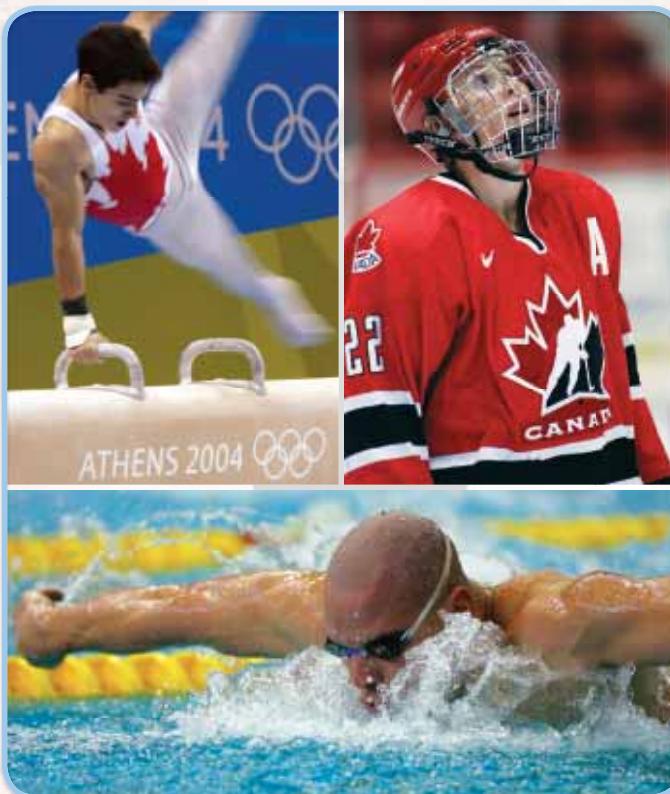
Creatine occurs naturally in the body. It helps muscles release energy. If creatine is something your body uses anyway, what's the problem with taking it? To get the performance-enhancing effect, athletes need to take a lot more creatine than is usually present in the body. What happens to the body when large amounts of creatine are taken on a regular basis? Dr. Peter Yu of the University of Saskatchewan wondered the same thing. The Canadian scientist found that the body changes creatine into another substance called formaldehyde. Formaldehyde is poisonous and can cause serious side-effects when present in large amounts. These side-effects include damage to the circulatory system and kidneys.

### Steroids

Steroids are hormones that enhance the production of muscle tissue in the body. If athletes want to bulk up, steroids can help them do it faster. Steroids also help athletes recover from training more quickly. However, the side-effects are dangerous—even deadly. They include changes in behaviour, such as episodes of rage or depression, as well as severe acne, liver damage, and increased risk of infection. Steroids also affect the sex hormones. Males may develop larger breasts and infertility, while females often gain a deeper voice and increased body hair.

## Human Growth Hormone

Farmers in some countries (not Canada) give dairy cows growth hormones to help them produce more milk. Growth hormones can also enhance the performance of human athletes. Human growth hormone promotes the production of new muscle cells. It also gives athletes more energy. Despite the fact that human growth hormone is naturally found in the body, it can cause problems when taken in large amounts. Side effects include joint pain, swollen limbs, high blood pressure, and diabetes.



Would you consider risking your health to win a medal?

### Over To You

1. Using your knowledge of how organs and systems work together in the body, suggest how using creatine could lead to the build-up of poisonous substances in an athlete's body.
2. Build on your knowledge of performance-enhancing substances by researching and writing a brief paragraph about a substance not covered in this Case Study Investigation. Possible choices include diuretics, androstenedione (andro), and stimulants such as caffeine and amphetamines.
3. The Olympics and other top competitions test athletes for banned performance-enhancing substances. If athletes test positive, they are stripped of their medals. What criteria would you use to determine which substances should be banned or allowed?
4. Some of your peers may be thinking of using performance-enhancing substances despite the risks. Design a campaign to demonstrate the risks of using these substances. Hint: Risks can involve harm to families and friendships as well as harm to the body.

# Making a DIFFERENCE



As a 14-year-old, Kristopher Knowles campaigned across Canada on a walking tour to educate people about organ donations. Increasing the rate of organ donation is a personal issue for Kristopher. He has been waiting for a new liver most of his life. The Ontario teen has biliary atresia, a liver disease that can be fatal. Because Kristopher's liver is severely damaged, he continues to wait for a transplant.

Kristopher's hope is for Canada to create a system of presumed consent. Such a system requires people to indicate only if they do not wish to have their organs donated after they die. This type of system has increased organ donations in other countries. Currently in Canada, people must sign their organ donor cards to indicate that they wish to donate.

*What could you do to raise awareness about a health care issue that is important to you?*

Prashanthi Baskaran was a high school student when she began researching atherosclerosis. Prashanthi was motivated to learn about atherosclerosis after her uncle was diagnosed with the disease. Her research focuses on connections between gingivitis and atherosclerosis. Gingivitis is a swelling of the gums that surround the teeth. The chronic inflammation that comes with gingivitis may link the two diseases.

How is Prashanthi making a difference? Her work could one day help uncover methods for early detection of atherosclerosis. Prashanthi's advice for students who want to use science to help make a difference is to "develop a passion for something you love." Prashanthi has also volunteered her time with a local pharmacy and other community organizations. In 2008, Prashanthi was named one of Youth in Motion's Top 20 Under 20™.

*How could you help promote health in your community?*



# Topic 1.5 Review

## Key Concept Summary

- Medical imaging technologies are used to explore, diagnose, and treat the human body.
- Exposure to various technologies, substances, and environmental factors can impair health.

- Technology will affect human health in new ways in the future.

## Review the Key Concepts

1. **K/U** Answer the question that is the title of this topic. Copy and complete the graphic organizer below in your notebook. Fill in four examples from the topic using key terms as well as your own words.



2. **K/U** Explain how ultrasound has improved health care.
3. a) **K/U** Identify the medical technology shown here.  
b) What is it best used for?



4. a) **K/U** How might exposure to cellphone radiation affect children?  
b) **A** Why do you think children are at higher risk from exposure to radiation?
5. a) **K/U** What is the i-Pill?  
b) What is the importance of i-Pill technology?
6. **T/I** What factors would you consider when deciding on a medical technology to diagnose a problem?
7. **T/I** **A** What would you tell a friend who asks you about the health risks of smoking?
8. **A** Consider the following patient cases.  
a) A 25-year-old female patient is experiencing severe pain in her hips. You cannot diagnose the problem using an external exam. What imaging test would you order?  
b) You are a medical technician who is taking a tissue sample of a 19-year-old male patient's small intestine. Which technology would you use?
9. **C** You have learned that pesticides can be harmful to human health. Write a letter to the editor of your local paper explaining why pesticides pose a health risk and what people can do to reduce the risk.

# SCIENCE AT WORK

## CANADIANS IN SCIENCE



▲ Masood Hassan is a radiological technologist at Sunnybrook Health Sciences Centre.

Radiological technologists—or “rad techs,” as they are commonly known—make it possible for doctors to locate problems hidden inside the body. This knowledge is often essential in diagnosing and treating a patient. Rad techs perform several types of radiography procedures. They carry out “plain” radiography, which use X rays to detect fractures, foreign objects, and malformations. They also take images that screen for breast cancer and show disease in the human heart. Maintaining radiation safety is another important aspect of the job.

Masood Hassan is a recent graduate from The Michener Institute for Applied Health Sciences in Toronto. The program is offered jointly with the University of Toronto. He now works at Toronto’s Sunnybrook Health Sciences Centre. This centre is home to a regional trauma centre. As a result, it has a special need for radiological technologists.

### How much do you have to know about organs and organ systems to be a radiological technologist?

“You must have a basic knowledge of organs and organ systems,” says Masood. To gain this knowledge, Masood took a higher level anatomy and physiology course as part of his training. Masood says he was attracted to radiological technology because it involved so many of the sciences. Physics helped him understand how X rays are generated. Computer skills are important because most images are now captured digitally. However, Masood also had to study chemistry in case he was required to work in a facility that used older, film-based technology.

### What is the most important skill required for the job?

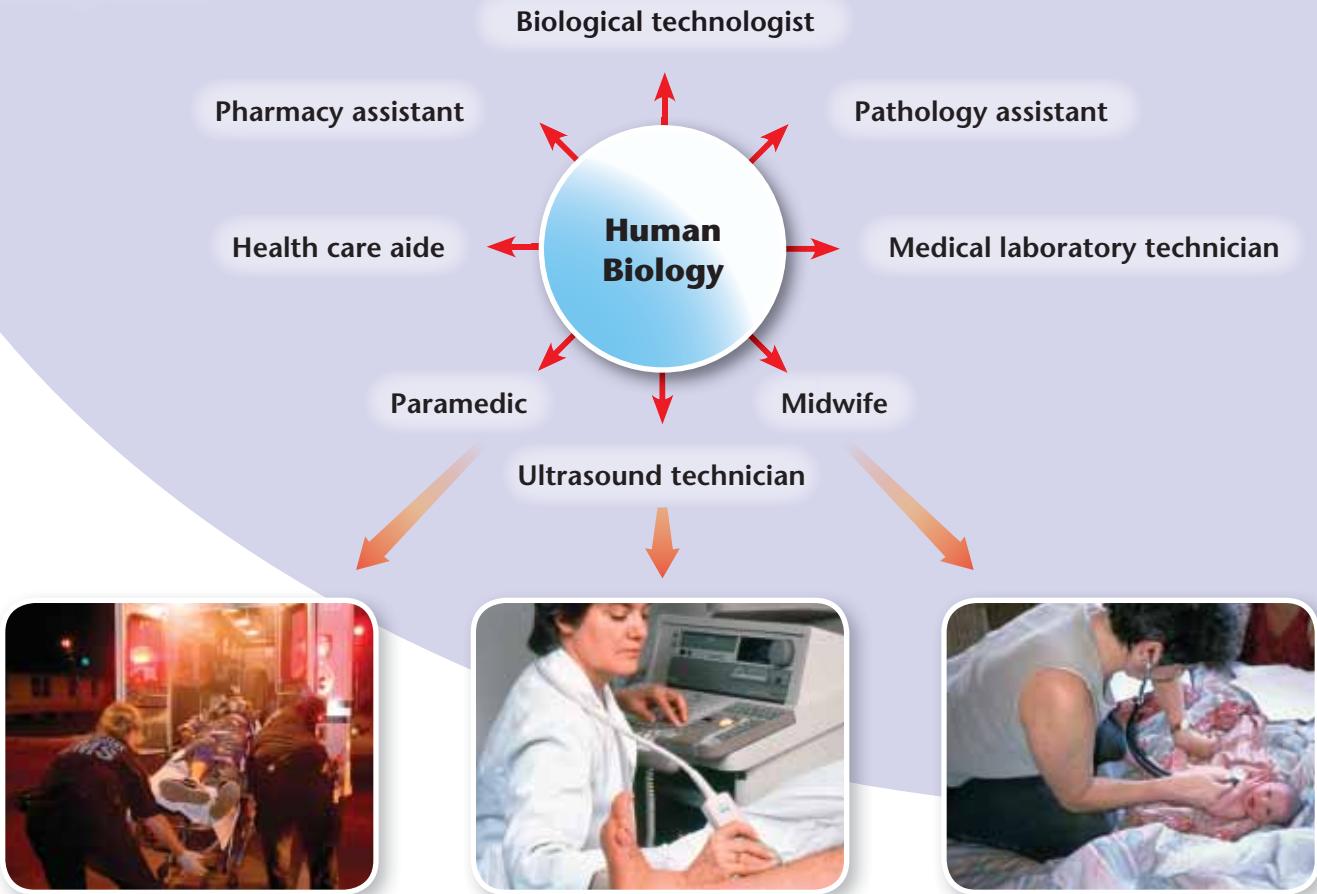
“The most important skill, in my opinion, would be communication with the patient. To get good X rays, you need to be able to communicate with the patient in a way that they understand what you want, so that they position themselves in a way that you can get a good picture. This can be a very big challenge in a cosmopolitan city where many people are not fluent in English. You have to be prepared to use non-verbal ways of communicating, to point and show them what you need.”

### What do you enjoy most about your work?

“I personally like problem-solving. Sometimes patients come to you in a cast which is not removable and the surgeons want to see a specific part of the bone and you have to find a way to manipulate your equipment to get the view that you’re looking for.”

# Put Science To Work

The study of human biology contributes to these careers, as well as many more!



- ▲ Paramedics work for ambulance services. They respond to emergency calls, complete initial patient diagnosis, provide emergency treatment, and safely convey patients to the hospital if necessary.
- ▲ Ultrasound technicians use ultrasound medical imaging technology to generate images used to diagnose and assess medical conditions.
- ▲ Midwives deliver babies in hospitals, birthing centres, and private homes. They care for women during pregnancy and act as labour coaches. They also offer care to new mothers and infants.

## Over To You

1. If you could interview Masood Hassan, what questions would you ask him about his work?
2. Why is it important for a radiological technologist to understand human biology?
3. Research a career involving human biology that interests you. If you wish, you may choose from the list above. What are the essential skills needed for this career?



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