Spondyloenchondrodysplasia with immune dysregulation

Spondyloenchondrodysplasia with immune dysregulation (SPENCDI) is an inherited condition that primarily affects bone growth and immune system function. The signs and symptoms of SPENCDI can become apparent anytime from infancy to adolescence.

Bone abnormalities in individuals with SPENCDI include flattened spinal bones (platyspondyly), abnormalities at the ends of long bones in the limbs (metaphyseal dysplasia), and areas of damage (lesions) on the long bones and spinal bones that can be seen on x-rays. Additional skeletal problems occur because of abnormalities of the tough, flexible tissue called cartilage that makes up much of the skeleton during early development. Individuals with SPENCDI often have areas where cartilage did not convert to bone. They may also have noncancerous growths of cartilage (enchondromas). The bone and cartilage problems contribute to short stature in people with SPENCDI.

Individuals with SPENCDI have a combination of immune system problems. Many affected individuals have malfunctioning immune systems that attack the body’s own tissues and organs, which is known as an autoimmune reaction. The malfunctioning immune system can lead to a variety of disorders, such as a decrease in blood cell fragments called platelets (thrombocytopenia), premature destruction of red blood cells (hemolytic anemia), an underactive thyroid gland (hypothyroidism), or chronic inflammatory disorders such as systemic lupus erythematosus or rheumatoid arthritis. In addition, affected individuals often have abnormal immune cells that cannot grow and divide in response to harmful invaders such as bacteria and viruses. As a result of this immune deficiency, these individuals have frequent fevers and recurrent respiratory infections.

Some people with SPENCDI have neurological problems such as abnormal muscle stiffness (spasticity), difficulty with coordinating movements (ataxia), and intellectual disability. They may also have abnormal deposits of calcium (calcification) in the brain.

Due to the range of immune system problems, people with SPENCDI typically have a shortened life expectancy, but figures vary widely.

Frequency

SPENCDI appears to be a rare condition, although its prevalence is unknown.

Causes

Mutations in the ACP5 gene cause SPENCDI. This gene provides instructions for making an enzyme called tartrate-resistant acid phosphatase type 5 (TRAP). The TRAP enzyme primarily regulates the activity of a protein called osteopontin, which is
produced in bone cells called osteoclasts and in immune cells. Osteopontin performs a 
variety of functions in these cells.

Osteoclasts are specialized cells that break down and remove (resorb) bone tissue 
that is no longer needed. These cells are involved in bone remodeling, which is a 
normal process that replaces old bone tissue with new bone. During bone remodeling, 
osteopontin is turned on (activated), allowing osteoclasts to attach (bind) to bones. 
When the breakdown of bone is complete, TRAP turns off (inactivates) osteopontin, 
causing the osteoclasts to release themselves from bone.

In immune system cells, osteopontin helps fight infection by promoting inflammation, 
regulating immune cell activity, and turning on various immune system cells that are 
necessary to fight off foreign invaders. As in bone cells, the TRAP enzyme inactivates 
osteopontin in immune cells when it is no longer needed.

The ACP5 gene mutations that cause SPENCDI impair or eliminate TRAP's ability 
to inactivate osteopontin. As a result, osteopontin is abnormally active, prolonging 
bone breakdown by osteoclasts and triggering abnormal inflammation and immune 
responses by immune cells. In people with SPENCDI, increased bone remodeling 
contributes to the skeletal abnormalities, including irregularly shaped bones and short 
stature. An overactive immune system leads to increased susceptibility to autoimmune 
disorders and impairs the body's normal immune response to harmful invaders, 
resulting in frequent infections. The mechanism that leads to the other features 
of SPENCDI, including movement disorders and intellectual disability, is currently 
unknown.

**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**

- combined immunodeficiency with autoimmunity and spondylometaphyseal 
dysplasia
- Roifman-Melamed syndrome
- Roifman–Costa syndrome
- SPENCDI
Diagnosis & Management

Genetic Testing Information

• What is genetic testing?
  https://primer/testing/genetictesting

• Genetic Testing Registry: Spondyloenchondrodysplasia with immune dysregulation

Other Diagnosis and Management Resources

• Boston Children's Hospital: Primary Immunodeficiency
  http://www.childrenshospital.org/conditions-and-treatments/conditions/p/primary-immunodeficiency

• MedlinePlus Encyclopedia: Immune Response
  https://medlineplus.gov/ency/article/000821.htm

• MedlinePlus Encyclopedia: Skeletal Limb Abnormalities
  https://medlineplus.gov/ency/article/003170.htm

Additional Information & Resources

Health Information from MedlinePlus

• Encyclopedia: Immune Response
  https://medlineplus.gov/ency/article/000821.htm

• Encyclopedia: Skeletal Limb Abnormalities
  https://medlineplus.gov/ency/article/003170.htm

• Health Topic: Bone Diseases
  https://medlineplus.gov/bonediseases.html

• Health Topic: Immune System and Disorders
  https://medlineplus.gov/immunesystemanddisorders.html

Additional NIH Resources

• National Institute of Allergy and Infectious Diseases: Disorders of the Immune System
  https://www.niaid.nih.gov/research/immune-system-research

Educational Resources

• MalaCards: spondyloenchondrodysplasia with immune dysregulation
  https://www.malacards.org/card/spondyloen
  chondrodysplasia_withImmuneDysregulation

• Orphanet: Spondyloenchondrodysplasia
  https://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=1855
Patient Support and Advocacy Resources

- Immune Deficiency Foundation
  https://primaryimmune.org/

- International Skeletal Dysplasia Registry, UCLA
  https://www.uclahealth.org/ortho/isdr

- Little People of America
  https://www.lpaonline.org/

- Little People UK
  https://littlepeopleuk.org/

- Primary Immunodeficiency Resource Center
  http://www.jmfworld.com/

- Resource List from the University of Kansas Medical Center: Dwarfism/Short Stature
  http://www.kumc.edu/gec/support/skeldysp.html

- Resource List from the University of Kansas Medical Center: Immune Deficiency
  http://www.kumc.edu/gec/support/immune.html

- The MAGIC Foundation
  https://www.magicfoundation.org/

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28spondyloenchondrodysplasia%5BALL%5D%29+AND+%28autoimmunity%5BTIAB%5D%29+OR+%28spondyloenchondrodysplasia%5BALL%5D%29+OR+%28spondyloenchondrodysplasia%5BALL%5D%29+OR+%28spondyloenchondrodysplasia%5BALL%5D%29+AND+immune%5BTIAB%5D%29+AND+english%5Bla%5D+AND+human%5Bmh%5D

Catalog of Genes and Diseases from OMIM

- SPONDYLOENCHONDRODYSPLASIA WITH IMMUNE DYSREGULATION
  http://omim.org/entry/607944
Sources for This Summary

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Reviewed: December 2013
Published: June 11, 2019