Spondylocarpotarsal synostosis syndrome

Spondylocarpotarsal synostosis syndrome is a disorder that affects the development of bones throughout the body. Newborns with this disorder are of approximately normal length, but impaired growth of the torso results in short stature over time. The bones of the spine (vertebrae) are misshapen and abnormally joined together (fused). The vertebral abnormalities may result in an abnormally curved lower back (lordosis) and a spine that curves to the side (scoliosis).

People with spondylocarpotarsal synostosis syndrome have abnormalities and fusion of the bones of the wrist (carpal bones) and ankle (tarsal bones). They may also have inward- and upward-turning feet (clubfeet). Characteristic facial features include a round face, a large forehead (frontal bossing), and nostrils that open to the front rather than downward (anteverted nares).

Some people with spondylocarpotarsal synostosis syndrome have an opening in the roof of the mouth (a cleft palate), hearing loss, thin tooth enamel, flat feet, or an unusually large range of joint movement (hypermobility). Individuals with this disorder can survive into adulthood. Intelligence is generally unaffected, although mild developmental delay has been reported in some affected individuals.

Frequency

Spondylocarpotarsal synostosis syndrome is a rare disorder; its prevalence is unknown. At least 25 affected individuals have been identified.

Causes

Mutations in the *FLNB* gene cause spondylocarpotarsal synostosis syndrome. The *FLNB* gene provides instructions for making a protein called filamin B. This protein helps build the network of protein filaments (cytoskeleton) that gives structure to cells and allows them to change shape and move. Filamin B attaches (binds) to another protein called actin and helps the actin to form the branching network of filaments that makes up the cytoskeleton. It also links actin to many other proteins to perform various functions within the cell, including the cell signaling that helps determine how the cytoskeleton will change as tissues grow and take shape during development.

Filamin B is especially important in the development of the skeleton before birth. It is active (expressed) in the cell membranes of cartilage-forming cells (chondrocytes). Cartilage is a tough, flexible tissue that makes up much of the skeleton during early development. Most cartilage is later converted to bone (a process called ossification), except for the cartilage that continues to cover and protect the ends of bones and is present in the nose, airways (trachea and bronchi), and external ears. Filamin

B appears to be important for normal cell growth and division (proliferation) and maturation (differentiation) of chondrocytes and for the ossification of cartilage.

FLNB gene mutations that cause spondylocarpotarsal synostosis syndrome result in the production of an abnormally short filamin B protein that is unstable and breaks down rapidly. Loss of the filamin B protein appears to result in out-of-place (ectopic) ossification, resulting in fusion of the bones in the spine, wrists, and ankles and other signs and symptoms of spondylocarpotarsal synostosis syndrome.

A few individuals who have been diagnosed with spondylocarpotarsal synostosis syndrome do not have mutations in the *FLNB* gene. Researchers are working to identify and confirm additional genetic changes that can cause this disorder.

Inheritance Pattern

Spondylocarpotarsal synostosis syndrome caused by *FLNB* gene mutations 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.

In a few individuals with signs and symptoms similar to those of spondylocarpotarsal synostosis syndrome but without *FLNB* gene mutations, the condition appears to have been inherited in an autosomal dominant pattern. Autosomal dominant means one copy of the altered gene in each cell is sufficient to cause the disorder.

Other Names for This Condition

- congenital scoliosis with unilateral unsegmented bar
- congenital synspondylism
- SCT
- SCT syndrome
- spondylocarpotarsal syndrome
- vertebral fusion with carpal coalition

Diagnosis & Management

Genetic Testing Information

- What is genetic testing?
  /primer/testing/genetictesting
- Genetic Testing Registry: Spondylocarpotarsal synostosis syndrome
  https://www.ncbi.nlm.nih.gov/gtr/conditions/C1848934/

Other Diagnosis and Management Resources

- GeneReview: FLNB-Related Disorders
  https://www.ncbi.nlm.nih.gov/books/NBK2534

Additional Information & Resources

Health Information from MedlinePlus

- Health Topic: Bone Diseases
  https://medlineplus.gov/bonediseases.html
- Health Topic: Scoliosis
  https://medlineplus.gov/scoliosis.html

Genetic and Rare Diseases Information Center

- Spondylocarpotarsal synostosis syndrome
  https://rarediseases.info.nih.gov/diseases/4974/spondylocarpotarsal-synostosis-syndrome

Educational Resources

- MalaCards: spondylocarpotarsal synostosis syndrome
  https://www.malacards.org/card/spondylocarpotarsal_synostosis_syndrome
- Orphanet: Spondylocarpotarsal synostosis
  https://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=3275

Patient Support and Advocacy Resources

- Little People of America
  https://www.lpaonline.org/
- Little People UK
  https://littlepeopleuk.org/
- The MAGIC Foundation for Children's Growth
  https://www.magicfoundation.org/

Clinical Information from GeneReviews

- FLNB-Related Disorders
  https://www.ncbi.nlm.nih.gov/books/NBK2534

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28spondylocarpotarsal+synostosis+syndrome%5BTIAB%5D%29+AND+english%5Bla%5D+AND+human%5Bmh%5D

Catalog of Genes and Diseases from OMIM

- SPONDYLOCARPOTARSAL SYNOSTOSIS SYNDROME
  http://omim.org/entry/272460

Medical Genetics Database from MedGen

- Spondylocarpotarsal synostosis syndrome
  https://www.ncbi.nlm.nih.gov/medgen/341339

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