Sensory Receptors

A sensory receptor is a structure that reacts to a physical stimulus in the environment, whether internal or external. It is a sensory nerve ending that receives information and conducts a process of generating nerve impulses to be transmitted to the brain for interpretation and perception. Sensory receptors vary in classifications but generally initiate the same process of registering stimuli and creating nerve signals.

Functions

In a sensory system, sensory receptors serve as the front-liners because they are in contact with the stimulus. Taste or gustatory receptors, odor or olfactory receptors have receptor molecules which undergo a process of binding to chemicals in the stimuli. For instance, the chemicals in food interaction with the taste receptors of the taste bud so that an action potential or a nerve signal can be created. Other sensory receptors function by means of transduction. Photoreceptors of the eye contain rhodopsin and other proteins that transduce
or transform light energy into electrical impulses. Without these sensory receptors, both sensation and perception cannot occur.

**Classifications**

Stimulus modality is defined as an aspect of a stimulus that could be light, sound, taste, temperature, smell, pressure, etc. Because there are different stimulus modalities, sensory receptors also vary in terms of adequate stimulus, morphology, and location.

**By Adequate Stimulus**

Adequate stimulus refers to the property of a sensory receptor that describes the type of energy to which the sensory receptor reacts to. In short, adequate stimulus is the ability of a sensory receptor to determine the stimulus modality. Sensory receptors that are classified according to their adequate stimulus include the following:

| Sensory Receptor                      | Adequate Stimulus (sensory receptor responds to…)
|----------------------------------------|--------------------------------------------------
| Ampullae of Lorenzini (electroreceptors) | electric fields, salinity, temperature           
| Baroreceptors                          | pressure in blood vessels                        
| Chemoreceptors                         | chemical stimuli                                  
| Hydroreceptors                         | humidity changes                                 
| Mechanoreceptors                       | mechanical stress or mechanical strain           
| Nociceptors                            | damage to body tissues (which leads to pain perception) 
| Osmoreceptors                          | osmolarity of fluids                             
| Photoreceptors                         | light                                            
| Proprioceptors                         | sense of position                                
| Thermoreceptors                        | temperature, heat, cold or both                  
| Electromagnetic receptors              | electromagnetic waves                             
| Pacinian Corpuscles                    | pressure on skin; weight of an object            
| Meissner’s Corpuscles                  | fine touch                                        

**By Morphology**

Sensory receptors that are classified according to morphology or form are usually divided into two main groups: free nerve endings and encapsulated receptors. Free nerve endings such as thermoreceptors and nociceptors have unmyelinated terminal neuronal branches (i.e. no myelinated sheath or protection, thus they are bare). Encapsulated receptors such as Meissner's and Pacinian corpuscles are protected by layered connective tissue.

**By Location**

The types of sensory receptors according to location include cutaneous receptors and mechanoreceptors. Sensory receptors located in the dermis or epidermis of the skin are called cutaneous receptors. These include nociceptors and thermoreceptors. Mechanoreceptors, on the other hand, are located in muscle spindles, enabling them to detect muscle stretch. Other receptors are located inside the body, such as the baroceptors in the blood vessels.

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