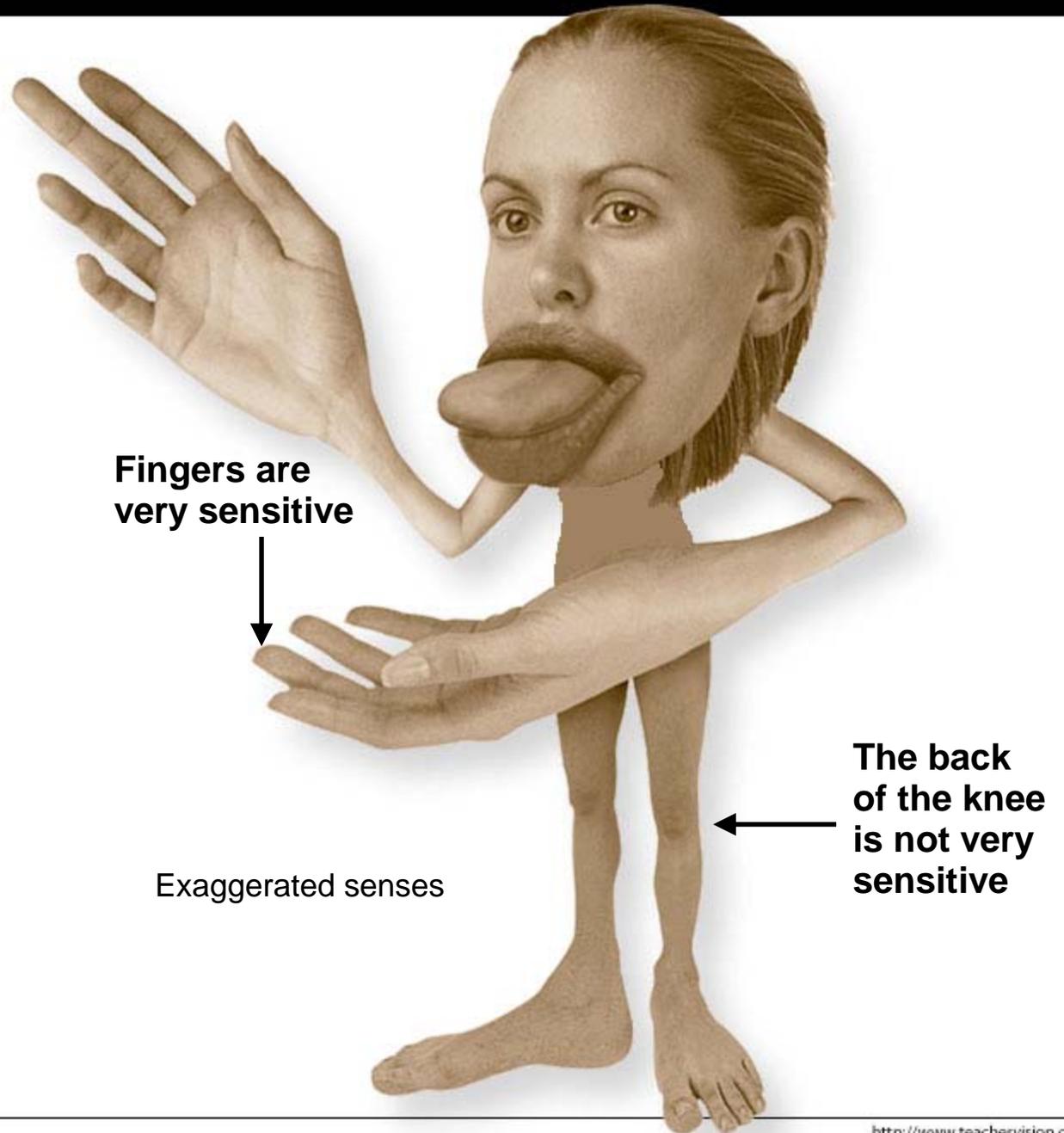




A Sensitive Touch

No—she's not an alien! Parts of this photo have been made bigger to show which areas of the skin are most sensitive to touch.

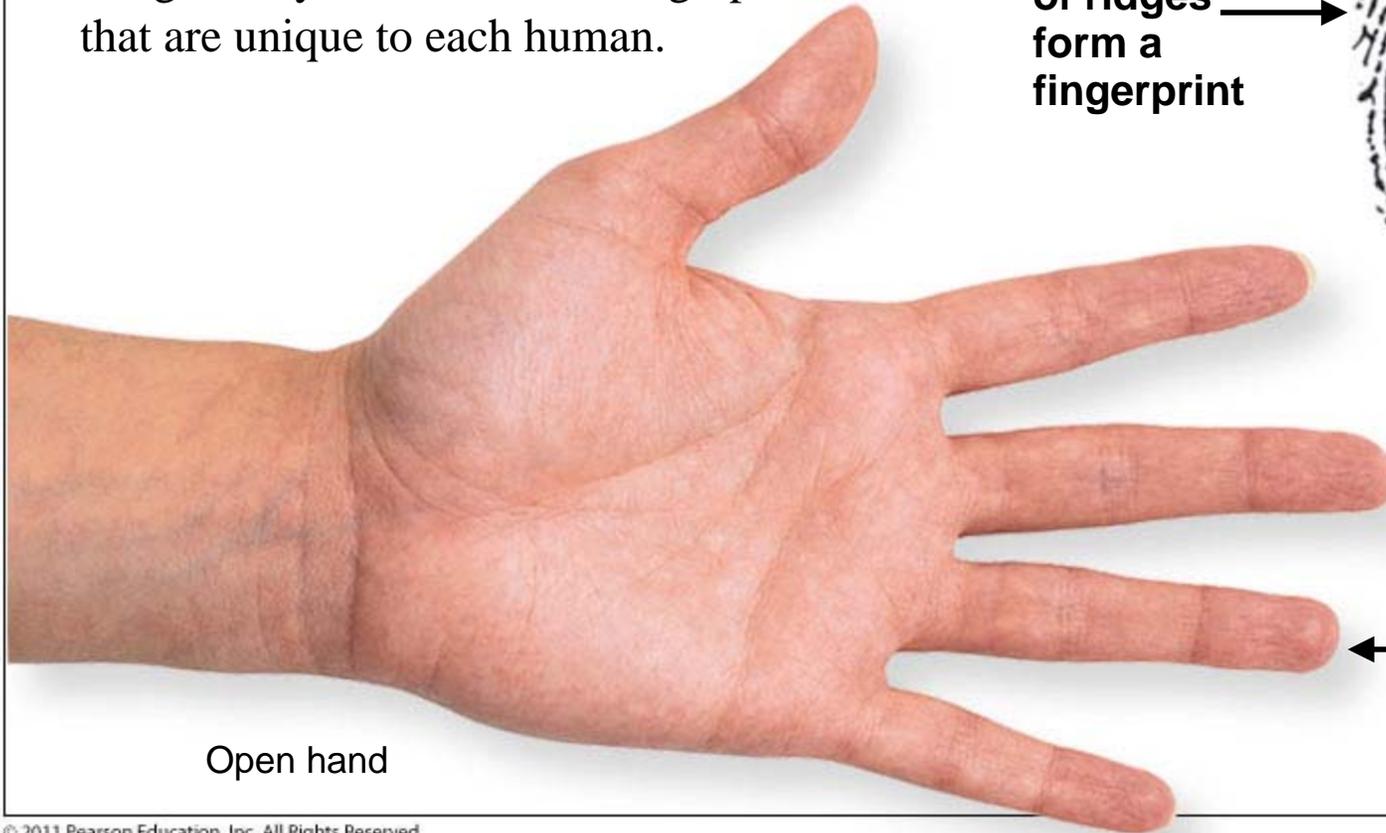
Head to toe, the skin that covers your body is loaded with special nerve cells, or receptors. These receptors collect information so your brain can detect changes in such things as touch, temperature, pressure, and pain.





Get a Grip

Your hands—and especially your fingertips—have many touch receptors. The skin covering your palm and fingers is folded into patterns of tiny ridges. These ridges help you grip things. They also create the fingerprints that are unique to each human.



Open hand

Swirling patterns of ridges form a fingerprint



Fingerprint

Fingertips have many touch receptors





Under Your Skin

The part of your skin that you see, called the epidermis, protects you in many ways. However, this tough outer layer is actually made of dead cells that are constantly being replaced.

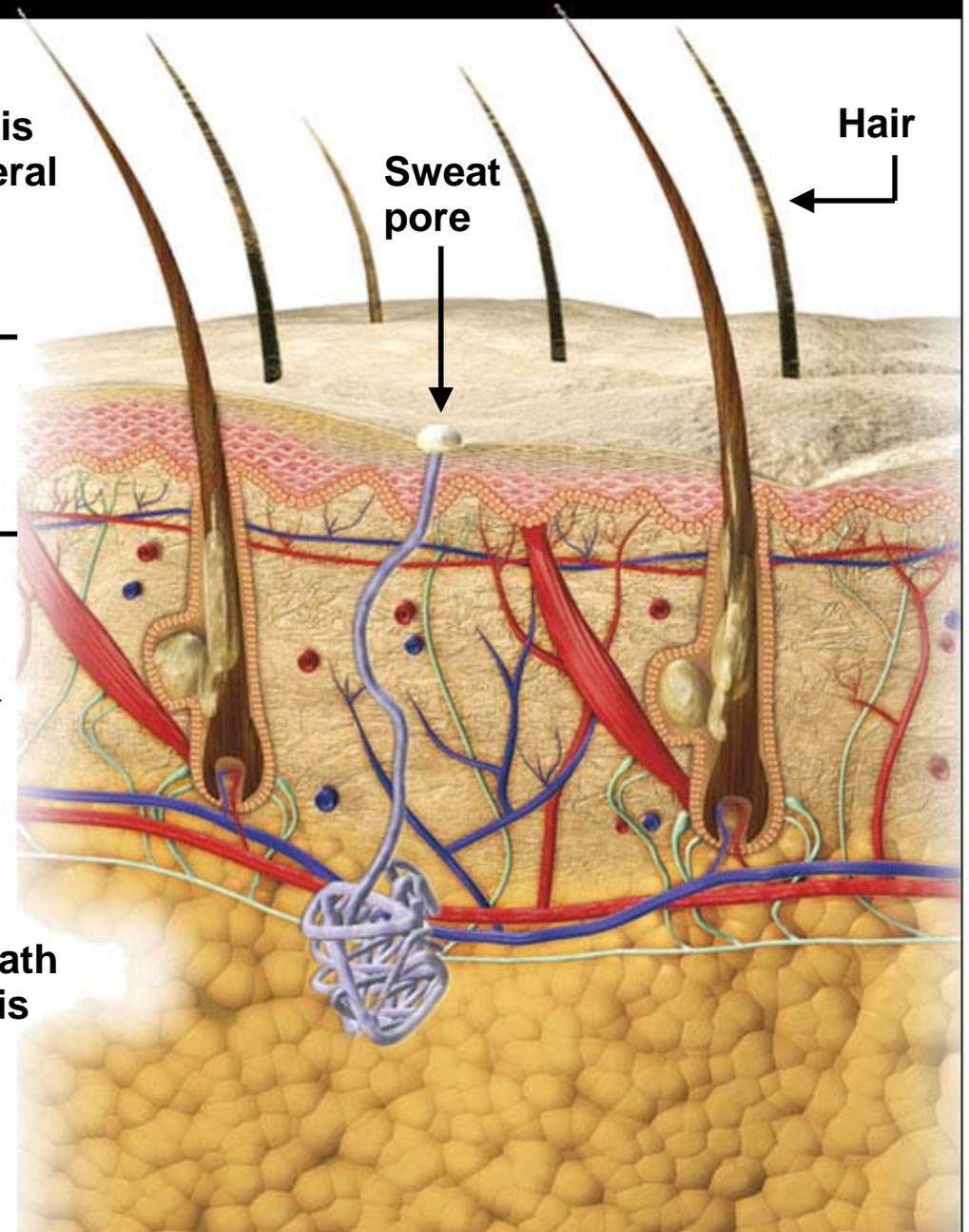
As this cross-section shows, there's a lot more action going on in the dermis layer which is loaded with blood vessels, sweat glands, and nerves. Touch receptors are found in both the epidermis and the dermis layers.

Epidermis has several layers

Sweat pore

Hair

Dermis layer is underneath epidermis

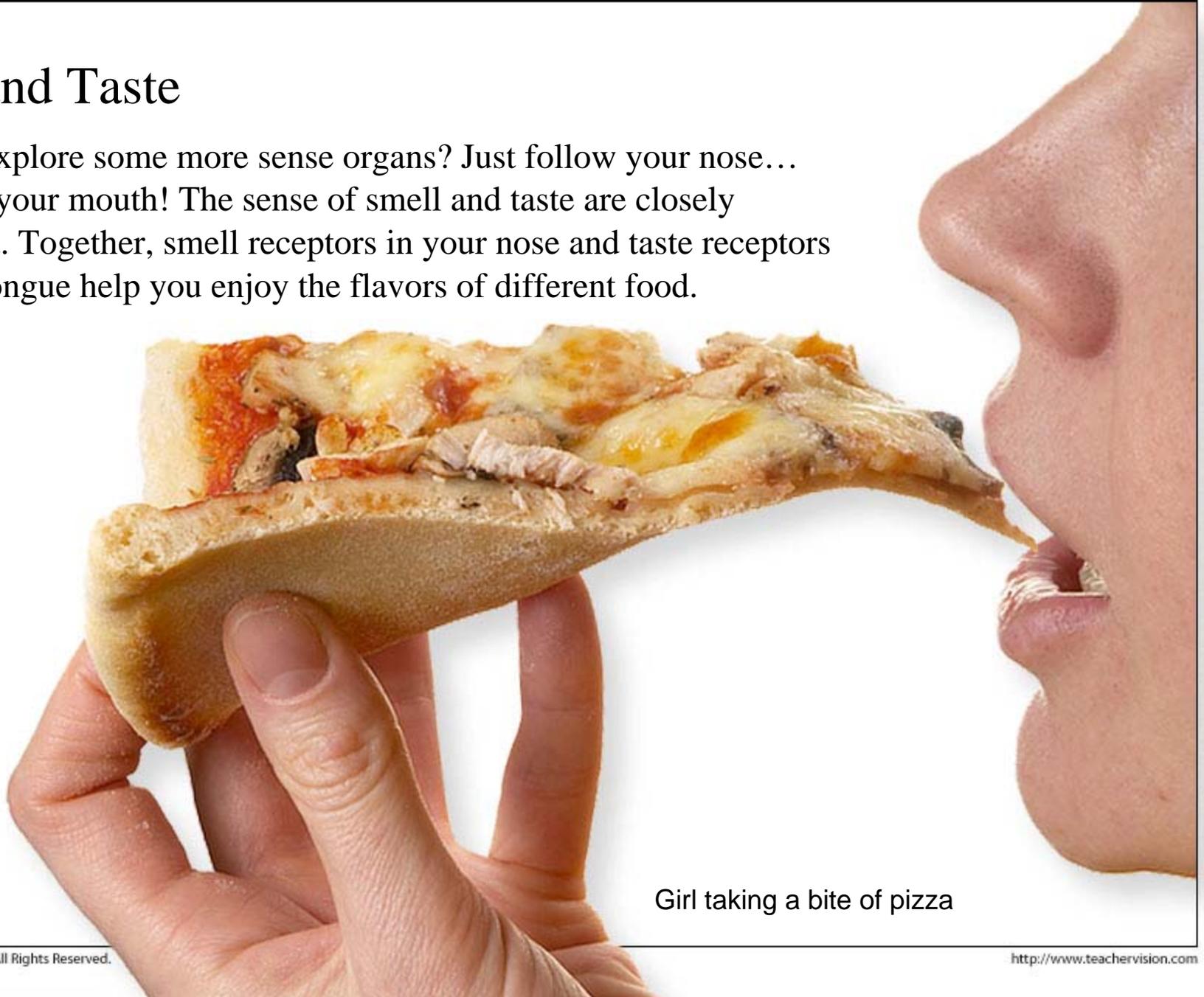


Cross-section of skin



Sniff and Taste

Want to explore some more sense organs? Just follow your nose... and open your mouth! The sense of smell and taste are closely connected. Together, smell receptors in your nose and taste receptors on your tongue help you enjoy the flavors of different food.



Girl taking a bite of pizza



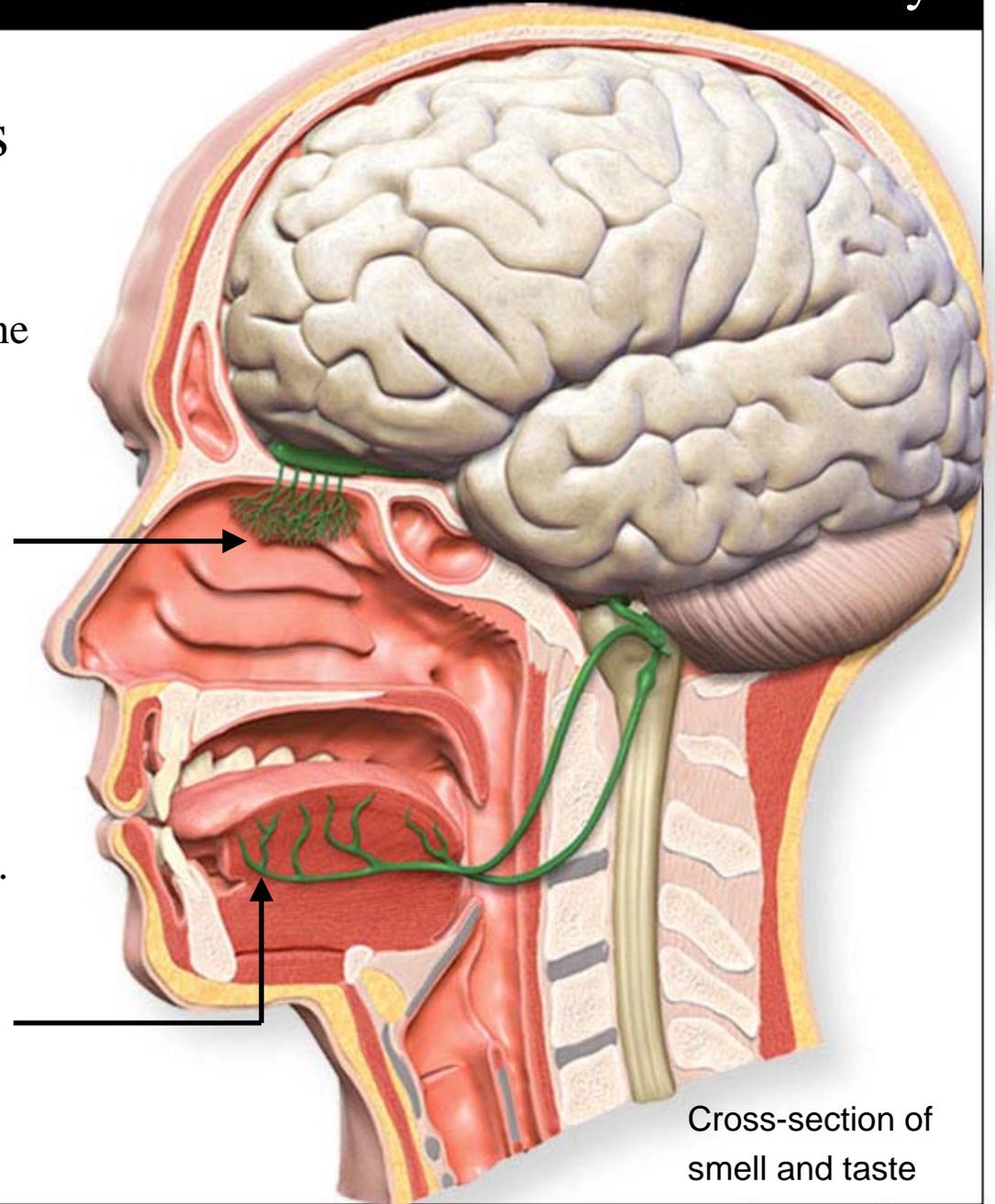
Smell and Taste Pathways

What's that smell? Thousands of smell receptors line your nose. They pick up odor molecules from the air and pass the signals to your brain so you can tell if something is "stinky" or "pleasant."

Nerve in the olfactory bulb carry "smell signals" to the brain

What's that taste? Signals sent from the front and back of your tongue travel to your brain. Then you can recognize a "yummy" or "yucky" taste.

Nerves under the tongue carry "taste signals" to the brain



Cross-section of smell and taste



Taste Organ Close-Up

Even though your tongue seems smooth, it actually has a rough surface. The larger “bumps” on this photo of a magnified tongue contain taste buds. The taste receptors in different taste buds help you detect sweet, sour, salty, bitter, and savory tastes.

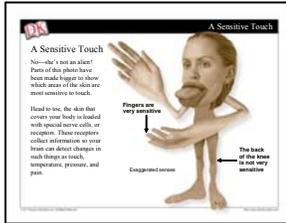
But all of this is just a beginning! When it comes to taste, touch, and smell there's a lot more to know. So get ready to explore more and remember, you're the expert!



Magnified tongue

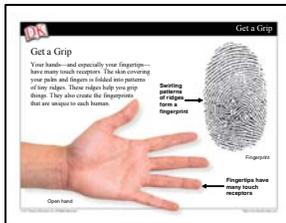


Sense Organs: Skin, Nose, Tongue Teacher Notes



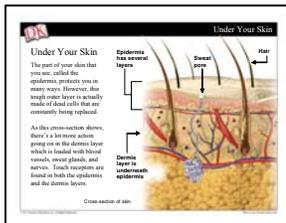
A Sensitive Touch

On an adult, the living, leathery overcoat of skin weighs about 11 pounds. Different parts of the body have varying numbers of sense receptors in the skin for detecting touch, pressure, and vibration. This body is exaggerated to show which areas of skin have the most touch receptors, and are therefore most sensitive to touch. The hands, lips, and tongue are very large, while the arms and legs are minimized.



Get a Grip

The skin on the palm of the hand is covered with ridges. These help the hand to grip objects when performing different tasks. Beneath the palm is a triangle-shaped sheet of tough, meshed fibers that anchor the skin and stops it from sliding over the underlying fat and muscle. When fingers touch smooth surfaces, such as glass, their ridges leave behind sweaty patterns called fingerprints. These are classified into types by the presence of three main features: arches, loops, and whorls. Each human has a unique set of fingerprints.



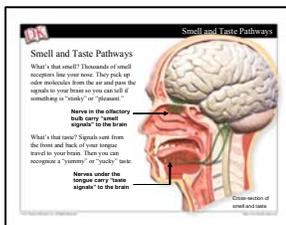
Under Your Skin

The upper surface layers of the epidermis consist of flat, interlocking dead cells. These are filled with hard-wearing protein called keratin. The skin flakes as dead cells wear away and are replaced with new cells. New cells are produced by cell division in the lowest layer of the epidermis. The thicker dermis layer contains the sense receptors that help the body detect changes in touch, temperature, vibration, pressure, and pain. The dermis also houses coiled sweat glands and hair follicles. The sebaceous glands release oily sebum, which keeps the skin and hair soft and flexible.



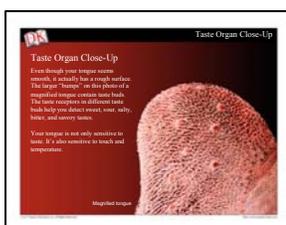
Sniff and Taste

The sense of smell is 10,000 times more sensitive than taste, so if the nose is blocked, food loses its flavor.



Smell and Taste Pathways

This cross-section through the head shows the pathways taken by nerve signals from smell receptors high in the nasal cavity, and from taste buds in the tongue. In the nasal cavity, branches of the olfactory nerve send signals to the olfactory bulb, which carries the signals to areas at the front of the brain that identify smells. Taste signals from the front and back of the tongue travel along separate nerves to the brain stem's medulla oblongata. From here they are sent to the gustatory (taste) area of the brain where tastes are recognized.



Taste Organ Close-Up

The muscular tongue mixes and tastes food during chewing. Its upper surface is covered with pimple-like papillae of different types. These make the tongue sensitive to taste and also to touch and temperature. The tongue's many nerves carry different types of sensory information to different parts of the brain. Taste molecules dissolve in saliva during chewing and pass into a taste bud through a pore. Here the hairs at the top of the taste receptor cells detect one of five tastes—sweet, sour, salty, bitter, or umami (savory).