NAME: OBERIKO OGHENERUNO FAVOUR

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 QUESTION: Discuss the somatosensory pathway

 ANSWER

First of all, what are the somatosensory pathways? The somatosensory pathways (also referred to as the somatosensory system or somatosensory tracts) process information about somatic sensations such as pain, temperature, touch, position and vibration. This information is received through receptors inside or at the surface of the body. The somatosensory pathways start by specialized receptors in the periphery receiving information and transmitting this through a series of neurons and synaptic relays in the central nervous system. The two main sensory pathways are the dorsal column pathway which conveys information regarding fine touch, vibration, proprioception, and two-point discrimination and the spinothalamic or anterolateral pathway which conveys information on crude touch, pain, and temperature. A somatosensory pathway will typically have 3 neurons: primary, secondary and tertiary. The cell bodies of the three neurons in a typical somatosensory pathway are located in the dorsal root ganglion, the spinal cord, and the thalamus. A major target of somatosensory pathways is the postcentral gyrus in the parietal lobe of the cerebral cortex and the postcentral gyrus is the location of the primary somatosensory area that takes the form of a map called the sensory homunculus, a sensory homunculus maps sub-regions of the cortical postcentral gyrus to certain part of the body.

Since this is a discussion on the somatosensory pathways some key points that might have or might have not been mentioned above are to be noted:

* Sensory receptors housed in the dorsal root ganglia project to secondary neurons of the spinal cord that decussate and project to the thalamus or cerebellum.
* Tertiary neurons project to the postcentral gyrus of the parietal lobe forming a sensory homunculus.
* Our sense of touch, or tactile sensation is mediated by cutaneous mechanoreceptors located in our skin.
* There are four main types of cutaneous mechanoreceptors: Pacinian corpuscles, Meissner’s corpuscles, Merkel’s discs, and Ruffini endings.
* Cutaneous mechanoreceptors are categorized by morphology, by the type of sensation they perceive and by the rate of adaptation. Furthermore, each has a different receptive field.
* Proprioception is the sense of the position parts of our body and force being generated during movement.
* Proprioception relies on two, primary stretch receptors: Golgi tendon organs and muscle spindles.
* Muscle spindles are sensory receptors within the belly of a muscle that primarily detects changes in length of this muscle. They convey length information to the central nervous system via sensory neurons. This information can be processed by the brain to determine the position of the body parts.
* The Golgi organ ( also called Golgi tendon organ, tendon organ, neurotendinous organ, or neurotendinous spindle) is a proprioceptive sensory receptor organ that is located at the insertion of skeletal muscle fibers into the tendons of skeletal muscle.
* A sensory homunculus is a pictorial representation of the primary somatosensory cortex.
* Somatotopy is the correspondence of an area of the body to a specific point in the brain.
* Wilder Penfield was the researcher and surgeon who created maps of the somatosensory cortex.

 FUNCTIONS

 The somatosensory system functions in the body’s periphery , spinal cord, and the brain.

* Periphery: Sensory receptors ( i.e., thermoreceptors, mechanoreceptors, etc.) detect various stimuli.
* Spinal cord: Afferent pathways in the spinal cord serve to pass information from the periphery and the rest of the body to the brain.
* Brain: The postcentral gyrus contains Brodmann areas (BA) 3a, 3b, 1, and 2 that make up the somatosensory cortex , BA3a is involved with the sense of relative position of neighboring body parts and the amount of effort being used during movement. BA3b is responsible for distributing somatosensory information to BA1 and shape and size information to BA2.

 THE END.