
Sensory Pathways And The Somatic Nervous System

What is Pain? Everyone has experienced pain in their lives, whether it's a bruise or a burn from touching the oven not knowing it was on. But not everyone experiences pain in the same way. There are lots of pathways in our Nervous system that bring information to our brain, but there are different sensory pathways for different types of pain causing intense stimulation meaning it causes some kind of activation after let's say feeling something hot. There are three types of receptors that tell your nervous system what type of pain is occurring, Thermoreceptors, Mechanoreceptors, and Chemoreceptors.

Literature Review

"Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (D. Andrew Tompkins, a, J. Greg Hobelmann, and Peggy Compton, 2018). Meaning that it depends greatly on the wound itself in order to be an actual or potential wound. Although there are not only pain receptors in the skin, there are some in your gut and your visceral organs. But the feeling of pain from these receptors are very different than on your skin because the pain is more spread out. (Martini, Nath, Bartholomew, 2018, p. 517). Pain receptors can also be called Nociceptors, and they are located in different portions of the skin such as the blood vessels, but there's less in others organs of your body. "Nociceptors are peripheral neurons whose main purpose is to detect painful stimuli, and can be stimulated by extremes in temperature (heat or cold), pressure, and/or chemicals most often released in the inflammatory response" (D. Andrew Tompkins, a, J. Greg Hobelmann, and Peggy Compton, 2018). But there is not just one type of nociceptor, there are three main ones that excites them, which is thermoreceptors, mechanoreceptors, and chemoreceptors (Martini, Nath, Bartholomew, 2018, p. 517).

Thermoreceptors as seen in the name, are temperature receptors and can be found in the dermis, and since they contain type C fibers they are put into the category of a type of slow pain (Martini, Nath, Bartholomew, 2018, p. 517-518). This is because you don't experience pain when you immediately touch a change of temperature, unless you keep touching it for more than a second then you will feel it. For example, if you are taking a pan out of the oven, without gloves on, you will most likely get burnt. Because you brain can't send the signal to your hands quick enough, you will end up dropping the pan because that's how you body's reflexes work. From then on you learn not to touch a pan without protective gloves. "Thermoreceptors are phasic receptors, they're very lively while the temperature is changing, however they are quick to adapt to a different temperature." (Martini, Nath, Bartholomew, 2018, p. 518). Another example would be that if it's freezing outside, and you get into a hot tub, at first it will be super hot. But after a while your body will get used to it and it won't be as cold outside because your body will be warm.

Mechanoreceptors are the receptors of physical pain or touch, and the reaction to it, are known to be receptors of fast pain. "The perception of innocuous and noxious touch sensations rely on special mechanosensitive sensory neurons that fall into two general categories; low threshold mechanoreceptors (LTMRs) that react to innocuous mechanical stimulation and high-threshold mechanoreceptors (HTMRs) that respond to harmful mechanical stimuli." (Victoria E. Abraira

and David D. Ginty, 2014). Meaning that there are two types of mechanoreceptors and one reacts to the feeling of touch and the other reacts to the feeling of pain. Mechanoreceptors also has three names for the types of feelings. “Tactile or touch-related receptors provide the closely related feelings of touch, pressure, and vibration. Baroreceptors detect pressure changes in the walls of blood vessels and in parts of the digestive, breathing and lung related, and urinary tracts. Proprioceptors monitor the positions of joints and skeletal muscles” (Martini, Nath, Bartholomew, 2018, p. 518). In low threshold mechanoreceptors, when it says innocuous it means not harmful touch or pressure. So a good example is, let’s say someone taps your shoulder when you are deep in thought, it could scare you but that reflex is because they scared you, not because they hurt you. An example of high threshold is when you are picking a rose from a bush, you don’t notice the thorns and when your finger gets pricked by one your reaction is to drop it or take your finger away because it caused you pain except which would be fast pain.

The last type of receptor is Chemoreceptors, which are a bit more complex than the other two receptors. “Are the type of nerve cells made to do one thing very well that detect small changes in the concentration of particular chemicals or compounds. In general, chemoreceptors respond only to water-soluble and lipid-soluble substances that are mixed with and now part of a liquid in body fluids. These receptors help show helpful change over a period of seconds, although they may also show central helpful change” (Martini, Nath, Bartholomew, 2018, p. 521).

Chemoreceptors work in our blood and keep our body in balance as well as our heart beat, not only that but they are the reason we can taste and smell. They work with these senses by tasting a certain food, then telling the brain whether you like it or not or if it smells good or not. But recognizing how something smells doesn’t come from the same neurons, there are different neurons for the smell of flowers verses something stinky. They also measure the oxygen levels in your heart in order to know if you have a good supply in your heart pumping or if you need more. “The chemoreceptors included in the general senses do not send information to the first or most important somatosensory cortex, so you are not consciously aware of the feelings they provide. The arriving sensory information is routed to brainstem centers that deal with the autonomic control of breathing and lung related and cardiovascular functions.” (Martini, Nath, Bartholomew, 2018, p. 521). An example would be that if you begin to smell smoke after you finish cooking something, your heart rate will pick up because you begin to realize that you left the stove on and it could start a fire. Or another example is that if you taste some bad food and you look at the bottom of it because it tastes bad and you realize it’s moldy, you get a bit scared because you could get sick, also making your heart beat faster.

In summary, Everyone has experienced pain in their lives, whether it’s a bruise or a burn from touching the oven not knowing it was on. But not everyone experiences pain in the same way. There are lots of pathways in our Nervous system that bring information to our brain, but there are different sensory pathways for different types of pain causing intense stimulation meaning it causes some kind of activation after let's say feeling something hot. There are three types of receptors that tell your nervous system what type of pain is occurring, Thermoreceptors, Mechanoreceptors, and Chemoreceptors.