AAAS ScienceNetLinks

Skin as an Organ

WHAT YOU NEED

- Skin as an Organ ESHEET
- Anatomy STUDENT ACTIVITY SHEET
- Organ Systems STUDENT ACTIVITY SHEET
- Integumentary System STUDENT ACTIVITY SHEET
- Know Your Organ Systems STUDENT ACTIVITY SHEET
- Know Your Organ Systems - Answers TEACHER SHEET
- Skin Connections STUDENT ACTIVITY SHEET

PURPOSE

To help students explore the skin as an organ.

CONTEXT

This lesson is part of the **Skin Deep Project**, which examines the science behind skin. Skin Deep is developed by AAAS and funded by Neutrogena. For more lessons, activities, and interactives that take a closer look at the science behind skin, be sure to check out the Skin Deep Project page.

In this lesson, students will examine the skin and how it functions as an organ and as part of a larger body system. In order to do this lesson, students should be aware of other organ systems and have knowledge about the anatomy of the human skin.

The human body is a complex system of cells, most of which are grouped into organ systems that have specialized functions. These systems can best be understood in terms of the essential functions they serve: derivation of energy from food, protection against injury, internal coordination, and reproduction. (*Science for All Americans*, **p. 77 (http://www.project2061.org/publications/sfaa/online/chap6.htm#17)** .) At this grade level, students should be able to develop more sophisticated understandings of how organs and organ systems work together. Students also can relate knowledge of organs and organ systems to their growing knowledge of cells. The specialization of cells serves the operation of the organs and the organs serve the needs of cells. (*Benchmarks for Science Literacy*, **p. 137 (http://www.project2061.org/publications/bsl/online/ch6/ch6.htm#BasicFunctions_6_8)** .)

By taking a closer look at the anatomy and function of the integumentary system, students will further their general knowledge of systems in general. Students at this

level need to be encouraged to think and talk about a whole (system) in terms of its parts and, alternatively, about parts in terms of how they relate to one another and to the whole. Further, they will benefit from realizing that any part of a system may itself be considered as a system—a subsystem—with its own internal parts and interactions. (*Science for All Americans*, **pp. 166–167 (http://www.project2061.org/publications/sfaa/online/chap11.htm#2)** .) Similarly, any system is likely to be part of a larger system that it influences and that influences it. The scientific idea of a system also implies detailed attention to inputs and outputs and interactions among the system components. (*Benchmarks for Science Literacy*, **pp. 262-263 (http://www.project2061.org/publications/bsl/online/ch11/ch11.htm#Systems)** .)

Students at this grade level hold a number of misconceptions about organs and organ systems. For example, upper elementary students can list a large number of organs; however, many adults continue to have little knowledge of internal organs or their location. Students of all ages also hold wrong ideas about the workings of organ systems. Further, these types of misconceptions are difficult to change. (*Benchmarks for Science Literacy*, **pp. 344-46 (http://www.project2061.org/publications/bsl/online/index.php?chapter=15&section=C&band=6#6)** .)

Studies of student thinking show that, at all ages, they tend to interpret phenomena by noting the qualities of separate objects rather than by seeing the interactions between the parts of a system. Students also tend to have a "common-sense view" of systems. For instance, they tend to view the properties of an object as belonging to the object (not the system), and that the properties of an object are the same as those of the bits that make it up. (*Science for All Americans*, **pp. 80–82 (http://www.project2061.org/publications/sfaa/online/chap11.htm#2)** .)

Ideas in this lesson are also related to concepts found in these health education standards:

> **Health Education Standard 1:**
> **Students will comprehend concepts related to health promotion and disease prevention.**
> 3. explain how health is influenced by the interaction of body systems.

MOTIVATION

Divide the class into four groups, with each group taking a pencil and piece of paper and assembling at one corner of the room. Explain that the groups will

compete to list as many organs of the body as they can in two minutes. Emphasize that group members will need to collaborate and write their answers very quietly, so other groups do not overhear their ideas.

At the end of two minutes, call time and have the groups tally their entries. Before naming the winner, have each group read the organs on its list and write them on the board. Have the class collaborate on eliminating any incorrect items. Then recognize the winner, offering special recognition if any group included skin as an organ.

Upon completion, ask discussion questions like these:

What characteristics do all of these organs share?
How do they differ?
What are organs composed of?
What would happen if you were missing an organ?
(If necessary) Would you consider skin to be an organ? Why or why not?
What functions does your skin serve?
What are some examples of organ systems?

DEVELOPMENT

Have students use their **Skin as an Organ** student esheet to navigate and read through **Organ Systems**. Explain that the human body is made up of many organ systems that work together to support body functions. Encourage students to take notes on this and all other resources used in this lesson.

Divide students into pairs when they are finished reading. Direct them to look away from their computer screens and their notes as they try to name as many of the ten organ systems as they can, recall the organs involved in each system, and guess which function and/or purpose each system serves in the body. Write their responses on the board. You might want to have students check their notes and suggest corrections to the list. Erase the board when finished and have students complete the **Know Your Organ Systems** to learn how each system functions.

Note: If you think students need to review the anatomy of the skin before looking more closely at the integumentary system, have them study the illustration and information at **Anatomy**.

Explain to students that they now will take a closer look at the skin organ system, or integumentary (in-teg-yuh-MENT-uh-ree) system. They may be surprised to know that the skin is the largest organ in the body. To help students explore the integumentary system and how it interacts with other organ systems, have them use their student esheet to visit **Integumentary System**.

Then have students address questions like these:

> What structures are associated with the integumentary system? (The structures include skin, hair, nails, glands, and nerves.)
>
> What are the functions of the integumentary system? (The functions are: to protect the body's internal living tissues and organs; to protect against invasion by infectious organisms; to protect the body from dehydration; to protect the body against abrupt changes in temperature; to help dispose of waste materials; to act as a receptor for touch, pressure, pain, heat, and cold; and to store water and fat.)
>
> What part does the skin play in your immune system? (The skin is one of the first defense mechanisms for the immune system.)
>
> How does the integumentary system interact with the digestive system? (The integumentary system works with the digestive system to encourage the uptake of calcium from our diet by helping to synthesize and absorb vitamin D. Also, the digestion and assimilation of dietary fats and oils are essential for the body to make the protective oils for the skin.)
>
> Why is it that patches placed on the skin can be used to deliver medications to the bloodstream? (There are capillary networks in the skin that allow certain substances to enter the bloodstream. These networks can help deliver medications found in the patches.)
>
> What role does your skin play in the regulation of body temperature? (There are three things the skin does: hairs on the skin trap more warmth if they are standing up, and less if they are lying flat; glands under the skin secrete sweat onto the surface of the skin in order to increase heat loss by evaporation if the body is too hot; capillaries near the surface can open when your body needs to cool off and close when you need to conserve heat.)
>
> How important is your skin for the functioning of the nervous system? (Your skin plays a vital role in the sense of touch. In turn, the nervous system depends on neurons embedded in your skin to sense the outside world.)

Finally, to give students another example of how different organs/systems work together, have them read how the integumentary system supports the excretory system at **How Your Body is Like a Factory**. After reading the short opening passage, they should scroll down the page and click on Excretory System and Integumentary System.

After they have finished reading, pose comprehension questions such as:

What parts of the integumentary system are made up of dead epidermal cells? (The parts include hair, fingernails, and toenails.)

What is the purpose of the excretory system? (It involves finding and removing waste materials produced in the body. It is your poisong-fighting team.)

What primary organs are involved in the excretion process? (The kidneys are involved in removing liquid waste. Each day, the kidneys produce about 1.5 liters of waste, which is expelled from the body as urine.)

What types of waste products are removed through the skin? (Dead cells and sweat are removed through the skin.)

ASSESSMENT

Have students use their notes to complete the **Skin Connections** student sheet, which will test what they have learned about the integumentary and other organ systems and how these systems work together. When students have completed their worksheets, discuss their responses as a class.

EXTENSIONS

You can extend the ideas about skin and organ systems in this lesson by leading students through these Science NetLinks lessons:

Skin Care: Acne

Coping With Changes

Cells 2: The Cell as a System

Students can enjoy a variety of informative and interactive games and puzzles at **BBC Interactive Body (http://www.bbc.co.uk/science/humanbody/body/index_interactivebody.shtml)** , which focuses on the location and functions of each of the organs and body systems.

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RELATED RESOURCES

Brine Shrimp 2: Brine Shrimp Survival ›

6-8 | HANDS-ON

Urban Ecosystems 4: Metabolism of Urban Ecosystems ›

6-8

The Beagle Brigade ›

6-8

LESSON DETAILS

Grades

6-8

Themes

BIOLOGY

HEALTH/MEDICINE

Type

INTERACTIVE

Project 2061 Benchmarks

6 THE HUMAN ORGANISM
11 COMMON THEMES

Have you tried this lesson?

Share your tips

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