

Digestive System

Teacher Information



Description

Activity 15a – Digestive System

Station lab activity that has students investigate the organs, histology, diseases, and characteristics of the digestive system. The length of the digestive system will be simulated with string, the time from swallowing until it reaches the stomach will be measured, and a simulated fecal occult blood test will be performed. Charts/information are provided for each station.

Activity 15b – Bacteria in Food

Lab activity in which students observe the amount of bacteria that develops in yogurt or milk left out for different periods of time. Students act as a family physician educating a patient on the importance of refrigeration to deter bacterial growth in milk products.

Activity 15c – What's in Your Food

Lab activity that has students investigate nutritional facts, choose a favorite meal, and measure out the amount of fat, salt, and sugar in their favorite meal. Meals are then compared among the class.

Objectives

1. Describe the structure and function of the organs in the digestive system.
2. Explain the common causes, symptoms, and diagnostic tests for digestive disorders.
3. Recognize the functional histology of different parts of the GI tract.
4. Explain the importance of refrigeration and heating for certain food sources.
5. Describe the common symptoms and causes of foodborne illness.
6. Compare and contrast the nutritional value of a healthy versus unhealthy meals.

Time: *Dependent on Activity*

Activity 15a: 60-90 minutes

Activity 15b: 30-45 minutes

Activity 15c: 30-45 minutes

Materials *Supplies needed for 10 lab groups or 40 students*

Supply	Provided (P) or Needed (N)	Quantity	Company/Item #	Approximate Cost
15a. Digestive System				
Digestive system chart	P	4	HASPI	Cost of copies
Digestive histology/pathology chart	P	4		
Digestive disease chart	P	5		
Ruler	P	10		
Fecal Occult Test Sheet <ul style="list-style-type: none"> Using a cotton swab, treat the circle on each test sheet with phenolphthalein; allow to dry 	P	40	HASPI (template) Carolina/879963 (phenolphthalein)	Cost of copies \$5.10
Stool samples A & B <ul style="list-style-type: none"> Sample A - equal parts salt, flour, and water. Add food coloring to obtain a brownish color. 	P	1 of each	Grocery (salt, flour, food color) Carolina/889425	\$10.00

• Sample B – equal parts salt, flour, and water + small amount of sodium hydroxide			(sodium hydroxide)	\$5.50
Yarn/string	P	430 ft	Convenience	\$5.00
Cotton swabs	P	20	Convenience	\$3.00
Stethoscopes (use from lab 13)	N	3	-	-
Scissors	N	5	-	-
Marker	N	5	-	-
Cups/bottled water	N	40	-	-
Timer	N	5	-	-
Water	N	As needed	-	-
15b. Bacteria in Food				
Methylene blue	P	20 ml	Carolina/875734	\$5.25
Plastic pipettes	P	10	Carolina/736984	\$5.55
Mineral oil	P	20 ml	Grocery	\$5.00
Test tubes	P	40	-	-
Fresh yogurt	N	1 container	-	-
24-hour left out yogurt	N	1 container	-	-
7-day left out yogurt	N	1 container	-	-
Water	N	1000 ml	-	-
Marker	N	10	-	-
Beakers	N	10	-	-
Graduated cylinder	N	10	-	-
Timer	N	10	-	-
15c. What's in Your Food?				
Labels • Use 15 label template	P	10 sets	HASPI	Cost of copies
Lard	P	500 g	Grocery	\$5.00
Sugar	P	500 g	Grocery	\$3.00
Salt	P	500 g	Grocery	\$3.00
Beans	P	500 g	Grocery	\$3.00
Weighing boats	P	10	Carolina/702338	\$9.25
12x12 Ziploc bags	P	10	-	-
6x6 Ziploc bags	P	40	-	-
Scoop/spoons	N	10	-	-
Scale	N	10	-	-

IMPORTANT: Check the MSDS for safety information on unfamiliar chemicals

Company Contact Information:

HASPI www.haspi.com Download free online	BP Medical www.bpmedicalsupplies.com 800.347.3494	Amazon www.amazon.com	Moore Medical www.mooremedical.com 800.234.1464
Carolina www.carolina.com 800.334.5551	Biology Products www.biologyproducts.com 800.222.9094	Convenience <i>Can be found at local convenience store</i>	Grocery <i>Can be found at local grocery store</i>

Additional Information

Lab 15a

- There are 6 stations in this lab that can be placed around the room.
- Three of the stations (1,3,5) are charts with information that the students use to answer questions. Three of the stations (2,4,6) are short activities.
- The stool sample is obviously simulated! The reaction is simply sodium hydroxide soaked paper as the “fecal occult blood test sheet”, and phenolphthalein within the stool sample made of water, flour, salt, and a small amount of albumin to add the wonderful smell ☺.

- Sample A is positive while Sample B is negative.
- These stations could easily be split into individual activities, as the student sheets are separated onto different pages.

Lab 15b

- 1 or 2 containers of plain yogurt with live cultures will work best.
- Make a 50% yogurt solution by adding 50 ml of yogurt to 50 ml of water. Do this for all of the yogurt samples to make it easier for the students to pour the yogurt into their test tubes.
- For more dramatic results, add a spoonful of sugar to each of the solutions.

Lab 15c

- More bags, lard, sugar, salt, and/or beans can be purchased to allow every student in your class to perform the lab.
- It may be useful to bring in an actual “healthy meal” and measure out the lard, sugar, salt, beans for the students to use as a comparison of their own meals.

Resources and References

- Boyers, L. 2011. Excess Sodium in the Diet. www.livestrong.com.
- CDC. 2012. Obese Youth Over Time. Division of Adolescent and School Health, Centers for Disease Control and Prevention, www.cdc.gov.
- CDC. 2012. Obesity Over Time. Adolescent and School Health, Centers for Disease Control, www.cdc.gov.
- Dietary Guidelines Advisory Committee. 2010. Report of the Dietary Guidelines Advisory Committee on the Dietary Guidelines for Americans to the Secretary of Agriculture and the Secretary of Health and Human Services. Washington, DC: U.S. Department of Agriculture.
- Doheny, K. and Martin, L. 2012. Americans Sweet on Sugar: Time to Regulate? WebMD, www.webmd.com.
- FDA. 2012. Nutrition Facts Label Programs and Materials. U.S. Food and Drug Administration, www.fda.gov.
- Hoyland, A., Dye, L., and Lawton, C. 2009. A Systematic Review of the Effect of Breakfast on the Cognitive Performance of Children and Adolescents. *Nutritional Research Reviews*, 22: 220-243.
- NIH. 2008. Your Digestive System and How it Works. National Institutes of Health (NIH), National Digestive Diseases Information Clearinghouse (NDDIC), NIH Publication No. 08-2681, <http://digestive.niddk.nih.gov/ddiseases/pubs/yrdd/>
- NIH. 2010. Digestive Diseases Statistics for the United States. No. 10-3873, <http://digestive.niddk.nih.gov/statistics/statistics.aspx#ack>
- Poarch, M. 1999. Disease. <http://science-class.net>.
- Poarch, M. 2002. The Digestive System. <http://science-class.net>.
- Poarch, M. 2004. Fast Food. <http://science-class.net>.
- Scallan, E., Griffin, P., Angulo, F., Tauxe, R., and Hoekstra, R. 2011. Foodborne illness acquired in the U.S.—unspecified agents. *Emerging Infectious Diseases*, 17(1): 16–22.
- USDA. 2011. Foodborne Illness: What Consumers Need to Know. Food Safety and Inspection Service, United States Department of Agriculture (USDA), www.fsis.usda.gov.
- Michelle Presley, Mission Hills High School. San Marcos, California.
- Heather Peterson, HASPI Curriculum Coordinator. www.haspi.org
- Edited by Janet Hoff-Kneier, HASPI Program Manager. www.haspi.org

Images (in order of appearance)

- <http://denverdigestive.com/art/DigestiveSystem.jpg>
- http://www.merckmanuals.com/media/home/figures/GI_digestive_tract_endoscope.gif

- http://4.bp.blogspot.com/-qQPPqQFMZVU/T7ApJ9Ih2hI/AAAAAAAAABfk/dhHBQfOvmUE/s1600/digestive_system_functions.jpg
- <http://www.encognitive.com/images/digestive-system-2.jpg>
- <http://apbrwww5.apsu.edu/thompsonj/Anatomy%20&%20Physiology/2020/2020%20Exam%20Reviews/Exam%203/colon%20diagram.jpg>
- http://www.peterjurek.com/rbv_site/images/big_slides/stom_in.jpg
- <http://faculty.une.edu/com/abell/histo/esophagusw.jpg>
- <http://ctrngenpath.net/static/atlas/mousehistology/Windows/digestive/pictures/esophagus4.jpg>
- http://biology.clc.uc.edu/fankhauser/Labs/Anatomy_&_Physiology/A&P203/Digestive_Sys_Histology/Colon_100x_P4260204Ibld.jpg
- <http://www.histology-world.com/photomicrographs/largeintestine1.jpg>
- <http://www.lab.anhb.uwa.edu.au/mb140/CorePages/GIT/images/jej04he.jpg>
- <http://dspace.udel.edu:8080/dspace/bitstream/handle/19716/2167/csiijmm.GIF?sequence=1>
- http://histology-world.com/photoalbum/albums/uploads/normal_mucosa10Xfundus_lbl.jpg
- http://histology-world.com/photoalbum/albums/userpics/normal_stomach2~0.jpg
- <http://www.mdguidelines.com/images/Illustrations/cholecys.jpg>
- <http://curezone.org/gallstones/images/galston1.jpg>
- <http://bugswong.smugmug.com/Medical-slides/Biliary-Pancreas-Spleen/i-hkNtKRQ/0/L/acute%20cholecystitis%20%20-L.jpg>
- http://www.bmj.com/highwire/filestream/586292/field_highwire_fragment_image_1/0.jpg
- <http://www.tuberoase.com/Graphics/diseased%20colon.jpg>
- http://3.bp.blogspot.com/_9mNHNOMMqM/ShvETeMt-I/AAAAAAAAACW0/LKVQSfTOQq0/s400/ColonCancerRates1.jpg
- <http://www.ozonewellnesscentre.com/colon-diseases.png>
- http://upload.wikimedia.org/wikipedia/commons/c/c8/Colorectal_cancer_endo_2.jpg
- <http://theidentifiedjournalist.files.wordpress.com/2011/10/spastic-colon.jpg>
- <http://www.hemorrhoidnomore.com/images/Int-Ext.jpg>
- <http://www.jeffersonhospital.org/images/staywell/125536.GIF>
- http://upload.wikimedia.org/wikipedia/commons/thumb/1/16/Peptic_stricture.png/200px-Peptic_stricture.png
- <http://blogs.nejm.org/now/wp-content/uploads/2012/10/Mechanisms-Underlying-the-Irritable-Bowel-Syndrome-IBS-small.jpg>
- http://my.clevelandclinic.org/PublishingImages/Florida/inflammatory_bowel.gif
- <http://img.medscape.com/pi/emed/ckb/gastroenterology/169972-179037-86tn.jpg>
- <http://ibstreatmentcenter.com/wp-content/uploads/2012/10/IBD-comparison.jpg>
- http://www.humanillnesses.com/original/images/hdc_0001_0003_0_img0198.jpg
- <http://allwellness.files.wordpress.com/2011/06/aspirin-pill.jpg>
- http://www.nbafoodadvocate.com/wp-content/uploads/2009/11/4x4_16-graphic-bad-bug-300x300.jpg
- <http://foodfreedom.files.wordpress.com/2011/05/foodborne-illness-per-year-grain.jpg>
- http://www.thejakartapost.com/files/images/p05-a_8.img_assist_custom.jpg
- <http://www.sweetfactoryonline.com/images/Nutrition/31000-NutriFact.jpg>
- <http://www.doctortipster.com/1410-obesity-risk-factors-complications-and-associated-diseases.html>