Welcome to this lesson today on somatic senses. Today we'll be discussing how the body detects somatic sensations. So somatic sensations are detected by sensory input from sensory receptors. And these sensory receptors can be found scattered throughout your body. They can be found in the skin and skeletal muscles and in the walls of some internal organs.

And somatic sensations can include things like pain, touch, pressure, temperature, motion, et cetera. So these are all examples of somatic sensations that are detected by various sensory receptors scattered throughout the body.

So signals from the sensory receptors will be sent to the somatosensory cortex, which is located in the cerebrum of the brain. And interneurons in the somatosensory cortex are associated with various parts of the body. So these interneurons are kind of organized and laid out like a map. And larger parts of the map are associated with more sensitive areas of the body, because more sensitive areas of the body have more receptors. So for example, your fingertips and your lips, which are very sensitive parts of your body are associated with more receptors and therefore take up a larger part of this map basically that's organized in the somatosensory cortex.

So we're going to take a second here to talk about pain specifically, so pain as an example of a somatic sensation. So pain is perceived injury. And although pain is not a pleasant thing to experience, it's actually an important protective feature of our body. So pain warns us that we've experienced some sort of injury to our body and that we need to withdraw from the situation that's causing that injury before further injury occurs.

So here's an example for you. If you've ever been cooking before, near a stove, and you've accidentally touched your hand on the burner, you will feel pain in your hand. And you'll pull your hand away because of that pain. So as you pull your hand away, it's not allowing for any more damage to occur.

So you feel that pain. You pull your hand away. And therefore, no more damage can occur to that tissue. So pain is perceived injury. It's a protective feature of our body.

So here's an example of a few different types of pain we're going to discuss. Visceral and somatic pain are pain related to the body, where visceral pain relates to internal organs and somatic pain relates to pain on the skin, skeletal muscles, joints, and tendons.

Referred pain is when pain from internal organs is wrongly projected to another part of the body. So an example of this is when a person has a heart attack, oftentimes they'll feel pain down their arm. So the body or the brain is not able to properly identify where that source of pain is coming from, so it will project it to another part of the body. So that's referred pain.

Phantom pain is when a person experiences pain in a missing limb. So this is common among amputees. If a person has had their leg amputated, oftentimes they will say they can still experience pain in that missing limb even though it's not there anymore. So this is something that's not really fully understood yet. But it's kind of an interesting concept to be able to feel pain in a limb that you don't even have anymore. So that's phantom pain.

So when signals of pain reach the brain, the hypothalamus will send signals to release endorphins and enkephalins. And these are natural opiates that reduce our ability to perceive pain, so endorphins and enkephalins.

So as I mentioned, they're natural opiates. So if we experience pain, these natural opiates will be released. And it'll reduce our ability to perceive pain.

So some scientists think that this might be some sort of evolutionary trait that's developed. So we know pain is important, because it warns us of some sort of perceived injury. But if it's important for us to feel pain to warn us of this perceived injury, why would our body also release these substances that reduce our ability to perceive pain. It seems like they kind of contradict one another.

So scientists sometimes believe that these will be released in a really stressful situation when a person has become injured as a way to not be incapacitated by that pain and continue to function. So here is an example. If you're a fan of Shark Week on the Discovery Channel, you've probably seen this before.

So a person swimming, they get attacked by a shark. And later on, they're talking about their experience with that shark attack. And oftentimes they'll say they didn't really feel anything. They were scared. But they didn't feel any pain.

And this is because the endorphins and the enkephalins were released that inhibited their ability to perceive that pain so that they could continue to swim and try and survive. They could continue to function, because if they were able to feel that pain, they would become incapacitated and would probably end up drowning for sure. So they don't actually feel that pain until after that stressful situation has ended. So that's why they think it's maybe some sort of evolutionary trait that's developed in order to allow a person to escape a stressful situation.

So let's take a look at this diagram right here, which is going to illustrate the various different types of sensory receptors that are found in the skin. So there are actually thousands of sensory receptors that are found in the skin that detect touch, pressure, cold, warmth, and pain. So we're just going to take a look at a few examples of these today.

So one type of receptor that can be found in the skin are thermoreceptors. And thermoreceptors detect temperature changes. They can detect hot or cold. So there are a couple different types of thermoreceptors,

depending on which type of temperature they are detecting.

Free nerve endings are also found within the skin. And free nerve endings, there's actually several different types of free nerve endings that can detect touch, pressure, heat, cold, or pain. So free nerve endings are very simple in structure. And they're basically just the dendrites of sensory neurons.

So they're found among the skin, as in this diagram here. But they're also found in other internal tissues. So nociceptors are actually examples of free nerve endings that specifically detect pain.

And then we also have receptors that are called encapsulated receptors. And encapsulated receptors are enclosed in a capsule of connective tissue or epithelial tissue. And there are various different types of encapsulated receptors.

So this would be an example of maybe a Pacinian corpuscle, which detects deep pressure or vibrations. Merkel's discs are also encapsulated receptors that detect steady touch. And then we also have other types of encapsulator receptors that detect light touch. So depending on the type of touch, we have different types of receptors that will interpret that information.

So as I mentioned, this is a diagram just showing a couple of the different types of receptors in the skin. So this would be the epidermis, the outer layer of the skin; and then the dermis, and the subcutaneous layer. So different types of receptors can be found at different layers and within different depths, basically kind of depending on which type of sensation they are there to detect.

So this lesson has been an overview on somatic sensations.