



Teaching Notes

Section 1.0 – Living things share certain characteristics and have structures to perform functions.

1.1 – The Characteristics of Living Things

When trying to determine what is living and non-living, most scientists agree on these **six characteristics** that are common to all living organisms:

Organization - Living organisms are made of cells

Energy - Living organisms need energy

Environment - Living organisms respond and adapt to their environment

Reproduction - Living organisms reproduce

Growth - Living organisms grow and develop

Wastes - Living organisms produce wastes

Cells

The cell is the **basic unit of life**. It can perform all the processes that allow life to happen. All organisms are made up of at least one cell and every cell comes from another cell.

Energy

Energy is the ability to make things move and change. Everything that an organism does needs energy. Energy is obtained from the environment. Plants and animals differ in how they obtain their energy. Plants use the energy of the sun to make their own food, whereas animals get their food from the environment around them. **Nutrients** are substances that provide the energy and materials that organisms need to grow, develop, and reproduce. All of the processes that occur inside the organism to sustain its life are called the organism's **metabolism**.

Responding To The Environment

A **stimulus** is anything that causes a response in an organism. The organism's reaction to this stimulus is called a **response**.

Growth and Development

Organisms have the ability to replace some cells that are worn out or damaged. As organisms grow and develop their body size and shape can change. This is called **development**.

Reproduction

All living things come from other living things. **Reproduction** is not necessary for the organism to survive (because it will eventually die), but it is necessary for the species to survive.

Spontaneous generation was mistakenly thought to explain how living things could come from non-living things (eg. flies from meat). http://www.kent.k12.wa.us/staff/rlynch/sci_class/chap01/spontaneous.html

Adaptations

An adaptation is a characteristic that allows an organism to survive in its environment. Organisms adapt to their environment for survival. There are two types of adaptations:

- structural – in which organisms have a structural feature that is a part of them that enables them to adapt
- behavioral – is an action the organism does to survive



Unit 2 - Cells and Systems

Notes

1.2 – Structure and Function

Organisms have developed many different ways of doing the things that keep them alive. The structures (body parts) they have developed to perform these tasks have different functions.

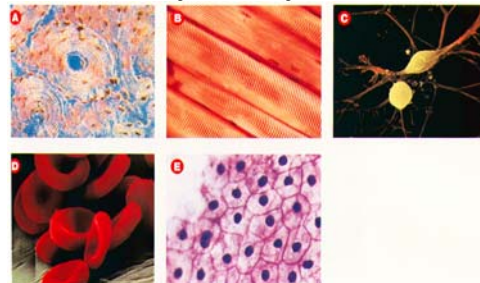
Spiracles are holes on the sides of the abdomen on some insects. The insect can adjust the size of the spiracle to control the amount of air entering their body.

http://users.rcn.com/jkimball.ma.ultranet/BiologyPages/T/Tracheal_Breathing.html

Different cells have different *structures and functions*: (from Science Focus 8)

Type of Cell	Shape (Structure)	Function
Muscle	Elongated and tapered on either end	Move parts of the body
Skin	Flat and thin, brick-shaped or honeycomb	Fit closely together to form a continuous protective layer
Nerve	Long branched fibers running from the main part of the cell	To carry nerve signals from one part of the body to another
Blood	Thin, disc-like	Carry oxygen in the bloodstream (giving them a large surface area to collect oxygen)
Bone	Thick, mineral matrix	To provide support

Can you identify each?



Different Structures For Similar Functions

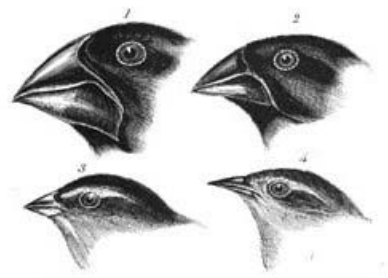
All organisms have to perform certain tasks or functions to stay alive, but different plants and animals have developed different structures for doing similar functions.

Function	Plant	Animal
moving	Most plants don't move from place to place	wings, legs, fins, tails
food gathering	roots	claws, hands, tentacles, mouths, tongues
breathing	leaves, needles	gills, lungs, spiracles, skin

Variations In Structure

Similarity in structure with some variability can be seen among animals living in the **Galapagos Islands**. Charles Darwin studied many of the animals on the Galapagos Islands and determined the '*Origin of the Species*' as a result of his observations. Darwin's 13 closely related species of finches have different bill structures to perform the function of gathering food.

Variations In Bill Shape



Bill Type	Describe the best type of feeding each bill is adapted to ...
Finch 1	_____
Finch 2	_____
Finch 3	_____
Finch 4	_____

1.3 – Organs and Organ Systems

Use the **Body Systems Summary Sheet** for this subsection.

Access the sheet using this link: <http://www.edquest.ca/Notes/bodysystems.pdf>

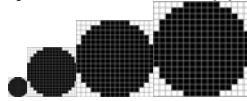


Section 2.0 – Cells play a vital role in living things

2.1 – The Microscope Extends the Sense of Sight

A World Too Small To See ...

- when an object is made to appear larger than it's actual size, it is said to be **magnified**..



Introducing the Compound Microscope

A microscope magnifies (enlarges) the images of small objects. With the aid of a microscope 'invisible' becomes 'visible'.

Early Microscopes ...

- micro-organisms were first discovered by **Anton van Leeuwenhoek**. His hobby of grinding lenses led him to eventually make the first simple microscope to study blood samples, pond water and plaque (which he scraped from his teeth) The organisms he found – that were single cells – he called '**animalcules**'
- **Robert Hooke** was also experimenting with microscopes he had built to look at different things, such as a tiny piece of cork. The small holes that were honeycombed were described as 'little rooms or boxes' and the word **cellulae** was used to name them (Latin form of 'cell').

Peeking Inside

Microscopes come in many shapes and sizes. Fiber optics is a technology that allows light to travel down a flexible tube. Medical researchers now use fiber optics to create microscopes that can be used to see inside the body and to assist in locating operating regions that help surgeons do their work more effectively.



Identify the parts, function and handling hints of the **Compound Light Microscope**
(SIA p. 101)

Technology improvements have lead to the development of compound light microscopes (2000X magnification) and electron microscopes (2,000,000X magnification).

There are two types of electron microscopes:

- **TEM** (transmission electron microscope) and
- **SEM** (scanning electron microscope)

The microscope has become a valuable tool for the investigation of the microscopic world

Preparing Slides

Preparing a Wet mount

- Gather all the materials you need (a clean glass slide and cover slip, an eyedropper, tweezers, a small amount of water and your specimen)
- Pick up the slide properly (touching only the edges and ends)
- Use the eyedropper to place one drop of water on the center of the slide and place your specimen (using the tweezers) right side up on the drop.
- Pick up the cover slip (using the tweezers) and lower it slowly over the specimen (try to avoid getting air bubbles).

Preparing and Viewing a Cell Specimen

- Remove a single layer of the specimen (placing it very carefully on the slide and try to avoid getting air bubbles between the specimen and the slide).
- Continue following the procedures for **preparing a wet mount**.



2.2 – The Cell Is The Basic Unit of Life (<http://library.thinkquest.org/3564/?tqskip=1>)



(Student Resources)

Looking At Cells

A cell is the basic unit of life, because their individual cells carry out all the functions carried out by living things. Two scientists (Matthias Schleiden and Theodore Schwann) who studied cells combined their observations to make a hypothesis ... **all living things are made up of cells.**

Rudolf Virchow contributed his observation and together the **Cell Theory** was formulated:

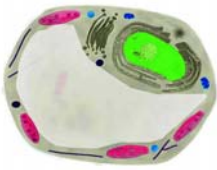
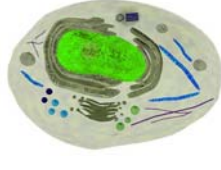
- all living things are composed of one or more cells
- cells are the basic units of structure and function in all organisms

When viewed with a compound light microscope these cell structures become visible to the naked eye. There are certain factors that can affect what you are able to see inside a cell.

These factors are:

- The type of microscope you use
- The power of the lenses
- The quality of the prepared slides

All cells, plant and animal, have structures and each structure performs a specific function in order for the cell to maintain life. The specialized structures inside the cell are called **organelles** and they carry out specific functions.

<p>Cell Structures</p> <p>Check out the Virtual Cell Tour</p>	Plant Cell	Animal Cell
		
Cell Membrane 'Controlled Gateway'	- surrounds and protects the contents of the cell (looks like a thin line surrounding the cell)	
Cell Wall 'Frame'	- are much thicker and more rigid than membranes, providing support for the plant or fungi (a rigid frame-like covering that surrounds the cell membrane)	
Cytoplasm 'Kitchen'	- distributes materials to different parts of the cell (a liquid inside the cell, which has grainy-looking bits in it)	
Nucleus 'Command Center'	- controls the cell's activities (a fairly large, dark, spherical structure that's usually near the center of the cell)	
Vacuoles 'Storage Rooms'	- is a membrane-bound sac acting as a storage space for surplus food, wastes and other substances the cell is unable to use immediately (clear, liquid-filled spaces in various places within the cytoplasm)	
Chloroplasts 'Solar Panels'	- are the structures in which photosynthesis takes place (greenish structures found only in a plant cell)	
Mitochondria 'Powerhouse'	- chemical reactions occur that convert energy into useable forms (small circular structure with little stringy bits inside)	

Cell Size and Function

To carry out their work, cells need a constant supply of materials, such as oxygen, water and food particles and they also need to get rid of waste products, all these materials must pass through the cell membrane, most cells fall into a very narrow range of size between 10 - 50 micrometers (um)

Cells Work Together

The cells of an organism all work together to help perform the various functions that need to occur if the organism is to live. The specialized cells of the body perform task that enable the organism to survive despite the actions and or habits it is involved in on a daily basis.



2.3 – Organisms Can Be Single-Celled or Multicellular

Unicellular VS Multi-cellular

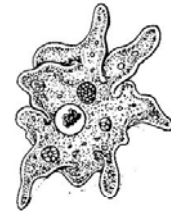
Multi-cellular organisms can:

- live in a wide variety of environments
- grow very large
- obtain their energy from a wide variety of foods
- have complex bodies
- specialize functions and work in harmony with other cells

Common Unicellular Organisms

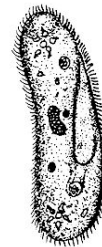
Amoeba

Amoebas are common unicellular organisms that live in water. They move around using foot-like projections called **pseudopods** (*false feet*). They extend a pseudopod and the cytoplasm fills it. They also use their pseudopods to capture food by surrounding it between two pseudopods and absorbing it.



Paramecium

Paramecium move swiftly through the fresh water where they live. They are covered in hair-like structures called **cilia**, which move back and forth like little oars, moving it through the water. Cilia also help gather food, by channeling the food to an **oral groove**, which is also lined with cilia, sweeping the food into the cytoplasm forming a food vacuole.



2.4 – How Substances Move Into and Out of Cells

The Cell Membrane

A cell membrane allows some substances to enter or leave the cell, while stopping other substances. It is a **selectively permeable membrane**. (A **permeable** membrane allows all materials through, while an **impermeable** membrane does not allow anything through)

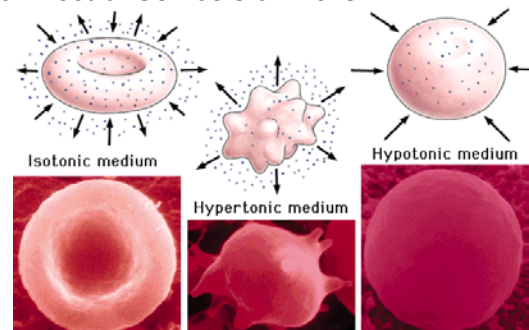
Diffusion

The structure of the cell membrane controls what moves in or out of a cell. Particles - moving in all directions, bumping into each other, eventually spreading out evenly throughout the cell (**diffusion**). Diffusion plays a part in moving substances into and out of a cell. **Concentration** determines the direction that a substance takes through the cell membrane – particles move from higher concentration areas to lower concentration areas (equal concentration allows the movement of particles in and out equally – whereas, a higher concentration of particles on the inside of the cell will move to an area of lower concentration on the outside (so movement will only occur from inside to outside) – until there is a balance.

Osmosis

The **diffusion of water through a selectively permeable membrane** is called **Osmosis**. Water helps to dissolve many of the substances involved in cell processes. When water is lost (moves out of the cell) it leaves behind a high concentration of the dissolved substances – when water moves back into the cell, the substances become more diluted and can be used by the cell for its life functions.

The Effect of Osmosis on Cells





2.5 – Cells In Multicellular Organisms Combine To Form Tissues, Organs and Organ Systems

Cells Reproduce

Cells with the same structure and function form **tissue**

Tissues form **organs**

Organs work together in **organ systems**

Systems work together to form an **organism**

Tissues

Tissues are groups of similar cells that work together, having similar structure and function.

(Remember the chart 'Structure and Function of Specialized Cells' in Section 1.2)

Plants require a large supply of water to make sugars in the process of **photosynthesis**. A group of cells, that perform similar functions, are called **tissue**. The transportation of nutrients is the role of plant tissues.

- **Vascular tissues** connect the roots to the leaves.
- **Phloem Tissue** transports sugars manufactured in the leaves to the rest of the plant.
- **Xylem tissue** conducts water and minerals, absorbed by the root cells, to every cell in the plant.

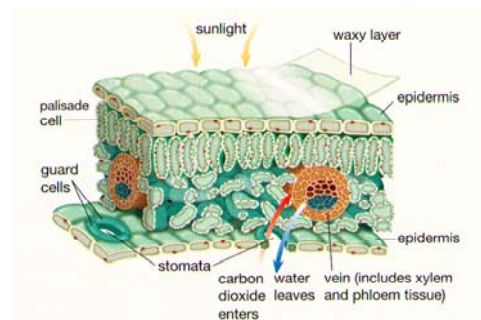
** Xylem and Phloem tissue usually occur together, along the length of plant stems and roots*

From Root to Leaf

The root system contains fine ' **root hairs** '. These hairs are extensions of epidermal cells (which protect the outside of the plant). When the concentration of water is greater on the outside of these ' root hairs ' then water can pass through the membrane by osmosis – which continues from cell to cell, until it reaches the xylem tissue. The tube-shaped xylem cells then move the water by a build up of water pressure in the root hairs (high pressure to low pressure) forcing the water up the xylem tissue, like water up a straw, into the stems and leaves.

Leaves are the plant's food-producing organs (this is where **photosynthesis** takes place).

Photosynthesis takes place in the layer of cells that contain **chloroplasts** (these cells are called **palisade cells**). They are thin, allowing a large amount of light in (large surface area), and enabling the gases (in the air) to diffuse into the leaf cells.



The tiny openings, called **stomata**, allow air to enter the leaf (supplying oxygen for respiration and carbon dioxide for **photosynthesis**). The spaces between leaf cells allow the air to flow and the **guard cells** open and close the stomata.

Transpiration

The loss of water (in a plant) happens through evaporation and is called transpiration. It is not a problem, unless, the plant loses too much water and doesn't replace it by the roots.

The movement of water throughout the plant happens because of the differences in pressure – high pressure in the root hairs to lower pressure in the leaves – (pushing and pulling water throughout the whole plant)

Organs

Each organ is made up of several tissues all working together. They are distinct structures in the body that perform particular functions. (Plants have organs as well – roots, stem and leaves)

Systems

Organs work together to perform activities that help the organism function as a whole. Plants typically have two systems (root system and shoot –stems and leaves – system). A reproductive system (flowers, fruits and seeds) is often produced at certain times as well.



Section 3.0

- Healthy human function depends on a variety of interacting and reacting body systems. -

Virtual Body <http://www.medtropolis.com/VBody.asp>

Body Systems (Student Site) http://www.stcms.si.edu/hbs/hbs_student.htm

Science Flash Movies <http://www.brainpop.com/science/seeall.weml>

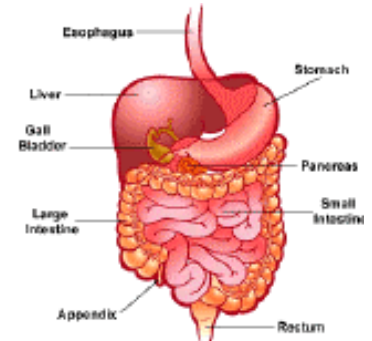
Human Body Links (Research on all Systems) <http://edtech.kennesaw.edu/web/humanbo.html>

3.1 – Digestive System

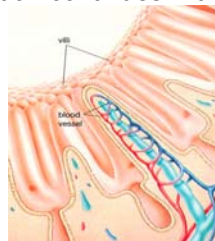
Food enters your body through the mouth and then passes to the stomach and intestines. It is broken down along the way into usable, soluble particles that can be used by different cells. (Figure 3.2)

There are two types of digestion:

- **mechanical digestion** involves the physical breakdown of food into useable pieces.
- **chemical digestion** breaks down the smaller pieces using **enzymes**



Digestion begins in the **mouth** with the mechanical breakdown of food. **Saliva** (produced by the salivary glands) mixes with the food to make it easier to swallow. **Salivary amylase**, an **enzyme**, begins the chemical digestion process by breaking the large starch molecules into smaller sugar molecules. The **epiglottis** is a flap of skin that covers the windpipe so that food will not enter the lungs. The food is pushed down the **esophagus** by contractions of muscle tissue. This is called **peristalsis**. The stomach churns the food mixing it with gastric juices (composed of mucus, hydrochloric acid, water and digestive enzymes). The **mucus** helps to protect the stomach from digesting itself. The food then enters the **small intestine** where chemical digestion continues with digestive enzymes added from the pancreas.

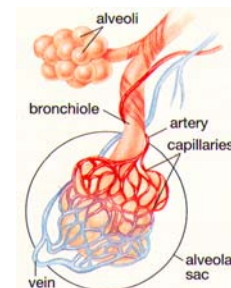


The inner surface is covered with **villi**, which increase the surface area for absorption of the nutrients that have been digested. **Microvilli** further this absorption of nutrients. In the **large intestine**, digestion is complete and those nutrients that have not been absorbed are formed into **feces**, which collect in the **rectum** and release from the body through the anus.

3.2 – Respiratory System

Breathing is the process, which moves air in and out of the lungs. The **diaphragm** muscles cause the air to be pushed out of and pulled into the lungs.

Diffusion occurs between the **alveoli** (tissues of the respiratory system) and the **capillaries** (tissues of the circulatory system)

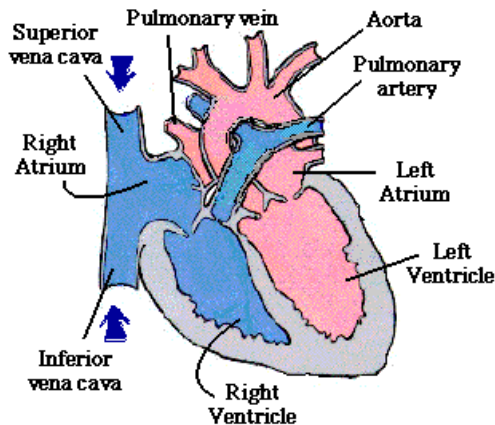




3.3 – Circulatory System

Transports food and gases throughout our body.

The Heart



Arteries, Veins, and Capillaries

The blood vessels that carry blood away from your heart and transport it to all part of the body are called **arteries**.

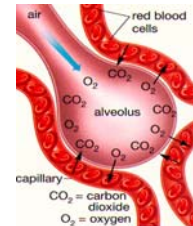
The blood is returned to the heart from all parts of the body by the **veins**.

Arteries and veins are connected by **capillaries**, which allow the exchange of nutrients and gases.

Capillaries have two adaptations for this:

- they are made of specialized epithelial tissue that is **only one layer thick**
- they are **very narrow** so that blood cells must pass through in single file

Oxygen goes from the alveoli to the capillaries and **Carbon Dioxide** goes from the capillaries to the alveoli



Blood - The Body's Transportation System

The blood vessels of the circulatory system form a complex network linking the outside environment with the internal environment of the body. The blood supplies all the living cells in the body with the nutrients they need to carry out their functions. The circulatory system must work closely with the respiratory system (which supplies the oxygen) and the digestive system (which supplies the nutrients)

(Composition)

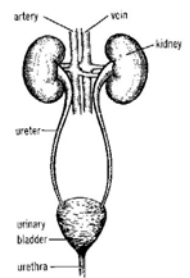
About 8% of an adult's body weight is blood, made up of:

Component	% of blood (by volume)	Main Function
plasma	55%	carries nutrients, waste products, hormones, and blood cells
red blood cells	44%	carries oxygen (because they have hemoglobin – an iron- rich chemical, which attracts oxygen)
white blood cell	less than 1%	defends the body against infection and disease
platelets	less than 1%	causes the blood to clot (thicken) at site of wounds to prevent blood loss

3.4 – Excretory System

Waste removal in the body is done through the organs of the **excretory system**. (The respiratory and circulatory systems also assist in the process) **Ammonia** is a chemical waste that the body produces when cells break down protein. The **liver** converts the ammonia to a less harmful substance called **urea**. The urea is carried to the kidneys, where it is mixed with water, and other salts to produce **urine**. The urine is transported to the bladder through the **ureter** tubes. The **bladder** expands and then releases the urine out through the **urethra**.

The **skin** also gets rid of waste (excess salt that the body does not need). This process, called '**sweating**' also keeps you cool.

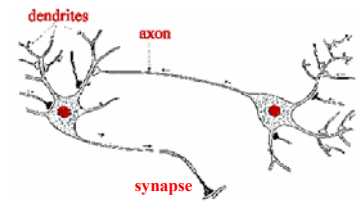


Urine can reveal diseases – That is why you often take a urine test for a doctor to determine if certain processes in the excretory system are functioning properly. (See Section 4 Notes)



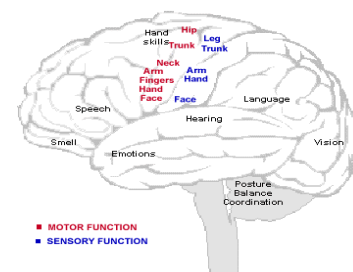
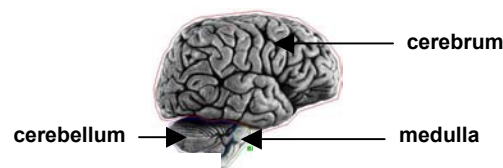
3.5 – Nervous (Sensory Awareness) System

Nervous tissue is made entirely of specialized cells called **neurons**. A neuron's job is to *send and receive messages*. Small branches in the neuron, called **dendrites**, *receive messages*, which then pass them on through the cell body to the axon. The **axon** then *passes the messages on* to neighboring dendrites at a **synapse**.



The nervous system consists of two main divisions:

- the **central nervous system**, which is composed of the brain and the spinal cord
- The brain receives stimuli from the outside world through sensory organs in the body. Internal stimuli are also received from inside the body. It reacts to all this stimuli and responds appropriately. The brain is divided into three main sections:



The **spinal cord** connects the brain to the peripheral nervous system. It contains **interneurons**, which connect one neuron to another.

- the **peripheral nervous system** is made up of the cranial (head) and spinal nerves, which travel to all parts of the body

Sensory neurons carry information from the body to the central nervous system. **Motor neurons** carry information from the central nervous system to the muscles and organs. The responses to these stimuli can be *automatic* (autonomic nervous system) or *voluntary* (somatic nervous system).

The nervous system allows each of the systems of the body to respond to changing conditions and make adjustments in order to maintain a stable internal environment, allowing the cells to function properly.

The Reflex Response

Sensory and motor nerves work together, sometimes not involving the brain. This is known as a **reflex**.

- Quivering muscles generate heat.
- 90% of heat loss is through the skin (most of the rest is through the lungs).
- Hairs on the skin stand on end when the tiny muscle cells near the surface contract, creating '*gooseflesh*' (goosebumps)
- Fluffing body hair (in animals with thick fur) reduces heat loss by improving insulation
- Feeling flushed (red and hot) happens because tiny blood vessels in the skin expand, which increases blood flow. Sweating helps cool down your body as moisture evaporates from the skin surface.

The nervous system helps to keep your body temperature stable by monitoring conditions outside, using temperature receptors in the skin. The information is then transmitted to the **hypothalamus** (section of the brain which regulates body functions), which then decides what action needs to be taken – increasing activity to raise the temperature or, reduce it to prevent heat loss.

Response to stimuli is coordinated by the nervous system (brain, spinal cord and nerves) and the **endocrine system** (glands that produce **hormones**).



Section 4.0

Scientific investigation leads to new knowledge about body systems and new medical applications

4.1 – Developing A Theory For Disease

If you lived in before the 17th Century, chances are that a simple cut or broken bone would have killed you. This is because of infection and the lack of knowledge about cleanliness.

The First Vaccine

In the late 1700's **Edward Jenner**, an English country doctor, developed the first vaccine. He noticed that milkmaids who had cowpox (a mild form of smallpox) did not get smallpox. He began infecting people with cowpox so that they would become immune to smallpox, and it worked – the first **vaccine** was created. The last case of smallpox reported was in 1979.

Watch Out Germs!

Louis Pasteur was the first person to identify living micro-organisms as “germs”. He suggested, and later proved his theory that these germs were the cause of most infectious diseases. The process of heating food, to kill the micro-organisms, worked. The process was called pasteurization and is still used today.

Cleaning Up The Germs

Once doctors knew that ‘germs’ caused disease, other discoveries followed. **Joseph Lister** determined that these germs were entering his patients wounds, so he introduced the practice of cleanliness and sterilization to surgery.

Nutritional Research

During the time of discovery, explorers would travel on ships for very long periods of time. The only foods they could take along were ones that wouldn't spoil. Many sailors developed **scurvy** as a result – with open sores, bleeding gums, loose teeth, and an unsteady gait. James Lind treated these sailors by feeding them oranges and lemons. It was later discovered that scurvy was caused by a lack of Vitamin C. Researchers have discovered that various diseases can be treated by proper dietary choices. **Canada's Food Guide** was developed to show people how much of certain types of foods are necessary to stay healthy.

4.2 – Factors That Affect The Healthy Function of Body Systems

Diet, exercise, drugs, injury and disease can affect body systems and how they perform their functions. Scientific Research has also determined that there are many factors, which can affect your cells, and consequently, your body systems.

These factors include:

- Diseases or conditions that are inherited from family
- Sensitivity (allergies) to environmental conditions; such as smog, pollen, dust, dairy products, or peanuts. Asthma is a condition, which reflects this kind of sensitivity.
- How you respond to physical, emotional and psychological stresses.
- How you treat your body in general – making healthy choices, instead of unhealthy choices

Disorders, which can hospitalize Canadians include:

- circulatory system (15%)
- digestive system (11%)
- respiratory system (10%).



Unit 2 - Cells and Systems

Notes

The **circulatory system** must work closely with the **respiratory system** (which supplies the oxygen) and the **digestive system** (which supplies the nutrients)

How the Respiratory and Circulatory Systems Connect

The respiratory system exchanges oxygen and carbon dioxide, while the circulatory system transports those gases throughout the body. The interaction between these two systems happens in the tissues of the lungs. Breathing (the exchange of gases) moves air in (inhalation) and out (expiration) of our bodies.

How the Digestive and Circulatory Systems Connect

The transfer of food particles, from the digestive system to the circulatory system, takes place at the inner lining of the small intestine, through millions of tiny, finger-like projections, called villi, which contain a network of capillaries. The transfer of food particles is possible because of absorption (the villi absorb the food particles from the capillaries and then transport the nutrients to the cells, to be used as fuel).

Factors Affecting the Respiratory System - SMOKING -

The Contents of Cigarettes

There are over 400 different chemicals in a cigarette. Tar, carbon monoxide, and nicotine are the most destructive. **Tar** is a sticky substance formed when the cigarette is burned. As it is inhaled, the tar settles on the surface of organs (lungs) and interferes with the function of the cilia (to move mucus out of the respiratory tract). **Carbon monoxide** is also released when the cigarette is burned and gets absorbed by the red blood cells, during gas exchange. Less oxygen is absorbed by the red blood cells, causing the heart to work harder and faster. **Nicotine** is an addictive drug that causes the heart to speed up, and raises the blood pressure. Besides smoking, **air pollution** and **industrial by-products** (coal dust) can lead to disorders of the respiratory system.

Disorders of the Respiratory System (Smoking-Related diseases)

If the lining of the lungs becomes inflamed, it can lead to **bronchitis** (which makes breathing more difficult), which can further lead to damage of the lung tissue, causing **emphysema** (shortness of breath), which is a permanent condition. **Lung cancer** is caused by the tar and smoke in cigarettes, which cause the lung cells to grow out of control (tumours are formed) and overcome healthy cells.

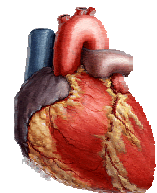
Factors Affecting the Circulatory System

Certain conditions place people at greater risk of contracting a circulatory system disorder:

- **Smoking** (nicotine causes blood vessels to constrict, increasing the heart rate and raising blood pressure – carbon monoxide competes with oxygen in the lungs, reducing the blood's ability to carry oxygen)
- **Poor diet** (may produce a **high Cholesterol (a lipid – 'fat') level**. Too much of a type of food that has a high content of fat will cause a build-up of cholesterol in the walls of the arteries. This build-up, called **arteriosclerosis**, makes it more difficult for blood to flow and can lead to a **heart attack**.)
- **Little exercise** (makes fatty deposits increase, because the nutrients are not used up completely.)

A Healthy Circulatory System

The heart circulates the blood throughout the body by pumping it to where it can supply nutrients and remove wastes.



Blood – The Body's Transportation System

The blood vessels of the circulatory system form a complex network linking the outside environment with the internal environment of the body. The blood supplies all the living cells in the body with the nutrients they need to carry out their functions.



Unit 2 - Cells and Systems

Notes

About 8% of an adult's body weight is blood, made up of:

<u>Component</u>	<u>% of blood (by volume)</u>	<u>Main Function</u>
plasma	55%	carries nutrients, waste products, hormones, and blood cells
red blood cells	44%	carries oxygen (because they have hemoglobin – an iron- rich chemical, which attracts oxygen)
white blood cells	less than 1%	defends the body against infection and disease
platelets	less than 1%	causes the blood to clot (thicken) at site of wounds to prevent blood loss

Disorders of the Circulatory System include: **high blood pressure** (hypertension), heart attacks (damage to heart muscle) and High blood pressure, or **hypertension** ('*the silent killer*') can lead to **strokes** (brain damage).

Measuring Blood Pressure

The device used to measure blood pressure is called a **sphygmomanometer** (an inflatable cuff wrapped around the arm, with a pump attached – which is used to inflate it). The blood flow is slowed and then listened to by a doctor, with a **stethoscope**.

Blood pressure indicates:

- The volume of blood
- Heart rate
- Artery size
- Artery elasticity
- Blood viscosity

Factors Affecting the Digestive System

Food provides nutrients in the form of carbohydrates, fats, proteins, vitamins, minerals and water – which provide energy and materials used for growth, development and repair. Some foods cause poor health and promote disease (like refined sugar and low fibre foods) if consumed in large quantities over long periods of time. Starch and sugars are carbohydrates and provide the body with its main source of energy. Fats are also essential in our diet, providing us with energy and cushioning the internal organs from shock. Proteins are essential for growth and repair of body tissues. Minerals and vitamins are also needed for good health.

Disorders of the Digestive System

Painful **ULCERS**; sores on the lining of the stomach, originally thought to be caused by stress, are caused by *H. pylori* (*Helicobacter pylori*), a bacteria present in the stomach..

High fibre diet is important, the fibre is used by the colon to process waste materials. Low-fibre can irritate the colon wall and lead to **colon cancer**.

Long-term stress, smoking, excessive use of alcohol or aspirin can lead to a **peptic ulcer**.

Healthy Life Style

Proper care means maintaining healthy organs and organ systems. This can be accomplished with clean air and water, nutritious foods, exercise and sleep. This is a healthy lifestyle, which makes you feel better and helps your body resist disease. Your immune system will work best when you are well fed and rested.