Cap myopathy

Description

Cap myopathy is a disorder that primarily affects skeletal muscles, which are muscles that the body uses for movement. People with cap myopathy have muscle weakness (myopathy) and poor muscle tone (hypotonia) throughout the body, but they are most severely affected in the muscles of the face, neck, and limbs. The muscle weakness, which begins at birth or during childhood, can worsen over time.

Affected individuals may have feeding and swallowing difficulties in infancy. They typically have delayed development of motor skills such as sitting, crawling, standing, and walking. They may fall frequently, tire easily, and have difficulty running, climbing stairs, or jumping. In some cases, the muscles used for breathing are affected, and life-threatening breathing difficulties can occur.

People with cap myopathy may have a high arch in the roof of the mouth (high-arched palate), severely drooping eyelids (ptosis), and a long face. Some affected individuals develop an abnormally curved lower back (lordosis) or a spine that curves to the side (scoliosis).

The name cap myopathy comes from characteristic abnormal cap-like structures that can be seen in muscle cells when muscle tissue is viewed under a microscope. The severity of cap myopathy is related to the percentage of muscle cells that have these caps. Individuals in whom 70 to 75 percent of muscle cells have caps typically have severe breathing problems and may not survive childhood, while those in whom 10 to 30 percent of muscle cells have caps have milder symptoms and can live into adulthood.

Frequency

Cap myopathy is a rare disorder that has been identified in only a small number of individuals. Its exact prevalence is unknown.

Causes

Mutations in the *ACTA1*, *TPM2*, or *TPM3* genes can cause cap myopathy. These genes provide instructions for producing proteins that play important roles in skeletal muscles.

The *ACTA1* gene provides instructions for making a protein called skeletal alpha (α)-

actin, which is part of the actin protein family. Actin proteins are important for cell movement and the tensing of muscle fibers (muscle contraction). Thin filaments made up of actin molecules and thick filaments made up of another protein called myosin are the primary components of muscle fibers and are important for muscle contraction. Attachment (binding) and release of the overlapping thick and thin filaments allows them to move relative to each other so that the muscles can contract. The mutation in the *ACTA1* gene that causes cap myopathy results in an abnormal protein that may interfere with the proper assembly of thin filaments. The cap structures in muscle cells characteristic of this disorder are composed of disorganized thin filaments.

The *TPM2* and *TPM3* genes provide instructions for making proteins that are members of the tropomyosin protein family. Tropomyosin proteins regulate muscle contraction by attaching to actin and controlling its binding to myosin. The specific effects of *TPM2* and *TPM3* gene mutations are unclear, but researchers suggest they may interfere with normal actin-myosin binding between the thin and thick filaments, impairing muscle contraction and resulting in the muscle weakness that occurs in cap myopathy.

Learn more about the genes associated with Cap myopathy

- ACTA1
- TPM2
- TPM3

Inheritance

Cap myopathy is an autosomal dominant condition, which means one copy of the altered gene in each cell is sufficient to cause the disorder. Most cases are not inherited; they result from new mutations in the gene and occur in people with no history of the disorder in their family.

Other Names for This Condition

- Cap disease
- Congenital myopathy with caps

Additional Information & Resources

Genetic and Rare Diseases Information Center

- Cap myopathy (https://rarediseases.info.nih.gov/diseases/11915/index)

Patient Support and Advocacy Resources

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

Catalog of Genes and Diseases from OMIM

- CONGENITAL MYOPATHY 4B, AUTOSOMAL RECESSIVE; CMYO4B (https://omim.org/entry/609284)
- CONGENITAL MYOPATHY 23; CMYO23 (https://omim.org/entry/609285)

Scientific Articles on PubMed

- PubMed (https://pubmed.ncbi.nlm.nih.gov/?term=%28cap+myopathy%5BTIAB%5D%29+OR+%28%28cap+disease%5BTIAB%5D%29+AND+%28myopathy%5BTIAB%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D)

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