# Juvenile Paget disease

## Description

Juvenile Paget disease is a disorder that affects bone growth. This disease causes bones to be abnormally large, misshapen, and easily broken (fractured).

The signs of juvenile Paget disease appear in infancy or early childhood. As bones grow, they become progressively weaker and more deformed. These abnormalities usually become more severe during the adolescent growth spurt, when bones grow very quickly.

Juvenile Paget disease affects the entire skeleton, resulting in widespread bone and joint pain. The bones of the skull tend to grow unusually large and thick, which can lead to hearing loss. The disease also affects bones of the spine (vertebrae). The deformed vertebrae can collapse, leading to abnormal curvature of the spine. Additionally, weight-bearing long bones in the legs tend to bow and fracture easily, which can interfere with standing and walking.

## Frequency

Juvenile Paget disease is rare; about 50 affected individuals have been identified worldwide.

## Causes

Juvenile Paget disease is caused by mutations in the *TNFRSF11B* gene. This gene provides instructions for making a protein that is involved in bone remodeling, a normal process in which old bone is broken down and new bone is created to replace it.

Bones are constantly being remodeled, and the process is carefully controlled to ensure that bones stay strong and healthy. Mutations in the *TNFRSF11B* gene lead to a much faster rate of bone remodeling starting early in life. Bone tissue is broken down more quickly than usual, and when new bone tissue grows it is larger, weaker, and less organized than normal bone. This abnormally fast bone remodeling underlies the problems with bone growth characteristic of juvenile Paget disease.

Learn more about the gene associated with Juvenile Paget disease

- TNFRSF11B

## 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

- Chronic congenital idiopathic hyperphosphatasemia
- Familial idiopathic hyperphosphatasemia
- Familial osteoectasia
- Hyperostosis corticalis deformans juvenilis
- Hyperphosphatasemia with bone disease
- Hyperphosphatasia, familial idiopathic
- Idiopathic hyperphosphatasia
- JPD
- Juvenile Paget's disease
- Osteochalasia desmalis familiaris
- Osteoectasia with hyperphosphatasia

## Additional Information & Resources

Genetic Testing Information

- Genetic Testing Registry: Hyperphosphatasemia with bone disease (https://www.ncbi.nlm.nih.gov/gtr/conditions/C0268414/)

Genetic and Rare Diseases Information Center

- Juvenile Paget disease (https://rarediseases.info.nih.gov/diseases/2831/index)

Patient Support and Advocacy Resources

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

Catalog of Genes and Diseases from OMIM

- PAGET DISEASE OF BONE 5, JUVENILE-ONSET; PDB5 (https://omim.org/entry/239000)

Scientific Articles on PubMed

- PubMed (https://pubmed.ncbi.nlm.nih.gov/?term=%28%28juvenile+paget+disease%5BTIAB%5D%29+OR+%28juvenile+paget's+disease%5BTIAB%5D%29+OR+%28idiopathic+hyperphosphatasia%5BTIAB%5D%29+OR+%28osteoectasia+with+hyperphosphatasia%5BTIAB%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+3600+days%22%5Bdp%5D)

## References


- Chong B, Hegde M, Fawkner M, Simonet S, Cassinelli H, Coker M, Kanis J, SeidelJ, Tau C, Tuysuz B, Yuksel B, Love D; International HyperphosphatasiaCollaborative Group. Idiopathic hyperphosphatasia and TNFRSF11B mutations:relationships between phenotype and genotype. J Bone Miner Res. 2003Dec;18(12):2095-104. doi: 10.1359/jbmr.2003.18.12.2095. Citation on PubMed (https://pubmed.ncbi.nlm.nih.gov/14672344)
- Cundy T, Hegde M, Naot D, Chong B, King A, Wallace R, Mulley J, Love DR,Seidel J, Fawkner M, Banovic T, Callon KE, Grey AB, Reid IR, Middleton-Hardie CA, Cornish J. A mutation in the gene TNFRSF11B encoding osteoprotegerin causes anidiopathic hyperphosphatasia phenotype. Hum Mol Genet. 2002 Sep 1;11(18): 2119-27.doi: 10.1093/hmg/11.18.2119. Citation on PubMed (https://pubmed.ncbi.nlm.nih.gov/12189164)
- Cundy T. Idiopathic hyperphosphatasia. Semin Musculoskelet Radiol. 2002Dec;6(4): 307-12. doi: 10.1055/s-2002-36729. Citation on PubMed (https://pubmed.ncbi.nlm.nih.gov/12541187)
- Daroszewska A, Ralston SH. Mechanisms of disease: genetics of Paget's diseaseof bone and related disorders. Nat Clin Pract Rheumatol. 2006 May;2(5):270-7.doi: 10.1038/ncprheum0172. Citation on PubMed (https://pubmed.ncbi.nlm.nih.gov/16932700)
- Janssens K, de Vernejoul MC, de Freitas F, Vanhoenacker F, Van Hul W. Anintermediate form of juvenile Paget's disease caused by a truncating TNFRSF11Bmutation. Bone. 2005 Mar;36(3):542-8. doi: 10.1016/j.bone.2004.12.004. Citation on PubMed (https://pubmed.ncbi.nlm.nih.gov/15777670)
- Lucas GJ, Daroszewska A, Ralston SH. Contribution of genetic factors to thepathogenesis of Paget's disease of bone and related disorders. J Bone Miner Res.2006 Dec;21 Suppl 2:P31-7. doi: 10.1359/jbmr.06s206. Citation on PubMed (https://pubmed.ncbi.nlm.nih.gov/17229006)
- Ralston SH. Juvenile Paget's disease, familial expansile osteolysis and othergenetic osteolytic disorders. Best Pract Res Clin Rheumatol. 2008Mar;22(1): 101-11. doi: 10.1016/j.berh.2007.11.005. Citation on PubMed (https://pubmed.ncbi.nlm.nih.gov/18328984)
- Whyte MP, Obrecht SE, Finnegan PM, Jones JL, Podgornik MN, McAlister WH, MummS. Osteoprotegerin deficiency and juvenile Paget's disease. N Engl J Med. 2002Jul 18;347(3):175-84. doi: 10.1056/NEJMoa013096. Citation on PubMed ( https://pubmed.ncbi.nlm.nih.gov/12124406)

**Last updated February 1, 2010**