Channelopathy-associated congenital insensitivity to pain

Description

Channelopathy-associated congenital insensitivity to pain is a condition that inhibits the ability to perceive physical pain. From birth, affected individuals never feel pain in any part of their body when injured. People with this condition can feel the difference between sharp and dull and hot and cold, but they cannot sense, for example, that a hot beverage is burning their tongue. Pain is a vital signal that helps people avoid danger and injuries. People who cannot feel pain experience more injuries and may have shorter life expectancies.

The first signs of channelopathy-associated congenital insensitivity to pain often occur when an infant shows no response to stimuli such as an injury or medical procedures like vaccines. Young children with this condition may have wounds from biting or burning themselves.

A lack of pain awareness often leads individuals to develop wounds, bruises, broken bones, and other health issues that may go undetected. Long lasting joint injuries (often occurring alongside broken bones) can lead to joint deformities and often the loss of normal use of that body part. Eye injuries that go unnoticed can lead to vision loss. Many people with channelopathy-associated congenital insensitivity to pain also have a complete loss of the sense of smell (anosmia).

Channelopathy-associated congenital insensitivity to pain is considered a form of peripheral neuropathy because it affects the peripheral nervous system, which connects the brain and spinal cord to muscles and to cells that detect sensations such as touch, smell, and pain.

Frequency

Channelopathy-associated congenital insensitivity to pain is a rare condition, though its exact prevalence is unknown. It is one of about 10 disorders characterized by a lifelong inability to sense physical pain.

Causes

Variants (also called mutations) in the *SCN9A* gene cause channelopathy-associated congenital insensitivity to pain. The *SCN9A* gene provides instructions for making one part (the alpha subunit) of a sodium channel called NaV1.7. Sodium channels create an

opening in the cell membrane to transport positively charged sodium atoms (sodium ions) into cells. Sodium ion transport play a key role in a cell's ability to generate and transmit electrical signals.

NaV1.7 sodium channels are found in nerve cells called nociceptors. These cells transmit pain signals to the spinal cord and brain; this pain signaling is known as nociception. The NaV1.7 sodium channel is also found in olfactory sensory neurons, which are nerve cells in the nasal cavity that transmit smell-related signals to the brain.

Certain variants in the *SCN9A* gene can cause cells to produce alpha subunits that do not work normally. These nonfunctional subunits do not allow NaV1.7 sodium channels to open, preventing the flow of sodium ions into nociceptors. This lack of sodium ions blocks nociceptors from transmitting pain signals from the site of an injury to the brain. The loss of NaV1.7 sodium channel activity in olfactory sensory neurons similarly likely prevents smell-related signals from reaching the brain, leading to anosmia.

Learn more about the gene associated with Channelopathy-associated congenital insensitivity to pain

- SCN9A

Inheritance

This condition is inherited in an autosomal recessive pattern, which means both copies of the gene in each cell must have a variant to cause the disorder. The parents of an individual with an autosomal recessive condition each carry one copy of the altered gene, but they typically do not show signs and symptoms of the condition.

Other Names for This Condition

- Asymbolia for pain
- Channelopathy-associated insensitivity to pain
- CIP
- CIP-SCN9A
- Congenital analgesia
- Congenital indifference to pain
- Congenital pain indifference
- Indifference to pain, congenital, autosomal recessive
- Pain insensitivity, congenital

Additional Information & Resources

Genetic Testing Information

- Genetic Testing Registry: Channelopathy-associated congenital insensitivity to pain, autosomal recessive (https://www.ncbi.nlm.nih.gov/gtr/conditions/C1855739/)

Genetic and Rare Diseases Information Center

- Congenital insensitivity to pain-anosmia-neuropathic arthropathy (https://rarediseases.info.nih.gov/diseases/12267/index)

Patient Support and Advocacy Resources

- National Organization for Rare Disorders (NORD) (https://rarediseases.org/)

Clinical Trials

- ClinicalTrials.gov (https://clinicaltrials.gov/search?cond=%22Channelopathy-associated congenital insensitivity to pain%22)

Catalog of Genes and Diseases from OMIM

- INDIFFERENCE TO PAIN, CONGENITAL, AUTOSOMAL RECESSIVE; CIP (https://omim.org/entry/243000)

Scientific Articles on PubMed

- PubMed (https://pubmed.ncbi.nlm.nih.gov/?term=((congenital+insensitivity+to+pain%5BTIAB%5D)+OR+(congenital+indifference+to+pain%5BTIAB%5D))+AND+SCN9A+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+6000+days%22%5Bdp%5D)

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