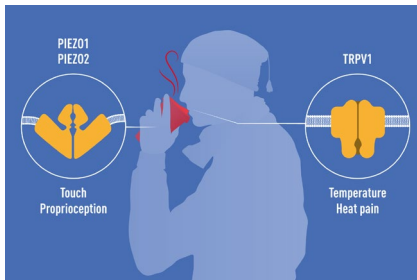


Student worksheet – Medicine prize 2021

Receptors reacting to temperature and pressure



The ability to perceive heat, cold and touch is essential to our survival and a necessary condition for us to perceive and interpret the world around us. We take these sensory impressions for granted in our daily lives, but how exactly are temperature and pressure translated into nerve signals? This year's Nobel Prize laureates have answered that question.

David Julius wanted to study how it happens that a feeling of heat or pain is produced when we eat chilli peppers. The substance that makes chili peppers spicy is called capsaicin. Julius knew that capsaicin activates nerve cells that normally register pain. But exactly how capsaicin affects those cells was a mystery. The work for which he was awarded the prize was the discovery of a receptor in the cell membrane. When this receptor is activated by capsaicin, a signal is sent through the nerve system to the brain. The brain in turn interprets this signal as heat or pain.

Ardem Patapoutian worked with receptors, too, but he focused on pressure receptors. The work for which he was awarded the prize is the discovery of a specific protein that functions as a receptor. This receptor reacts to pressure and touch. When this receptor is activated, here too a nerve signal is sent to the brain.

The primary benefit of these discoveries is that they have given us a better understanding of how the body reacts to external factors and expanded our knowledge of the processes that are triggered and how they work. These discoveries can also be used in further research, including the search for a treatment for chronic pain.

Vocabulary

Nerve cell: One type of cell in the human body. These cells make up our nervous system, the function of which is to receive and transmit nerve signals.

Nerve signal: When one nerve cell communicates something to another nerve cell, it sends the information through an electrical impulse, or nerve signal.

Receptor: A protein that is embedded in or on the cell membrane. Receptors are what cells use to communicate. They take in and pass on signals both within and outside the cell.

Cell membrane: A layer that forms a barrier around the cell, something like the skin around your body.

Chronic pain: Recurring, persistent or lifelong pain.

What is the most interesting part of the laureates' work?

Alfred Nobel wanted the Nobel Prizes to be awarded to people who worked for the greatest benefit to humankind. What is the greatest benefit of the laureates' contributions?
