Fukuyama congenital muscular dystrophy

Description

Fukuyama congenital muscular dystrophy is an inherited condition that predominantly affects the muscles, brain, and eyes. Congenital muscular dystrophies are a group of genetic conditions that cause muscle weakness and wasting (atrophy) beginning very early in life.

Fukuyama congenital muscular dystrophy affects the skeletal muscles, which are muscles the body uses for movement. The first signs of the disorder appear in early infancy and include a weak cry, poor feeding, and weak muscle tone (hypotonia). Weakness of the facial muscles often leads to a distinctive facial appearance including droopy eyelids (ptosis) and an open mouth. In childhood, muscle weakness and joint deformities (contractures) restrict movement and interfere with the development of motor skills such as sitting, standing, and walking.

Fukuyama congenital muscular dystrophy also impairs brain development. People with this condition have a brain abnormality called cobblestone lissencephaly, in which the surface of the brain develops a bumpy, irregular appearance (like that of cobblestones). These changes in the structure of the brain lead to significantly delayed development of speech and motor skills and moderate to severe intellectual disability. Social skills are less severely impaired. Most children with Fukuyama congenital muscular dystrophy are never able to stand or walk, although some can sit without support and slide across the floor in a seated position. More than half of all affected children also experience seizures.

Other signs and symptoms of Fukuyama congenital muscular dystrophy include impaired vision, other eye abnormalities, and slowly progressive heart problems after age 10. As the disease progresses, affected people may develop swallowing difficulties that can lead to a bacterial lung infection called aspiration pneumonia. Because of the serious medical problems associated with Fukuyama congenital muscular dystrophy, most people with the disorder live only into late childhood or adolescence.

Frequency

Fukuyama congenital muscular dystrophy is seen almost exclusively in Japan, where it is the second most common form of childhood muscular dystrophy (after Duchenne muscular dystrophy). Fukuyama congenital muscular dystrophy has an estimated incidence of 2 to 4 per 100,000 Japanese infants.

Causes

Fukuyama congenital muscular dystrophy is caused by mutations in the *FKTN* gene. This gene provides instructions for making a protein called fukutin. Although the exact function of fukutin is unclear, researchers predict that it may chemically modify a protein called alpha (α)-dystroglycan. This protein anchors cells to the lattice of proteins and other molecules (the extracellular matrix) that surrounds them. In skeletal muscles, α-dystroglycan helps stabilize and protect muscle fibers. In the brain, this protein helps direct the movement (migration) of nerve cells (neurons) during early development.

The most common mutation in the *FKTN* gene reduces the amount of fukutin produced within cells. A shortage of fukutin likely prevents the normal modification of α-dystroglycan, which disrupts that protein's normal function. Without functional α-dystroglycan to stabilize muscle cells, muscle fibers become damaged as they repeatedly contract and relax with use. The damaged fibers weaken and die over time, leading to progressive weakness and atrophy of the skeletal muscles.

Defective α-dystroglycan also affects the migration of neurons during the early development of the brain. Instead of stopping when they reach their intended destinations, some neurons migrate past the surface of the brain into the fluid-filled space that surrounds it. Researchers believe that this problem with neuronal migration causes cobblestone lissencephaly in children with Fukuyama congenital muscular dystrophy. Less is known about the effects of *FKTN* mutations in other parts of the body.

Because Fukuyama congenital muscular dystrophy involves a malfunction of α-dystroglycan, this condition is described as a dystroglycanopathy.

Learn more about the gene associated with Fukuyama congenital muscular dystrophy

- FKTN

Inheritance

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

- Cerebromuscular dystrophy, Fukuyama type
- FCMD
- Fukuyama CMD
- Fukuyama muscular dystrophy
- Fukuyama syndrome

- Fukuyama type congenital muscular dystrophy
- Muscular dystrophy, congenital progressive, with mental retardation
- Muscular dystrophy, congenital, Fukuyama type
- Muscular dystrophy, congenital, with central nervous system involvement
- Polymicrogyria with muscular dystrophy

Additional Information & Resources

Genetic Testing Information

- Genetic Testing Registry: Muscular dystrophy-dystroglycanopathy (congenital with brain and eye anomalies), type A, 4 (https://www.ncbi.nlm.nih.gov/gtr/conditions/C0410174/)

Genetic and Rare Diseases Information Center

- Congenital muscular dystrophy, Fukuyama type (https://rarediseases.info.nih.gov/diseases/6475/index)

Patient Support and Advocacy Resources

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

Clinical Trials

- ClinicalTrials.gov (https://clinicaltrials.gov/search?cond=%22Fukuyama congenital muscular dystrophy%22)

Catalog of Genes and Diseases from OMIM

- MUSCULAR DYSTROPHY-DYSTROGLYCANOPATHY (CONGENITAL WITH BRAIN AND EYE ANOMALIES), TYPE A, 4; MDDGA4 (https://omim.org/entry/253800)

Scientific Articles on PubMed

- PubMed (https://pubmed.ncbi.nlm.nih.gov/?term=%28%28fukuyama+congenital+muscular+dystrophy%5BTIAB%5D%29+OR+%28fukuyama+muscular+dystrophy%5BTIAB%5D%29+OR+%28fukuyama+syndrome%5BTIAB%5D%29+OR+%28FCMD%29+OR+%28Fukuyama-type+congenital+muscular+dystrophy%5BTIAB%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1800+days%22%5Bdp%5D)

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