The Somatosensory Tracts

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How Does The Gut & Brain Work Together?

The way the gut and brain correlate together is quite remarkable. The gut allows food to be digested in the stomach to be bio-transformed into nutrients the body needs to function. While the brain sends neuron signals through the spinal cord, those signals help provide the sensory-motor functions to make the body move. Now, how do the brain and gut work together in the body? Well, studies reveal that the gut-brain axis correlates to the various systems like the autonomic nervous system, the HPA axis, and the nerves surrounding the gastrointestinal tract help the brain influence intestinal activity and regulate cognitive function. Each of these vital organs has a causal relationship where they:

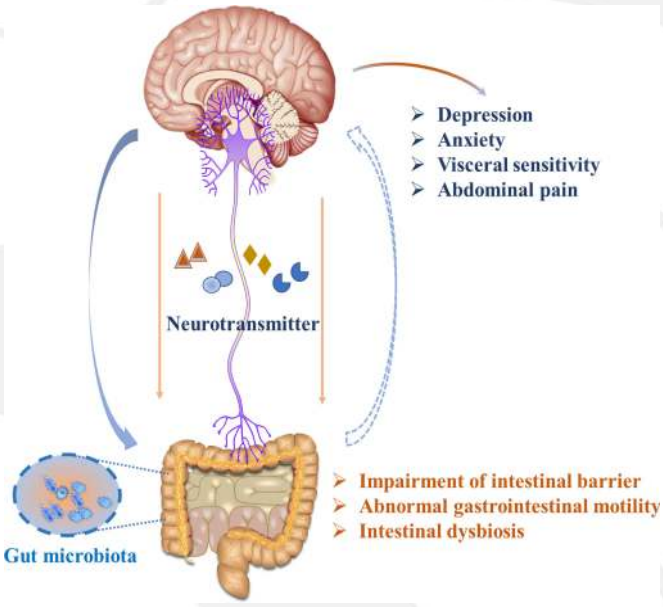
-Help with sleep regulation
-Improve memory functionality
-Helps coordinate physical and emotional well-being
-Regulating inflammatory responses

When chronic issues affect the gut-brain axis, it can cause an overlap in risk profiles that rise in the body and not just in the brain or the gut. Studies reveal that issues that begin to affect the gut-brain axis can cause alteration within the bi-directional pathway and trigger other problems that correlate to the body.

The Somatosensory Tract

In this video, I will talk about the somatosensory tracts. Somatosensory, the body's senses, and the tracts are collections of axons traveling together through the central nervous system. Now recall that somatosensory information from most of the body will travel back to the central nervous system through the peripheral nerves. And the different types of somatosensory information travel in different pathways as they go through the nervous system. And in general, the different kinds of somato sensations break down into two categories. The first includes position sense, vibration sense, fine touch sense, or precise touch sense information. And the other big group of somatosensory details tends to travel together, which includes the sense of pain, temperature, and gross touch sense or less precise touch-sense information.

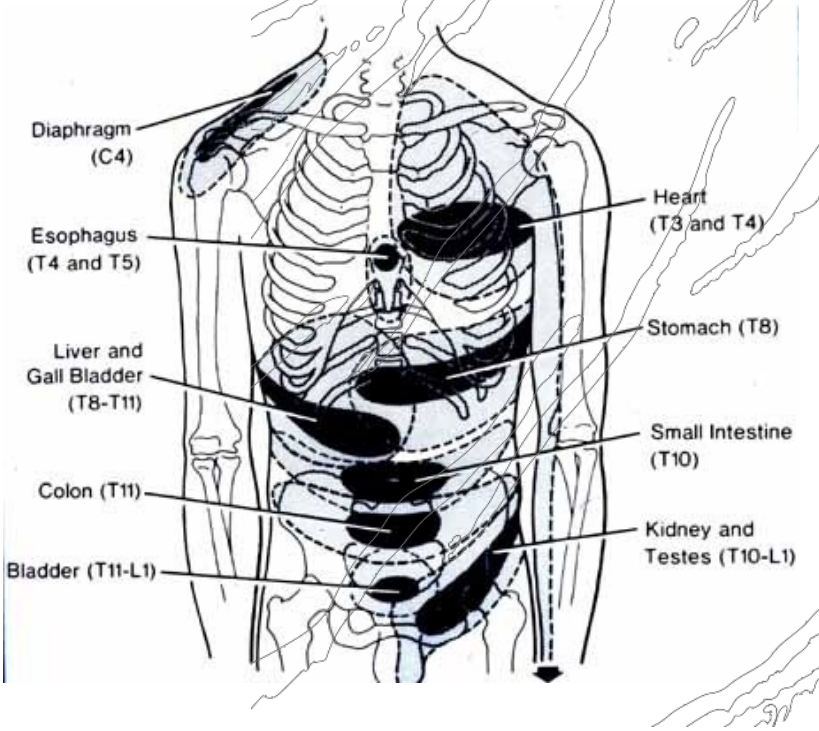
So, for example, let's say in this category, we have a receptor that carries position sense information. So let me draw like an R here in the arm for a receptor for position sense. And then, that information will travel through the peripheral nerves and then enter the spinal nerves through the spinal cord and deliver that information. And the same thing happened with this other big category of somato sensation. So let's say we had some receptor here down in the leg; I'll write an R for a receptor that can detect stimuli that can cause the experience of pain in the body. Then that information can travel through the peripheral nervous system's nerves, and spinal nerves enter the spinal cord and deliver the data into the brain.

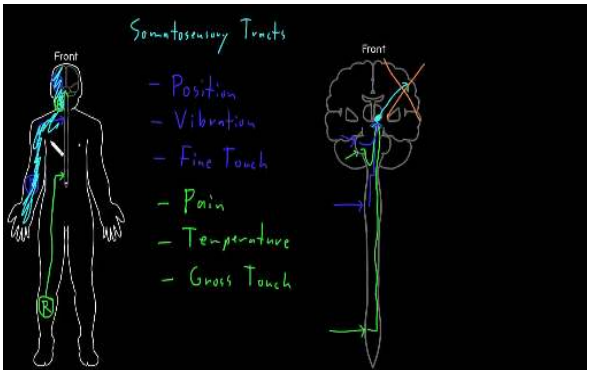


The same thing is true for somatosensory information coming from the face and other head parts. But that information usually enters the brain stem through cranial nerves instead of the spinal cord. So, for example, if we have a receptor that can detect a vibration sensation somewhere on the face, that information could travel through a cranial nerve into the brain stem in the central nervous system. And suppose we had another receptor at the beginning that could detect, say. In that case, temperature, one of these other types of somato sensation, could also travel through the cranial nerve and enter the brain stem. But what happens once this information is delivered into the spinal cord or brain stem? So I have taken the brain and the spinal cord and drawn a bigger illustration over here, and we are still looking at it from the front side of the body, but I've cut into the brain here. So we're seeing the inside of the brain and the spinal cord. And first, let's consider this.

Category of different types of somato sensation, the class includes pain sense, temperature sense, and gross touch sense. So, as I've drawn here, we have some of the senses coming in from the leg on one side; by showing that information entering the spinal cord below the spinal cord, neuron axons will carry that information to the brain in one of these somatosensory tracts. One of the tracks is specific to this category of somato sensation. And so let me draw that, but I will leave out some details. But one important detail is that it crosses to the other side, then goes up through the spinal cord, up through the brain stem, and then comes deep down in the cerebrum.

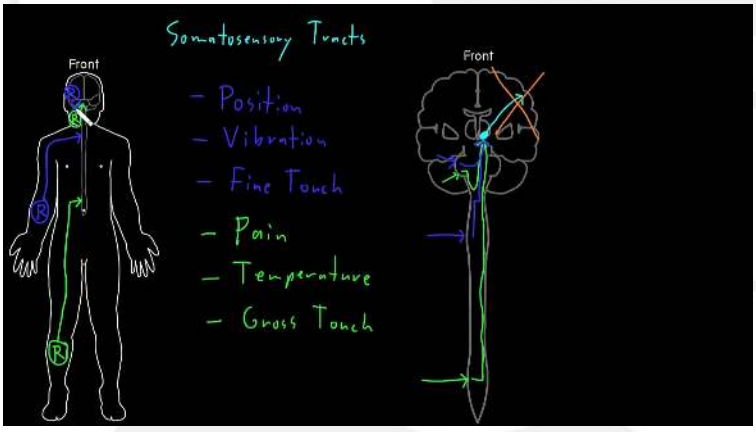
We'll talk about it a little bit more in another video. But notice that it's on the other side. It's coming into the cerebral hemisphere on the other side of the body that the receptor was on. I also drew some of that information in the spinal cord, but a little higher. Now there'll be a different tract in the body that will carry that information up through the spinal cord, and it's going to cross through a little another place slightly higher in the brain stem. At the same time, it will be true for the different types of somato sensations, including position, vibration, and fine touch sense.



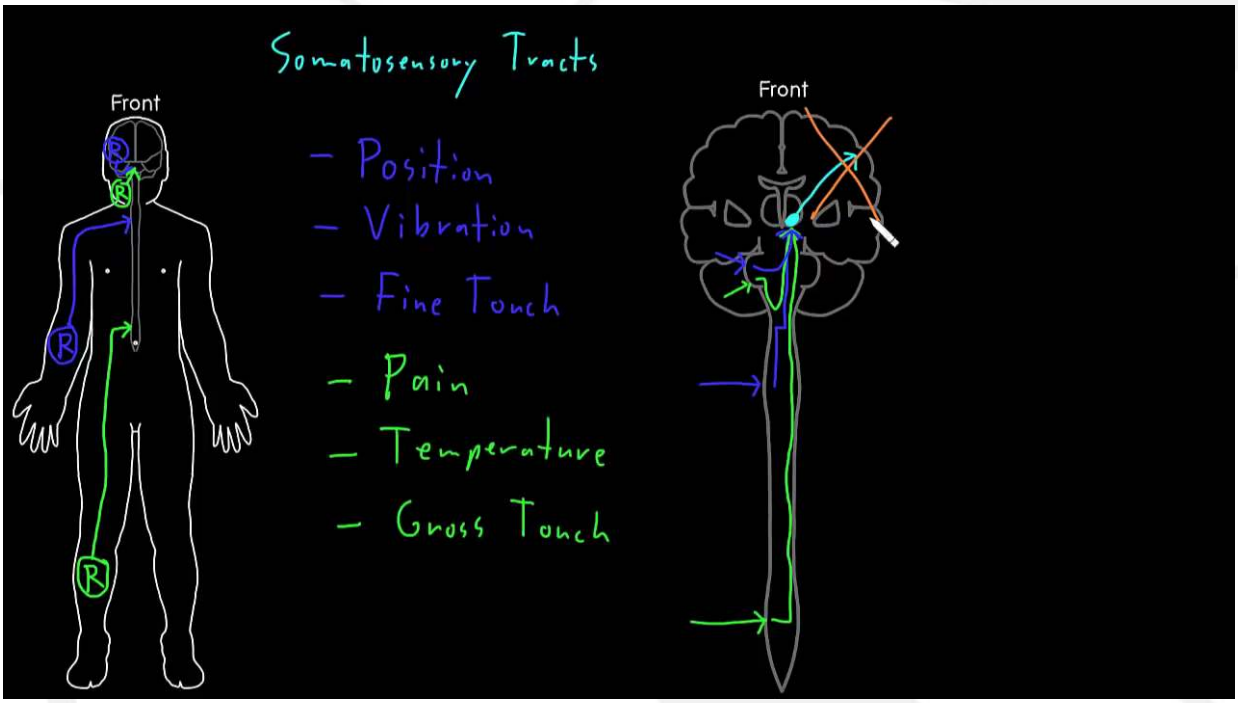


And then, it will come to the same place that is deep down in one of the brain's cerebral hemispheres where that information is coming from the body on the other side. The pain, temperature, and gross touch senses from the face and other head parts can enter the brain stem through cranial nerves. And then that information takes a funny pathway that goes down first and then crosses, then goes up near the area where this information came from the rest of the body. And lastly, all these senses from the face and some other head parts will also come into the brain stem through the cranial nerves. This will also cross over to the other side of the brain and go to the same deep place in the cerebral hemisphere.

All these different types of somatosensory information deep in the cerebral hemisphere will come back together. They're going to be very close to each other now. Then they will stay together pretty close as they send information to areas of the cerebral cortex outside the cerebral hemisphere that will process that information more. So because the somatosensory tracks are carrying these types of sensory information through the nervous system, they have this sort of anatomy that if there's some injury to one of the cerebral hemispheres. Then what we often see with damage to one side of the brain is that the other side of the body can have a somatosensory loss because all these pathways carry somatosensory information across from one side to the other.



I am introducing these somatosensory tracts to you and explaining why we, doctors, often see injuries to one side of the brain that is causing somatosensory loss or abnormalities in the body. So if we're looking from the front and the left cerebral hemisphere of the brain that has an injury, we could see the loss of somato sensation or abnormal somato sensation on the side of the face and the body. Also, depending on how much brain tissue is injured and how much of these somatosensory pathways are affected. And you could also see that these different pathways have different parts in the central nervous system, so they travel to abnormalities. Some additional details of the brainstem or the spinal cord could affect some aspects of somato sensation but not others depending on where the abnormal area is.



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