



Congenital insensitivity to pain with anhidrosis

Congenital insensitivity to pain with anhidrosis (CIPA) has two characteristic features: the inability to feel pain and temperature, and decreased or absent sweating (anhidrosis). This condition is also known as hereditary sensory and autonomic neuropathy type IV. The signs and symptoms of CIPA appear early, usually at birth or during infancy, but with careful medical attention, affected individuals can live into adulthood.

An inability to feel pain and temperature often leads to repeated severe injuries. Unintentional self-injury is common in people with CIPA, typically by biting the tongue, lips, or fingers, which may lead to spontaneous amputation of the affected area. In addition, people with CIPA heal slowly from skin and bone injuries. Repeated trauma can lead to chronic bone infections (osteomyelitis) or a condition called Charcot joints, in which the bones and tissue surrounding joints are destroyed.

Normally, sweating helps cool the body temperature. However, in people with CIPA, anhidrosis often causes recurrent, extremely high fevers (hyperpyrexia) and seizures brought on by high temperature (febrile seizures).

In addition to the characteristic features, there are other signs and symptoms of CIPA. Many affected individuals have thick, leathery skin (lichenification) on the palms of their hands or misshapen fingernails or toenails. They can also have patches on their scalp where hair does not grow (hypotrichosis). About half of people with CIPA show signs of hyperactivity or emotional instability, and many affected individuals have intellectual disability. Some people with CIPA have weak muscle tone (hypotonia) when they are young, but muscle strength and tone become more normal as they get older.

Frequency

CIPA is a rare condition; however, the prevalence is unknown.

Causes

Mutations in the *NTRK1* gene cause CIPA. The *NTRK1* gene provides instructions for making a receptor protein that attaches (binds) to another protein called NGF β . The NTRK1 receptor is important for the survival of nerve cells (neurons).

The NTRK1 receptor is found on the surface of cells, particularly neurons that transmit pain, temperature, and touch sensations (sensory neurons). When the NGF β protein binds to the NTRK1 receptor, signals are transmitted inside the cell that tell the cell to grow and divide, and that help it survive. Mutations in the *NTRK1* gene lead to a protein that cannot transmit signals. Without the proper signaling, neurons die by a process of self-destruction called apoptosis. Loss of sensory neurons leads to the inability to feel

pain in people with CIPA. In addition, people with CIPA lose the nerves leading to their sweat glands, which causes the anhidrosis seen in affected individuals.

Inheritance Pattern

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

Other Names for This Condition

- CIPA
- hereditary insensitivity to pain with anhidrosis
- hereditary sensory and autonomic neuropathy type IV
- hereditary sensory and autonomic neuropathy, type 4
- HSAN type IV
- HSAN4

Diagnosis & Management

Genetic Testing Information

- What is genetic testing?
[/primer/testing/geneticTesting](#)
- Genetic Testing Registry: Hereditary insensitivity to pain with anhidrosis
<https://www.ncbi.nlm.nih.gov/gtr/conditions/C0020074/>

Research Studies from ClinicalTrials.gov

- ClinicalTrials.gov
<https://clinicaltrials.gov/ct2/results?cond=%22congenital+insensitivity+to+pain+with+anhidrosis%22+OR+%22Hereditary+Sensory+Autonomic+Neuropathy%2C+Type+4%22+OR+%22Type+IV%2C+HSAN%22>

Other Diagnosis and Management Resources

- GeneReview: NTRK1 Congenital Insensitivity to Pain with Anhidrosis
<https://www.ncbi.nlm.nih.gov/books/NBK1769>

Additional Information & Resources

Health Information from MedlinePlus

- Encyclopedia: Osteomyelitis
<https://medlineplus.gov/ency/article/000437.htm>
- Encyclopedia: Sweating - absent
<https://medlineplus.gov/ency/article/003219.htm>
- Health Topic: Degenerative Nerve Diseases
<https://medlineplus.gov/degenerativenervediseases.html>
- Health Topic: Peripheral Nerve Disorders
<https://medlineplus.gov/peripheralnervedisorders.html>

Genetic and Rare Diseases Information Center

- Congenital insensitivity to pain with anhidrosis
<https://rarediseases.info.nih.gov/diseases/3006/congenital-insensitivity-to-pain-with-anhidrosis>

Additional NIH Resources

- National Institute of Neurological Disorders and Stroke: Hereditary Neuropathies
<https://www.ninds.nih.gov/Disorders/All-Disorders/Hereditary-Neuropathies-Information-Page>
- National Institute of Neurological Disorders and Stroke: Peripheral Neuropathy
<https://www.ninds.nih.gov/Disorders/All-Disorders/Peripheral-Neuropathy-Information-Page>
- National Institutes of Health Rare Diseases Clinical Research Network: The Inherited Neuropathies Consortium
<https://www.rarediseasesnetwork.org/cms/inc/Healthcare-Professionals/CMT>

Educational Resources

- MalaCards: insensitivity to pain, congenital, with anhidrosis
https://www.malacards.org/card/insensitivity_to_pain_congenital_with_anhidrosis
- Orphanet: Hereditary sensory and autonomic neuropathy type 4
https://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=642
- University of Chicago Center for Peripheral Neuropathy
<http://peripheralneuropathycenter.uchicago.edu/>

Patient Support and Advocacy Resources

- National Organization for Rare Disorders (NORD): Hereditary Sensory and Autonomic Neuropathy, Type IV
<https://rarediseases.org/rare-diseases/hereditary-sensory-and-autonomic-neuropathy-type-iv/>
- The Foundation for Peripheral Neuropathy
<https://www.foundationforpn.org/>

Clinical Information from GeneReviews

- NTRK1 Congenital Insensitivity to Pain with Anhidrosis
<https://www.ncbi.nlm.nih.gov/books/NBK1769>

Scientific Articles on PubMed

- PubMed
<https://www.ncbi.nlm.nih.gov/pubmed?term=%28Hereditary+Sensory+and+Autonomic+Neuropathies%5BMAJR%5D%29+AND+%28%28congenital+insensitivity+to+pain+with+anhidrosis%5BTIAB%5D%29+OR+%28hsan+type+iv%5BTIAB%5D%29+OR+%28hereditary+sensory+autonomic+neuropathy+type+iv%5BTIAB%5D%29+OR+%28hsan4%5BTIAB%5D%29+OR+%28cipa%5BTIAB%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+3600+days%22%5Bdp%5D>

Catalog of Genes and Diseases from OMIM

- INSENSITIVITY TO PAIN, CONGENITAL, WITH ANHIDROSIS
<http://omim.org/entry/256800>

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