

**GRADE 4**

**TEACHER BACKGROUND INFORMATION**

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**GROWTH AND DEVELOPMENT**

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# THE DIGESTIVE SYSTEM

Digestion begins in the mouth, where food is broken down by the teeth and the enzyme action of the saliva. The muscular tongue guides food to the site of the teeth, the incisors cut, the canines tear and the molars grind. By the time food reaches the mouth, secretions of saliva have been increased. This occurs as thoughts of food signal the brain to send impulses to the salivary glands. Secretion from these glands is continuous to keep the mouth moist and ready for food.

Solid foods become a semi-liquid mass as a result of the action of teeth and saliva. Swallowing pushes the food mass into the first part of the esophagus called the pharynx or throat. The pharynx is a passageway for both air and food. The food travels from the pharynx down the esophagus to the stomach. The act of swallowing signals the air passages of the pharynx to be sealed off so that food does not enter the air passages.

The food is moved down the ten-inch esophagus by muscular contractions called peristalsis. As food enters the stomach, the secretion of digestive gastric juice begins. The gastric juice is secreted from the stomach walls and signals the churning action of the stomach to start. As food is churned it mixes with the enzymes of the gastric juice. The stomach wall is made up of proteins and protective mucus prevents it from also being digested.

The gurgling sounds often heard in the stomach are a result of trapped gases. These gases can also cause hunger pangs when they apply pressure to the walls of an empty stomach.

Some foods remain in the stomach for three to four hours while others may pass through to the small intestine in a few minutes. Foods like meat take longer to digest than soft drinks.

The food flows from the stomach to the small intestine. Neutralizing digestive juices from the pancreas and the liver arrive in the small intestine and act on the partially digested food now called chyme.

The pancreas is located behind the lower portion of the stomach. The

pancreatic juices neutralize acids and also digest fats, carbohydrates and proteins.

The liver is located under the diaphragm. Its functions include storage of vitamins, iron and blood sugar, regulation of blood sugar levels; and detoxification of poisons such as alcohol and old red blood cells. The liver also produces bile to digest fats and metabolize proteins. The gallbladder is a special storage place for bile on its way to the small intestine. The presence of fats in the small intestine stimulate the gallbladder to send secretions of bile.

The small intestine is responsible for the absorption of food nutrients into the blood and the lymph. The lining of the small intestine is made up of millions of tiny finger-like projections called villi. The villi and the folds in the lining greatly increase the absorption surfaces of the small intestine.

The villi also secrete intestinal juices which complete the digestion of fats, proteins and carbohydrates before absorption.

The process of absorption, through the villi takes two pathways. The blood picks up digested carbohydrates and proteins and delivers them to the liver, which in turn sends them to the body cells as they are needed. Digested fats are picked up by the lymph vessels and delivered to the tissues.

Remaining waste materials enter the colon or large intestine. Its function is to absorb water from the waste material. The appendix is a 3-4 inch structure at the beginning of the large intestine. It appears to have no function. The solid waste products found at the end of the colon are stored in the rectum and eliminated through the anus as feces.

Adapted from: Harvey, D and White, D (ed )  
*Body Systems and Physical Fitness*,  
Health Education Methods Project for Elementary  
School Teachers, Ottawa, Ont Health Promotion  
Directorate, Health and Welfare Canada, 1983

## PROBLEM CONDITIONS OF THE DIGESTIVE SYSTEM

<b>Problem</b>	<b>Cause</b>	<b>Brief Description</b>
choking	- can occur when a person is talking or laughing while eating	- the message to the pharynx becomes confused and the air passage is not sealed off, food enters air passage, breathing becomes difficult or impossible
constipation	- too little exercise, a diet low in fibre: emotional stress	- bowel movements are difficult and infrequent
diarrhea	- large intestine does not absorb enough water, infections	- bowel movements are watery, loose and occur too often
food poisoning	- food infected with harmful bacteria, unrefrigerated raw meat, salads	- severe vomiting, diarrhea, abdominal pains and fever, usually within 24 hours of eating infected food
gas/flatulence	- air or gas in intestinal tract - gas forming foods e g , onions, cabbage, turnips, members of bean family, seasonings - air ingested - indigestion	- may cause discomfort due to distention
heartburn	- stomach gases may escape into esophagus	- feeling of discomfort after eating
indigestion	- difficulty in digesting some foods - disease - change in diet or lifestyle	- abdominal pain or discomfort, heartburn, flatulence, nausea, vomiting may occur
appendicitis	- unknown	- swollen, inflamed and pus-filled small pouch of the large intestine surgical removal may be necessary
diabetes mellitus	- genetic and/or environmental predisposition, possible virus	- inability to make or utilize insulin to break down blood sugar - a controlled diet and/or insulin injections may be necessary

## PROBLEMS CONDITIONS OF THE DIGESTIVE SYSTEM (CONTINUED)

<b>Problem</b>	<b>Cause</b>	<b>Brief Description</b>
lactose intolerance	- genetic or dietary predisposition	- inability to breakdown component of milk - avoidance of milk may be necessary or a supplement to break down the milk
gallstones	- diet high in fats, low in fibre is suspected	- hard stone-like substances form in the gallbladder, may cause pain, fever and infection or pass through bile duct to be eliminated through digestive system - surgical removal of gallbladder may be necessary
haemorrhoids	- constipation, sedentary lifestyle, pregnancy, obesity	- swollen veins in the anal area may lead to itching, pain and bleeding
pinworms	- direct transfer of infective eggs by hand from the feces and anus to mouth by the same or a new host	- anal itching with disturbed sleep
ulcers	- many contributing factors are suspected poor diet, stress, heredity, too much caffeine, alcohol, tobacco, aspirin	- open sores in the lining of the stomach or duodenum - excess acid weakens the lining and bleeding, blockage or perforation can occur - or mucus secretion to neutralize acid may be inadequate

## WAYS TO CARE FOR THE DIGESTIVE SYSTEM

Positive health habits related to the digestive system include

- eating fresh, wholesome foods
- eating a proper balanced diet from the four food groups
- eating breakfast every day
- eating sparingly of sugar, salt and fat
- not eating junk food
- washing hands before eating or preparing food
- washing food
- drinking lots of liquids
- putting only food in the mouth
- not rushing meals
- not talking or laughing with food in mouth
- chewing food thoroughly (especially hard foods)
- washing pots and pans after preparing food

## OTHER DISEASES WITH WHICH STUDENTS MAY BE FAMILIAR

<b>Problem</b>	<b>Communicable</b>	<b>Cause</b>	<b>Brief Description</b>
AIDS	Yes	<ul style="list-style-type: none"> <li>- virus</li> <li>- spread from person to person usually by sexual contact</li> </ul>	<ul style="list-style-type: none"> <li>- break down of the body's immune system which makes the person susceptible to many different diseases</li> </ul>
arthritis	No	<ul style="list-style-type: none"> <li>- Unknown</li> </ul>	<ul style="list-style-type: none"> <li>- swelling and inflammation of a joint or joints causing pain and stiffness</li> </ul>
bronchitis	No/Yes	<ul style="list-style-type: none"> <li>- irritants</li> <li>- spread from person to person by direct contact</li> </ul>	<ul style="list-style-type: none"> <li>- an inflammation of the mucous membrane of the bronchi with fluid and thick mucus accumulation;</li> <li>- signals cold, hoarseness, coughing</li> </ul>
cancer	No	<ul style="list-style-type: none"> <li>- environmental, hereditary, biological factors</li> </ul>	<ul style="list-style-type: none"> <li>- normal body cells become malignant</li> </ul>
chicken pox	Yes	<ul style="list-style-type: none"> <li>- spread from person to person by direct contact, virus</li> </ul>	<ul style="list-style-type: none"> <li>- slight fever, headache, backache, loss of appetite, small red spots on the back or chest, spots enlarge and a vesicle of clear fluid appears, itchy</li> </ul>
common cold	Yes	<ul style="list-style-type: none"> <li>- spread from person to person by direct contact, virus</li> </ul>	<ul style="list-style-type: none"> <li>- upper respiratory infection, especially of nose and throat,</li> <li>- signals headache, runny/stuffed nose, watery eyes, fever, cough</li> </ul>
diabetes mellitus	No	<ul style="list-style-type: none"> <li>- genetic and/or environmental predisposition, possible virus</li> </ul>	<ul style="list-style-type: none"> <li>- inability to make or utilize insulin to break down blood sugar</li> <li>- a controlled diet and/or insulin injections may be necessary</li> </ul>
ear infection	Yes	<ul style="list-style-type: none"> <li>- environmental predisposition, virus, bacteria, spread from person to person by direct contact</li> </ul>	<ul style="list-style-type: none"> <li>- severe pain, fever, draining of the ear</li> </ul>
emphysema	No	<ul style="list-style-type: none"> <li>- smoking, pollution</li> </ul>	<ul style="list-style-type: none"> <li>- lung disorder in which the bronchioles become plugged with mucus, onset - 40-80 years old</li> </ul>
German Measles (Rubella)	Yes	<ul style="list-style-type: none"> <li>- spread from person to person by direct contact, bacteria</li> </ul>	<ul style="list-style-type: none"> <li>- slight cold, some fever, sore throat, lymph nodes swell, rash on face and scalp, then to body and arms, spots do not run together - rash fades in 2-3 days</li> </ul>

**OTHER DISEASES WITH WHICH STUDENTS MAY BE FAMILIAR (CONTINUED)**

<b>Problem</b>	<b>Communicable</b>	<b>Cause</b>	<b>Brief Description</b>
impetigo	Yes	- spread from person to person by direct contact, bacteria	- thin walled vesicle which ruptures and is covered by a honey-yellow crust, spreads in circles on exposed parts of the body
influenza (flu)	Yes	- spread from person to person by direct contact, virus	- fever, chills, headache, sore throat, cough, intestinal disorders, muscular pain
lice (pediculosis) (head lice)	Yes	- spread from person to person by direct contact	- visible white specks in the hairs of the back of the head, glands behind ears and back of the neck are enlarged, itching
meningitis	Yes	- spread from person to person by direct contact	- headache, vomiting, nausea, stiff neck, chills, fever, irritability, confusion and later convulsions
mumps	Yes	- spread from person to person by direct contact	- swelling of glands in the neck, pain, tenderness, fever, loss of appetite, back pains, headache
red measles	Yes	- spread from person to person by direct contact	- tired and uncomfortable, running nose, fever, pains in back and head, small white dots on the gums, rash at the hairline spreading down the body, spots may run together to form blotches
pneumonia	Yes	- virus, bacteria	- an infection of the lung tissue often accompanied by fluid, - signals breathing difficulty, fever and coughing
scabies	Yes	- spread from person to person by direct contact	- intense itching, more often at night, usually one month after initial infection
strep throat	Yes	- spread from person to person by direct contact, bacteria	- sore throat, headache, red pharynx, enlarged tonsils, flushed face
tuberculosis (TB)	Yes	- spread from person to person by direct contact	- mainly a disease of the lungs with development of lesions, - signals fever, weight loss, cough, sputum, blood, pain, difficult to breathe
tonsillitis	Yes	- spread from person to person by direct contact	- tonsils act as a defence against respiratory infections, signals include sore throat, enlarged tonsils, difficulty in swallowing