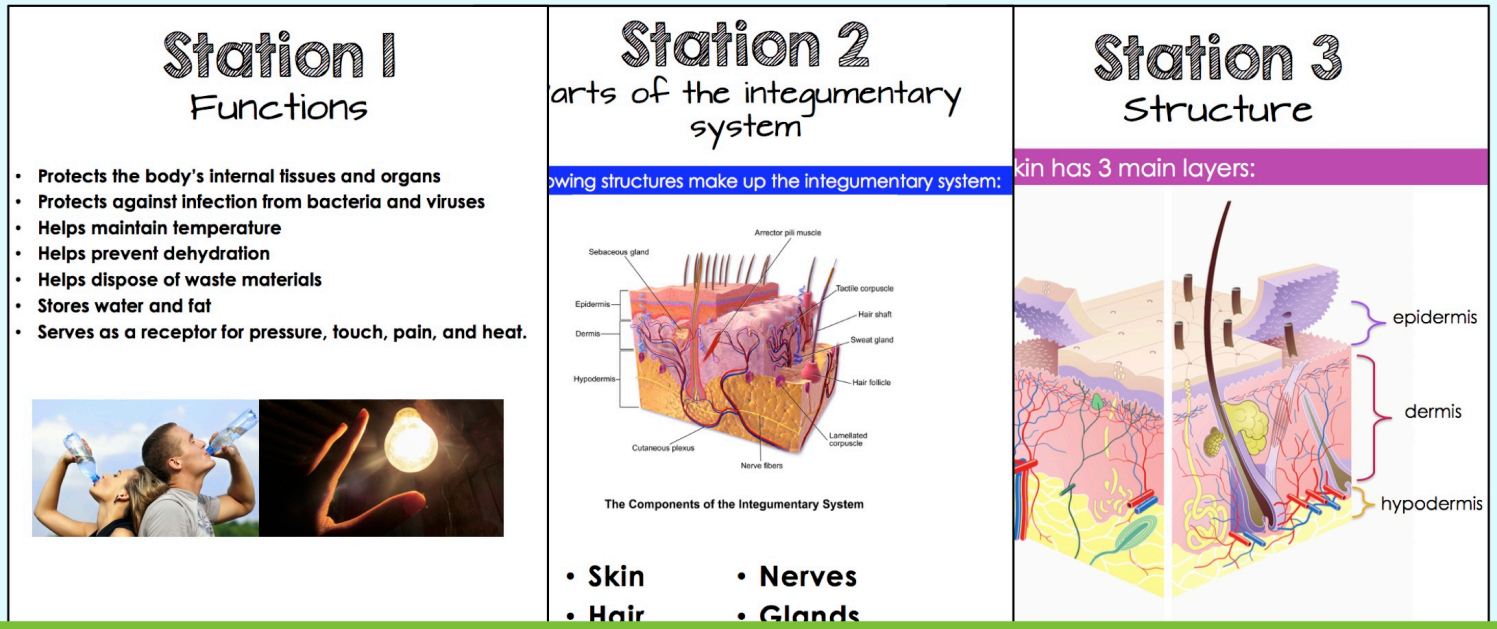
integumentary system

Exhibition Stations



22 SENSATIONAL STATIONS

TOPICS COVERED:

-Function and Structure

-Detailed observations and information about the layers (epidermis, dermis, hypodermis) including:

- Form and function
- Physical characteristics
- Fingerprints
- Scarring

-Hair and Nails

-The skin as a sensory organ (2 mini lab exercises)

-Glands

-Acne and Sweating

-Connections to other systems

-Skin disorders and cancer

-Interesting facts

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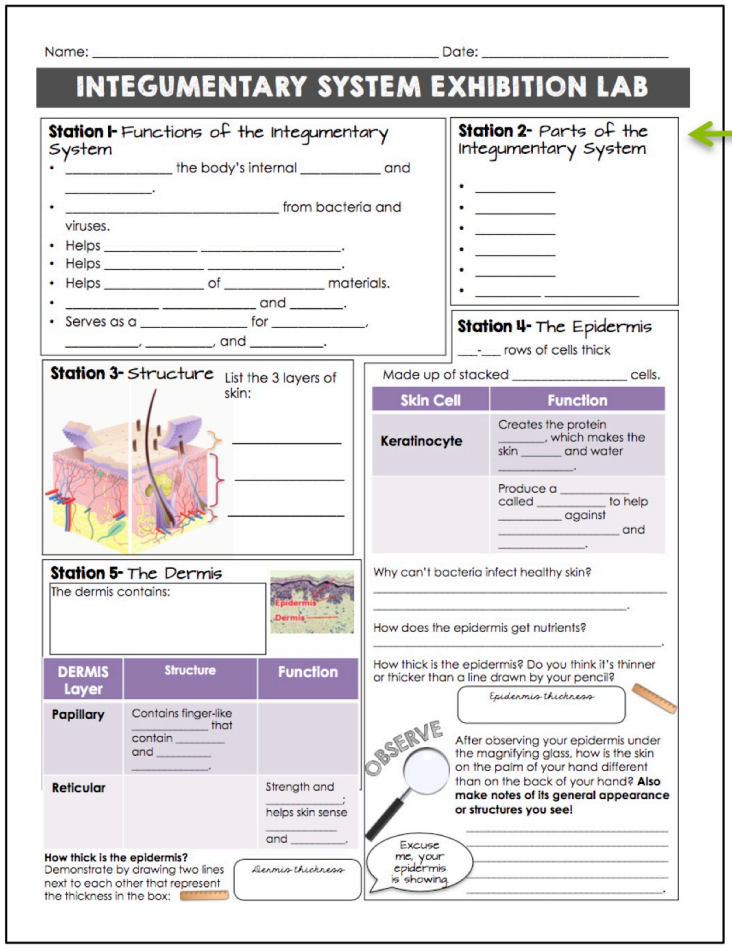
STUDENT ANSWER SHEET INCLUDED:



Name: _____ Date: _____

INTEGUMENTARY SYSTEM EXHIBITION LAB

Station 1- Functions of the Integumentary System

- _____ the body's internal _____ and _____.
- _____ from bacteria and viruses.
- Helps _____ _____.
- Helps _____ _____.
- Helps _____ of _____ materials.
- _____ _____ and _____.
- Serves as a _____ for _____, _____, _____, and _____.

Station 2- Parts of the Integumentary System

- _____
- _____
- _____
- _____
- _____
- _____ _____

Station 3- Structure

List the 3 layers of skin:

_____

_____

_____

Station 4- The Epidermis

___-___ rows of cells thick

Made up of stacked _____ cells.

Skin Cell	Function
Keratinocyte	Creates the protein _____, which makes the skin _____ and water _____.
	Produce a _____ called _____ to help _____ against _____ and _____.

Station 5- The Dermis

The dermis contains:

DERMIS Layer	Structure	Function
Papillary	Contains finger-like _____ that contain _____ and _____.	
Reticular		Strength and _____; helps skin sense _____ and _____.

How thick is the epidermis?
Demonstrate by drawing two lines next to each other that represent the thickness in the box:

Dermis thickness

Why can't bacteria infect healthy skin?

_____

_____.

How does the epidermis get nutrients?

_____.

How thick is the epidermis? Do you think it's thinner or thicker than a line drawn by your pencil?

Epidermis thickness

OBSERVE

After observing your epidermis under the magnifying glass, how is the skin on the palm of your hand different than on the back of your hand? **Also make notes of its general appearance or structures you see!**

_____

_____

_____

_____

_____.

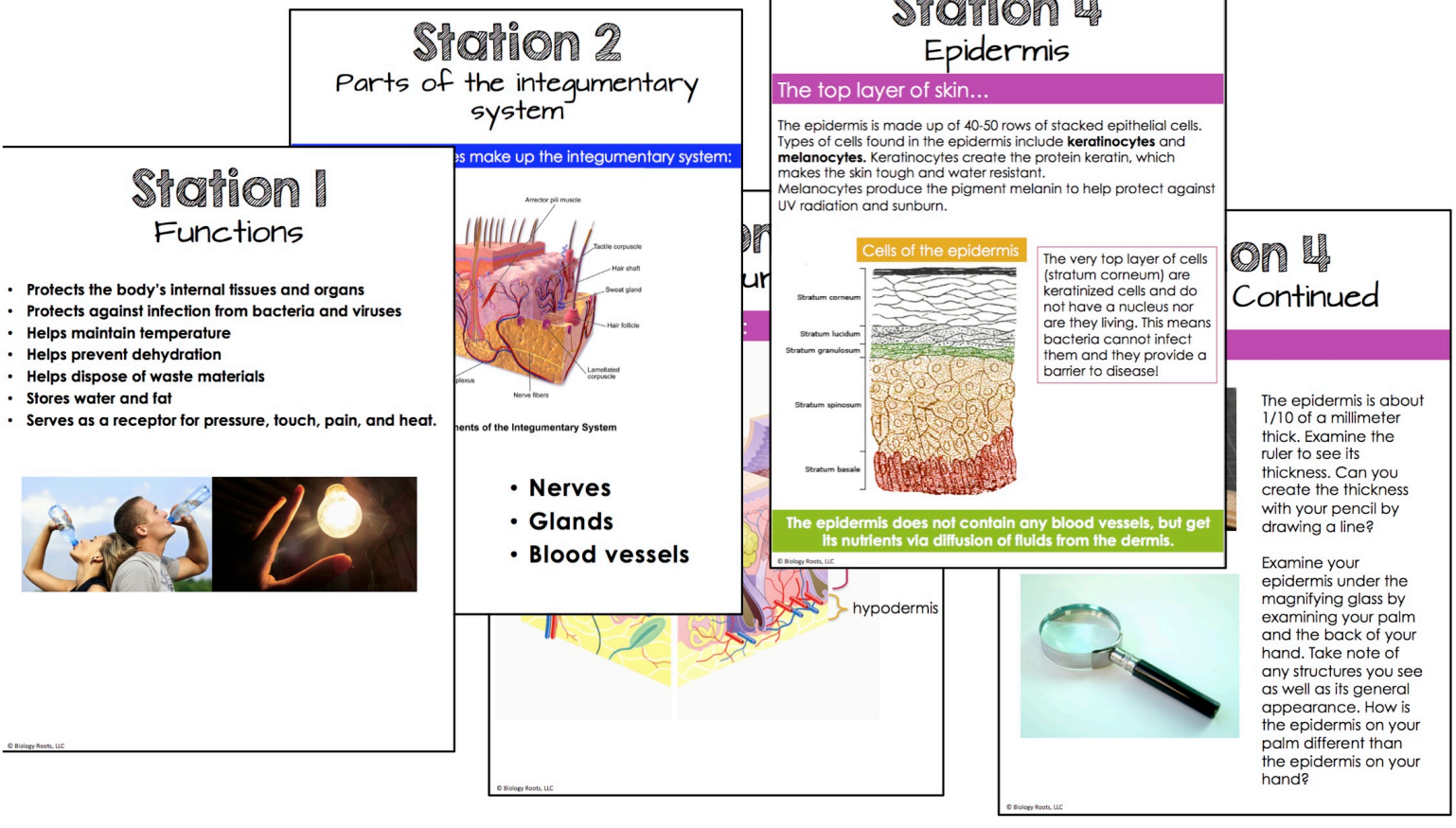
Excuse me, your epidermis is showing

Student answer/recording sheet included (5 sheets total).

22 Stations (a total of 27 sheets of paper as some stations require more than one).

Contains mini-lab exercises with simple materials.

Editable so you can tailor it to your classroom.



Station 1
Functions

- **Protects the body's internal tissues and organs**
- **Protects against infection from bacteria and viruses**
- **Helps maintain temperature**
- **Helps prevent dehydration**
- **Helps dispose of waste materials**
- **Stores water and fat**
- **Serves as a receptor for pressure, touch, pain, and heat.**

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Station 2
Parts of the integumentary system

...s make up the integumentary system:

Arrector pili muscle
Tactile corpuscle
Hair shaft
Sweat gland
Hair follicle
Lamellated corpuscle
Nerve fibers

...nents of the Integumentary System

- **Nerves**
- **Glands**
- **Blood vessels**

hypodermis

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Station 4
Epidermis

The top layer of skin...

The epidermis is made up of 40-50 rows of stacked epithelial cells. Types of cells found in the epidermis include **keratinocytes** and **melanocytes.** Keratinocytes create the protein keratin, which makes the skin tough and water resistant.
Melanocytes produce the pigment melanin to help protect against UV radiation and sunburn.

Cells of the epidermis

Stratum corneum
Stratum lucidum
Stratum granulosum
Stratum spinosum
Stratum basale

The very top layer of cells (stratum corneum) are keratinized cells and do not have a nucleus nor are they living. This means bacteria cannot infect them and they provide a barrier to disease!

The epidermis does not contain any blood vessels, but get its nutrients via diffusion of fluids from the dermis.

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...on 4
Continued

The epidermis is about 1/10 of a millimeter thick. Examine the ruler to see its thickness. Can you create the thickness with your pencil by drawing a line?

Examine your epidermis under the magnifying glass by examining your palm and the back of your hand. Take note of any structures you see as well as its general appearance. How is the epidermis on your palm different than the epidermis on your hand?

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STUDENT ANSWER SHEET INCLUDED:

Station 6- Fingerprints

How are fingerprint ridges formed and what is the relationship between fingerprints and the dermis? _____

Note any patterns or interesting characteristics you see when observing your fingerprints: _____

Station 7- Scarring and Stretch Marks

- **WHEN** do scars occur? _____
- **WHAT** is a scar? _____
- **WHY** is scar tissue different than normal tissue? _____
- **HOW** are stretch marks similar to scars? How do you think they are different? _____

Station 8- Hypodermis

FORM (what is it made of?)= _____

FUNCTION (what does it do?)= _____

How does its form relate to its function? _____

What type of immune cell lives in the hypodermis? _____

Station 9- Hair

Hair is made up of _____.

Hair can be found everywhere except the _____ of the hands and _____ of the feet, _____ and genitalia.

What is hair for? _____

Under the microscope...

Sketch what you see under the microscope. Which layers of the hair shaft can you see? **Label them.**

Station 10- Goose Bumps

Each hair shaft is connected to a tiny muscle called the _____ _____ muscle.

When and why do goose bumps occur? _____

Station 11- Nails

What are nails made of? _____

How are nails connected to the skin? _____

Nails protect your _____ and _____.

Station 12- Receptors and Senses

The skin is a _____ organ.

Sensory Receptor	Function	Location
Meissner's corpuscle		_____ of the _____ of hands and _____ of feet
Pacinian corpuscles		
Ruffini corpuscles		Connective tissue in _____ _____

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Station 13- Testing Tactile Localization

Tactile Localization= _____

Prediction- do you think all areas of the body will have the same tactile localization? Why or why not? _____

Prediction- do you think that if you were touched with your eyes closed, you'd be able to pinpoint the exact location? _____

Materials: 2 different colored felt tipped markers, ruler or measuring tape.

Body Region Tested	Error of localization in mm (Difference between two points)		Average distance
	Partner #1	Partner #2	Average
Palm of hand			
Fingertip			
Back of hand			
Wrist			
Cheek			
Forearm			

What body region is the most sensitive to touch (smallest error of localization)?
Partner #1_____ Partner #2 _____

What body region is the least sensitive to touch (greatest error of localization?)
Partner #1_____ Partner #2 _____

Offer an explanation as to why the skin on the some of the body parts are more sensitive than others? _____

Station 14- Testing Receptor Localization

What is receptor adaptation? _____

Prediction- how long do you think it takes for receptor adaptation to occur?
Do you think it depends on the body part? Explain. _____

Continued on other side -->

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Station 14- Testing Receptor Adaptation

Materials: Coins, timer

Offer a reason why is receptor adaptation useful: _____

Body Region Tested	Time before receptor adaptation occurred (s)		Average time (s)
	Partner #1	Partner #2	Average
Anterior forearm near wrist (less hairy side)			
Palm			
Posterior forearm (hairier side) near elbow			

Was your prediction correct? Explain: _____

Station 15- Glands of the Integumentary System

Gland		Function	Location
_____ _____ (Sudoriferous glands)	_____ sweat gland	Secretes water and salt (_____) to_____ _____via evaporative cooling.	
	_____ sweat gland	These secrete an ____ _____ and are also called " _____ _____ ".	
_____ glands (oil glands)		Produces _____, an _____ that covers the skin or hair to provide _____ and _____.	Every region of the skin except the palms of the hand and the soles of the feet.
Ceruminous Glands			

Station 16-Acne

What becomes clogged to cause acne? _____

Why do teenagers tend to have acne more often than adults? _____



Station 17- Sweat

Explain what happened when you used a sponge to simulate sweating: _____

How do you think sweating cools us off? _____

Station 18 - More Sweat

How does sweating cool off your body_____

Does sweat stink? Explain: _____

Station 19- Connections to Other Body Systems

Integumentary System Connections - continued	
Body System	**How it's related to the integumentary system**
Immune System	
Digestive System	
Circulatory System	

Station 20- Common Disorders

What causes warts? _____

Why do scales and rashes appear in psoriasis? _____

Station 21- Skin Cancer

Skin Cancer can be caused by _____

Which damages the ____ of _____ cells. This can form malignant _____.

Types of Skin Cancer

Most Dangerous form- tends to be malignant. Cancer occurs in the _____ of the epidermis.

Most Common form- usually treatable. Occurs in the lowest layer of the epidermis, the _____.

Station 22- Fun Facts

List 3-4 of your favorite skin facts!

- _____
- _____
- _____

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Station 6
Dermis and Fingerprints

The middle layer of skin…



Fingerprints are patterns that are formed from the ridges on our fingerprints.

These ridges are protrusions of the papillary layer of the dermis, which tends to be thicker in the fingertips, and cause a pattern to protrude from either the epidermis.

PREVIEW



Look at your fingerprints under the magnifying glass. What patterns do you see?

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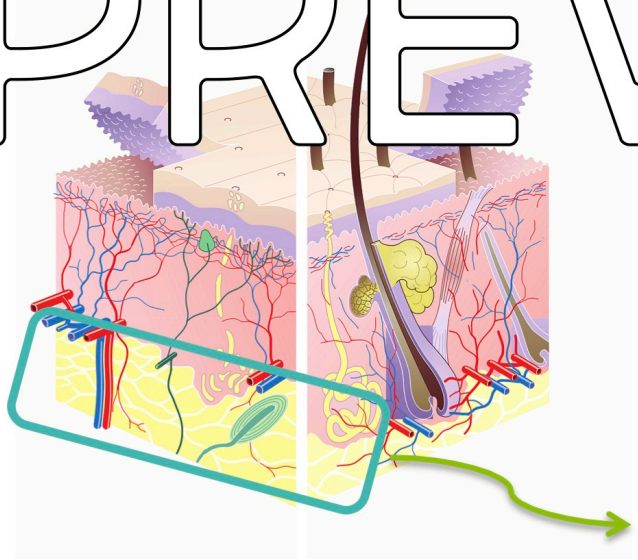
Station 8
Hypodermis

Deepest layer of skin

The hypodermis is the subcutaneous layer of skin- it is a flexible layer of loose connective tissue and fat which separates the skin from the underlying muscles and bones.

The hypodermis functions as insulation and padding. P[illegible] protection of internal organs

PREVIEW

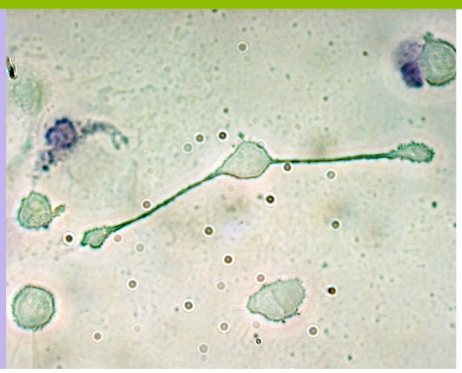


Hypodermis (aka subcutis)

The hypodermis contains fat in all parts of the body except the eyelids, ears, and genitalia.

The hypodermis also contains larger blood vessels. The blood vessels become smaller in diameter as they approach the surface of the skin.

Macrophages are immune cells that reside in the hypodermis – they are ready to gobble up any bacteria that may get passed the skin through a wound!



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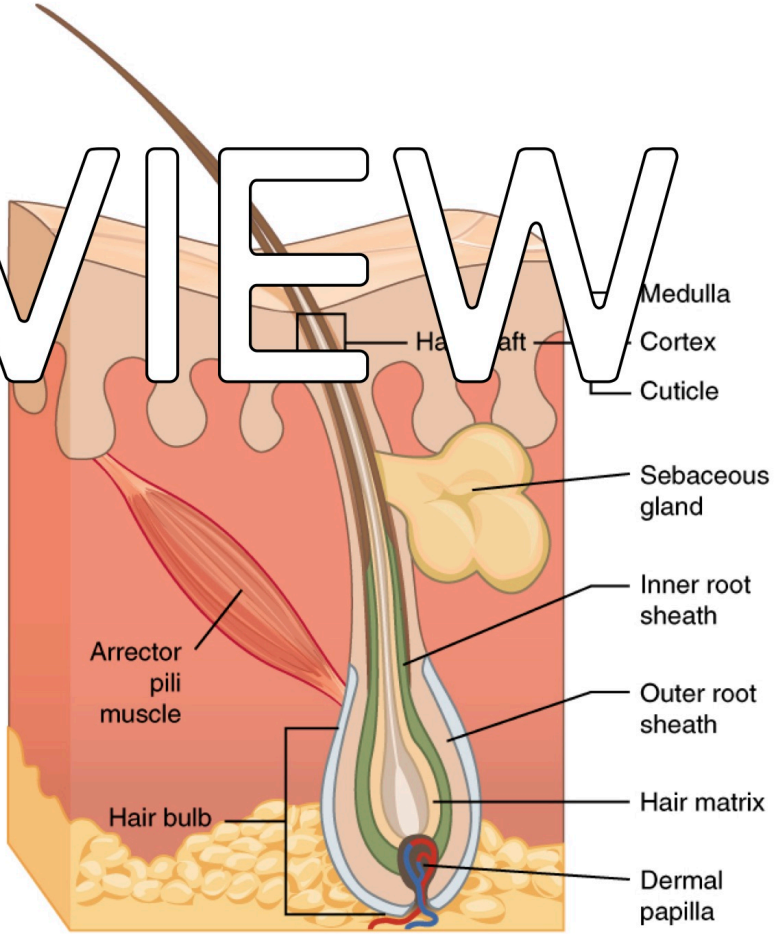
Station 10

Goose Bumps

Goose bumps are when the hairs on the body stand up. Each hair shaft is connected to a tiny muscle called the arrector pili muscle.



PREVIEW



Goose bumps typically occur when our body temperature decreases. The hair standing up creates a layer of warmth.

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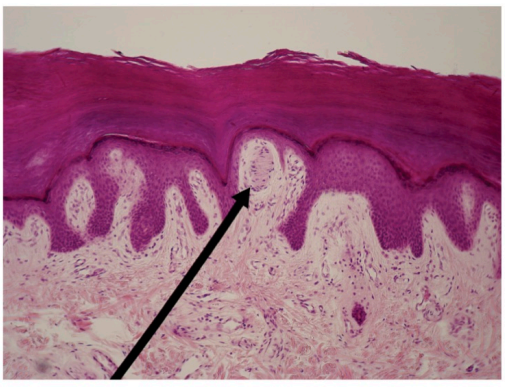
Station 12
Receptors/Senses

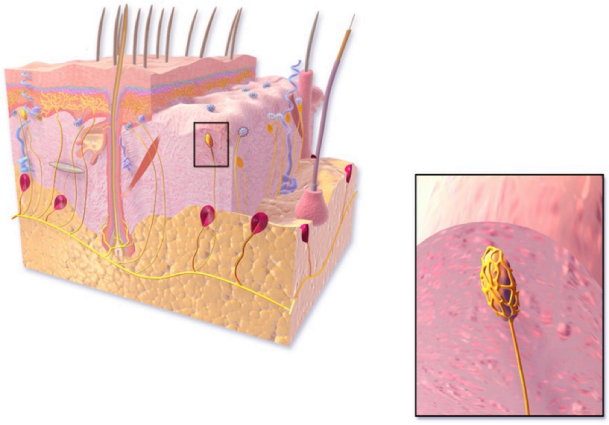
The skin as a sensory organ

The layers of the skin contain numerous sensory receptors that can sense pain, heat, cold, and touch.

Sensory Receptor	Function	Location
Meissner's corpuscle	Touch receptors	Dermis of the palms of hands and soles of feet
Pacinian corpuscles	Pressure and vibration receptors	Deep in the dermis or hypodermis
Ruffini corpuscles	Pain receptors	Connective tissue in deep dermis
Nerve endings	Sense pain, heat, cold, touch	Dermis and hypodermis

PREVIEW





Tactile Corpuscle
(Meissner's Corpuscle)

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Station 13

Touch Receptors Part 1

TESTING TACTILE LOCALIZATION ACTIVITY 1

Some parts of the body are more sensitive to touch than others. Tactile localization refers to the ability to determine which parts of the skin have been touched. The more sensitive the body part, the higher the tactile localization!

PREVIEW

You will need a partner for this! Read directions carefully!

BEFORE we begin… **predict!**
Do you think all areas of the body will have the same tactile localization?

Do you think that if you were touched with your eyes closed, you'd be able to pinpoint the *exact* location?

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Station 14

Touch Receptors Part 2

TESTING RECEPTOR ADAPATION- ACTIVITY 2

After a prolonged amount of time, touch receptors tend to slow down their response rate and "get used to" a stimulus. For example, you are not constantly aware that you have socks on, or jewelry on, or are holding a utensil, etc. This is called adaptation.

PREVIEW

BEFORE we begin… **predict!**

How much time do you think it takes for receptor adaptation to occur?



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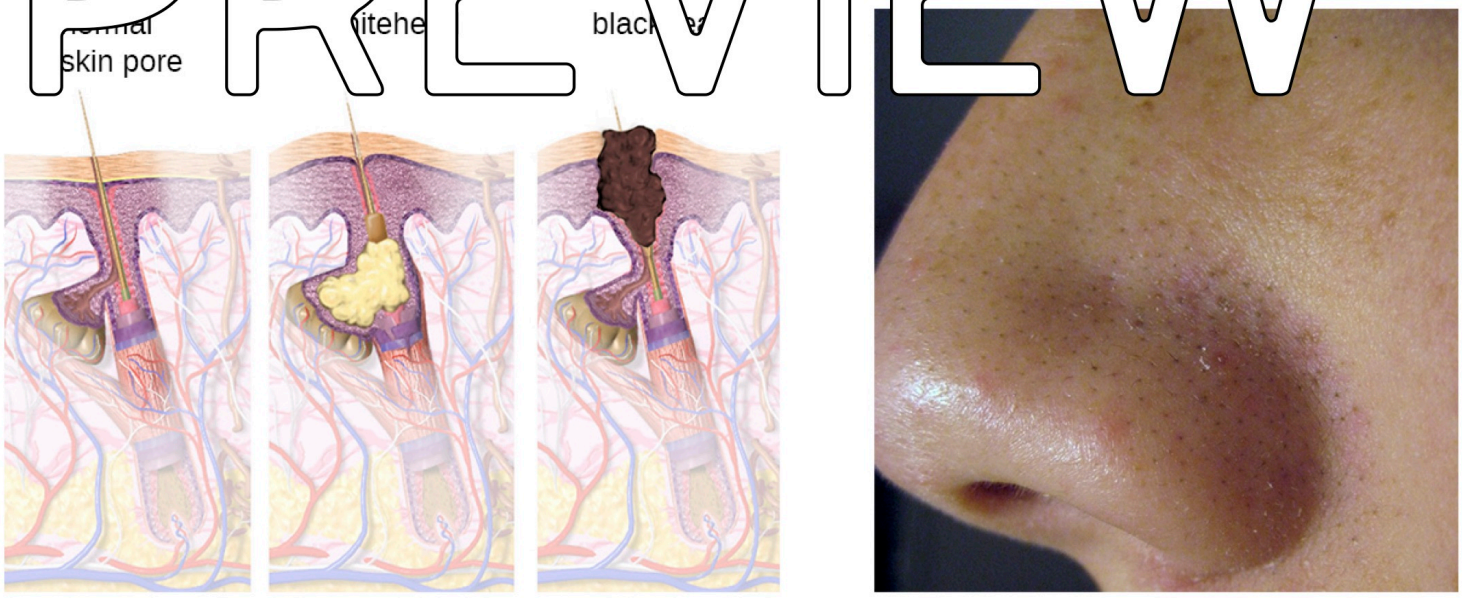
Station 16

Acne

Acne occurs when hair follicles become clogged with oil and dead skin cells. It often causes whiteheads, blackheads, or pimples.

Teenagers often have acne more than adults. This is because hormones can cause the body to make more sebum (oil), which contributes to acne.

PREVIEW



(a) (b)

The main difference between whiteheads and blackheads is the pore- in whiteheads, the pore remains closed. In blackheads, the pore is stretched open. The black color comes from oxidization.

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Station 17

Sweat

Why sweat?!

Directions: Take the sponge and lightly moisten one of your arms (or the back of one of your hands if you have long sleeves). Be sure to leave one arm or hand dry!

Now, lightly blow on both the wet arm/hand and the dry.

PREVIEW

How do you think sweating helps cool us off?



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Station 19

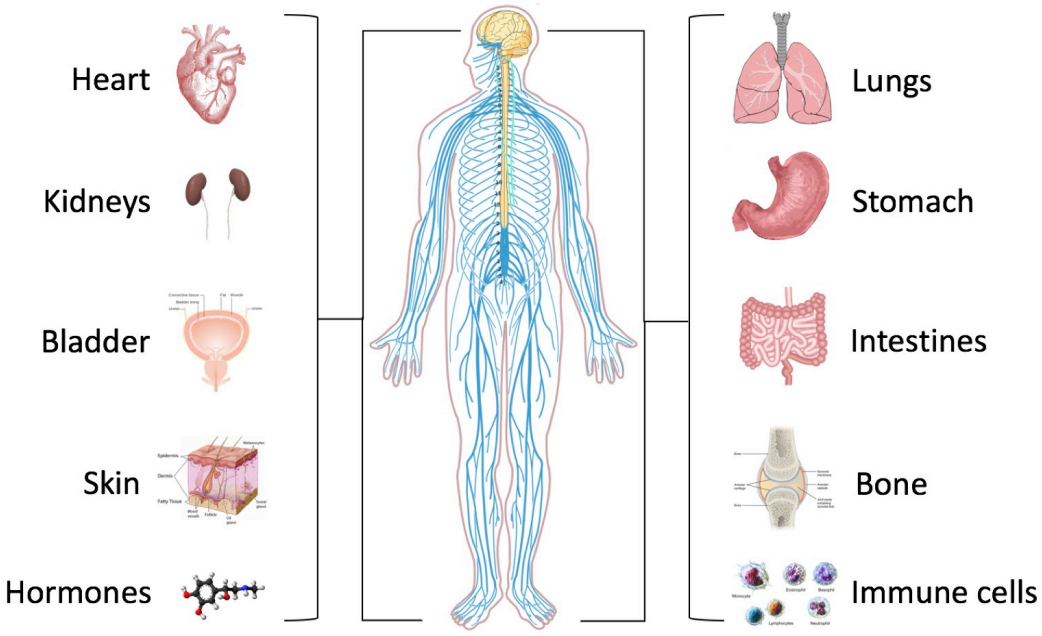
Connections to other systems

Immune system- your skin is the first line of defense against infection, and many macrophages (immune cells) live in the deep layers of the skin as the second line of defense!

Digestive system- the skin absorbs UV rays from the sun to create vitamin D, and vitamin D helps our body to absorb calcium. The digestive system also helps secure fats from oils that is stored in the skin and used as oils in the skin.

Circulatory system - the skin contains capillary networks (blood vessels) that are part of the circulatory system. This is how we can absorb some chemicals through our skin to get to other parts of the body; such as the birth control patch or nicotine patch.

PREVIEW



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