

Who Are Sam And Ella?

Lesson Guide	—
Digestive System	○
Food Additives	○
Metals and Chemicals	○
Bacteria	○
Viruses	○

Directions:

Work through all of the topics in the lesson guide, then continue to the activity and posttest.

The digestive system is one of three ways hazardous substances can enter the body. That's why **food safety** is very important!

There are a few rules of food safety that will minimize our risk of allowing the things we eat or drink to make us sick. These rules are the **3 C's** of Food Safety.

C l e a n	Always wash your hands after using the bathroom, handling uncooked foods and handling trash or waste of any kind. Thoroughly clean or peel raw fruits and vegetables. Trim fat from meats (pesticides are often found in fat).
C o l d	Cold food should be stored below 40 degrees Fahrenheit.
C o o k e d	Hot food should be cooked above 165 degrees Fahrenheit. NOTE: The best way to make sure that meat is cooked throughout is to use a thermometer. Once food reaches above 165 degrees Fahrenheit, you know that any bacteria present in the food has been killed. Food should also be served above 140 degrees Fahrenheit. When you serve hot food, you need to make sure it does not sit outside for too long. Otherwise, new bacteria may grow.

Observing the **3 C's** of Food Safety will help protect you from eating (and in areas without proper waste treatment facilities, drinking) things that might be hazardous to your health. Follow the links in the **lesson guide** on the left of your screen to learn more about how to reduce your risk of exposure.

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Food additives are ingredients added to foods to enhance their appearance or taste or to act as a preservative to reduce spoilage. Listed below are some common additives and symptoms if you have an allergic reaction.

Name	Symptoms	Prevention
Tartrazine (yellow food coloring)	Symptoms range from rashes to swelling to asthma and possibly even behavioral changes.	Avoid foods and medicines colored with tartrazine.
Monosodium Glutamate (flavor enhancer)	Symptoms that usually occur are headaches, tightness of the face, heating at the back of the neck, tingling in the fingers and arms, increased heart rate, and dizziness and intestinal discomfort.	It is safe for most people to consume, but avoid eating large amounts.
Sulfites (preservative)	Most frequently symptoms are wheezing, difficulty breathing, and chest tightness in patients with known reactive airway disease.	It is safe for most people to consume, but avoid eating large amounts.

Metals such as lead, mercury and arsenic and **chemicals** such as nitrates from fertilizers are important sources of environmental health hazards.

Lead poisoning can cause symptoms that range from a vague feeling of ill health (malaise) to vomiting, stupor and convulsions. Recent studies suggest that long-term exposure to lead may cause hypertension. Lead also affects behavior and academic performance in school. Extremely high levels of lead may cause headaches, abdominal pain, loss of appetite, constipation and decreased activity. The main route of poisoning is through the digestive system though lead can enter the body through the respiratory system.

Sources of Lead Exposure	Prevention Strategy
Air pollution	Use unleaded gasoline
Paint	Remove any lead-based paints
Soil	Wash hands frequently
Dust	Mop floors often
Drinking water	Run water for 2 mins. every morning
Old ceramic or pewter cookware	Avoid use
Some imported toys, crayons, cosmetics	Avoid use
Hobbies	Use and store properly
Parental occupations	Change clothes at work
Poor nutrition	High iron & calcium, low-fat diet

Mercury poisoning is most likely to occur as a result of eating methyl mercury-contaminated fish. Large marine (ocean) fish such as tuna, swordfish and shark are most likely to have elevated levels of methyl mercury because they eat other fish who may be contaminated. Symptoms of mercury poisoning vary widely, depending on the source and exposure however the nervous system and kidneys are usually affected.

Arsenic poisoning may occur not only through ingestion (eating or drinking it), but also by direct contact (touching it) or by inhalation (breathing it). A major use of arsenic is as a wood preservative. It is often found mixed with zinc and other metals

during mining operations and is also a common ingredient in pesticides and other poisons. Some of the common health effects of arsenic poisoning are nausea, vomiting, stomach pain, diarrhea, dizziness, weakness, excess salivation and listlessness. Arsenic can also cause Blackfoot disease, skin cancer, bladder cancer and lung cancer.

Nitrates themselves are not toxic to people, but infant's digestive systems are much more likely to contain bacteria that can transform nitrates into nitrites. Nitrites change the oxygen-carrying component of blood called hemoglobin into methemoglobin, a substance that does not carry oxygen. The result is **methemoglobinemia or blue-baby syndrome** where the infant turns blue and is deprived of oxygen. It is often fatal. The most common way for babies to ingest nitrates is through being fed formula that has been mixed with fertilizer-contaminated well water.

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Bacteria are blamed for causing a lot of different diseases. Not all bacteria are bad however. Listed below are some of the more common bacteria that cause illness and how to avoid them.

Name	Symptoms	Prevention
Salmonella (OK, so it's not really "Sam and Ella")	May experience mild or severe diarrhea, fever, and occasionally vomiting. Blood stream infections can be serious to the very young or to the elderly.	Avoid contaminating food with knives, cutting boards or utensils which have been in contact with raw meat, poultry, eggs, fish or dairy products. Some fruits and vegetables may also contain salmonella.
Shigella	Occurs mostly in summer or early fall as single cases or outbreaks. Recognized more often in young children. Experiences mild or severe diarrhea, often with fever and traces of blood or mucous in the stool.	Spread by eating or drinking contaminated food or water or by direct contact with infected person.
Campylobacter	Occurs mostly in summer months as single cases or outbreaks. May cause mild or severe diarrhea, often with fever and traces of blood in the stool.	Spread by eating or drinking contaminated food or water, or occasionally by direct contact with infected people or animals.
Escherichia coli (E. Coli)	Causes toxins that can cause diarrhea. Bacteria itself is mostly harmless. Severe diarrhea and abdominal cramps can occur with blood seen in the stool.	Acquired by eating food containing the bacteria. Avoid eating meat that is rare or inadequately cooked. Person to person transmission can occur if people do not wash their hands after using the toilet.
Vibrio cholera	Affects the intestinal tract. Mild to severe diarrhea, vomiting, and dehydration can occur.	Spread by eating or drinking food or water contaminated by the fecal waste of an infected person.

Yersenia enterocolitica	Usually occurs as a single isolated event. Occasional outbreak may occur due to common exposure. Mild or severe diarrhea, fever, and abdominal cramps. Sometimes infection may mimic appendicitis.	Spread by eating or drinking contaminated food or water or by direct contact with an infected person or animal.
Listeria	Generally infect specific locations within the human body, but may infect many different sites as well. Symptoms vary depending on where in the body parts. In most cases, Listeria infection causes fever and influenza.	Spread by several different methods. Ingestion of unpasteurized milk and contaminated vegetables. Transmitted from mother to fetus in-utero or directly to the fetus at the time of birth. Direct contact on the hands or arms, or sexual contact can also spread the bacteria.
Giardia lamblia	Occurs more often in institutional settings such as day care centers. May experience severe diarrhea, and fever is rarely present. Chronic diarrhea with significant weight loss occasionally.	Good hand washing practices is a way to prevent the bacterial disease. Beaver may be the potential source of Giardian lakes and rivers.
Staphylococcus aureus	Food poisoning. Nausea, vomiting, diarrhea, retching, abdominal cramping, and prostration are the most common symptoms. Headache, muscle cramping, and transient changes in blood pressure and pulse rate may occur in more severe cases.	It is contained in many food or food equipment that are not kept hot enough (60 C or above) or cold enough (7.2 C or below). Also, food handlers are usually the main source of contamination. The foods that are usually contaminated are meat and dairy products.
Bacillus cereus	There are two types of illness: diarrhea type and the vomiting type. Diarrhea type: basic symptoms are watery diarrhea, abdominal cramps, and pain occurs 6-15 hours after consumption of contaminated food. Emetic type: nausea and vomiting with abdominal cramps or diarrhea occasionally.	Avoid food mixtures such as sauces, pudding, soups, casseroles, pastries, and salads. The diarrhea type generally associated with meats, milk, and vegetables. The vomiting type generally associates with rice products.

Clostridium perfringens	Diarrhea and gas pains which begin between 6 and 24 hours ingestion and last approximately 24 hours.	Caused frequently by poor temperature control. Also cause by small numbers of the organism that are usually present in foods.
Clostridium botulinum	Produce symptoms that affect the nervous system of an infant. Other symptoms include blurred or double vision, general weakness, poor reflexes, difficulty swallowing and sometimes death. Symptoms usually appear 12-36 hours after ingestion, but may take up to several days.	Avoid improperly processed canned foods that causes toxin formed in food.

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Viruses are the smallest known disease-causing microorganisms. Viral infections can be spread in many different ways. Following the rules of food safety will help prevent infection by some viruses but not by others. The list below shows how to minimize your risk of being infected by some common viruses.

Name	Symptoms	Prevention
Chicken pox	Characterized by an itchy rash, forming blisters that dry and become scabs. Fever and listlessness are also common.	Avoid affected individuals. It is highly contagious. A vaccine is available.
Epstein-Barr	Fatigue, fever, sore throat, and swelling of the lymph nodes and spleen.	Avoid oral contact (kissing) with affected persons. A vaccine is available.
Hepatitis A	Jaundice (yellowing of the skin), weakness, brownish urine, lack of appetite, and low-grade fever.	Avoid fecal-contaminated water due to poor sanitation and/or poor hygiene and poorly cooked food. No vaccine is available but a shot of gamma globulin increases resistance.
Hepatitis B	May have the virus without having any symptoms. Common symptoms include fatigue, loss of appetite, weakness, fever, nausea and vomiting. Can cause liver failure and death.	Avoid contact with the blood of or any sexual contact with infected persons. A vaccine is available.
Herpes	There are two strains of this virus: one causes cold sores around the mouth and the other causes blisters in the genital region; usually accompanied by flu-like symptoms.	Avoid direct contact with a cold sores or contact with infected fluid from the genitalia.
HIV	Causes AIDS (Acquired Immune Deficiency Syndrome), a condition where the bodies immune system is impaired. Can cause death.	Avoid sexual contact with or contact with the blood of an infected person.
Influenza	There are many strains of influenza but common symptoms include fatigue, loss of appetite, weakness, fever, nausea and vomiting. Influenza is sometimes fatal.	Highly contagious. Spreads through the air or by direct contact. Vaccines are available.

Measles	Causes a rash and high fever. In severe cases it leads to death through pneumonia, diarrhea or malnutrition.	Avoid the coughing or sneezing of an infected person. A vaccine is available.
Norwalk	Symptoms include nausea, vomiting, diarrhea and abdominal pain. May also cause low grade fever and headache.	Avoid contaminated water, foods and/or persons already infected. Avoid eating raw or partially cooked clams and oysters.
Polio	It can cause paralysis.	Take the polio vaccine.
Rabies	Attacks the nervous system causing general malaise, restlessness and inability to swallow. It is almost always fatal once symptoms have begun.	Avoid bites of an infected animal. It is suspected that transmission through the air is possible. A vaccine is available.
Rubella	Rash, slight fever, enlarged lymph nodes and headache. It can cause birth defects such as heart problems and deafness if contracted by a pregnant woman during the first 3 months of pregnancy.	Avoid afflicted individuals. A vaccine is available.
Yellow Fever	Symptoms include yellow skin and black vomit. It is often fatal.	Get vaccinated if traveling abroad. Spread by mosquitoes living close to populated areas.

