Lysinuric protein intolerance

Description

Lysinuric protein intolerance is a disorder caused by the body's inability to digest and use certain protein building blocks (amino acids), namely lysine, arginine, and ornithine. Because the body cannot absorb these amino acids, which are found in many protein-rich foods, nausea and vomiting are typically experienced after ingesting protein.

People with lysinuric protein intolerance have a variety of features, such as an enlarged liver and spleen (hepatosplenomegaly), short stature, muscle weakness, impaired immune function, and brittle bones that are prone to fracture (osteoporosis). A lung disorder called pulmonary alveolar proteinosis may also develop. This disorder is characterized by protein deposits in the lungs, which interfere with lung function and can be life-threatening. An accumulation of amino acids in the kidneys can cause end-stage renal disease (ESRD), in which the kidneys become unable to filter fluids and waste products from the body effectively. A lack of certain amino acids can cause elevated levels of ammonia in the blood. If ammonia levels are too high for too long, they can cause coma and intellectual disability.

The signs and symptoms of lysinuric protein intolerance typically appear after infants are weaned and receive greater amounts of protein from solid foods.

Frequency

Lysinuric protein intolerance is estimated to occur in 1 in 50,000 newborns in Finland. This condition has also been found in numerous individuals in Japan and Italy. Outside these populations, this condition occurs less frequently, but the exact incidence is unknown.

Causes

Variants (also called mutations) in the *SLC7A7* gene cause lysinuric protein intolerance. The *SLC7A7* gene provides instructions for producing a protein called y+L amino acid transporter 1 (y+LAT-1), which is involved in transporting lysine, arginine, and ornithine between cells in the body. The transportation of amino acids from the small intestine and kidneys to the rest of the body is necessary for the body to be able to make and use proteins.

Variants in the y+LAT-1 protein disrupt the transportation of lysine, arginine, and

ornithine. As a result, these amino acids are not absorbed by cells in the small intestine, leading to a shortage of lysine, arginine, and ornithine in the body. In the kidneys, the amino acids cannot be returned to the bloodstream (a process called reabsorption) but are instead removed from the body in urine.

This shortage of lysine, arginine, and ornithine disrupts many vital functions. Arginine and ornithine are involved in a cellular process called the urea cycle, which processes the excess nitrogen (in the form of ammonia) that is generated when protein is used by the body. The lack of arginine and ornithine in the urea cycle causes elevated levels of ammonia in the blood (hyperammonemia). Lysine is particularly abundant in collagen molecules, which give structure and strength to connective tissues such as skin, tendons, and ligaments. A deficiency of lysine may contribute to the short stature and osteoporosis seen in people with lysinuric protein intolerance. However, the cause for most of the features of lysinuric protein intolerance is unclear.

Learn more about the gene associated with Lysinuric protein intolerance

- SLC7A7

Inheritance

This condition is inherited in an autosomal recessive pattern, which means both copies of the gene in each cell have variants. The parents of an individual with an autosomal recessive condition each carry one copy of the altered gene, but they typically do not show signs and symptoms of the condition.

Other Names for This Condition

- Congenital lysinuria
- Hyperdibasic aminoaciduria
- LPI

Additional Information & Resources

Genetic Testing Information

- Genetic Testing Registry: Lysinuric protein intolerance (https://www.ncbi.nlm.nih.gov/gtr/conditions/C0268647/)

Genetic and Rare Diseases Information Center

- Lysinuric protein intolerance (https://rarediseases.info.nih.gov/diseases/3335/index)

Patient Support and Advocacy Resources

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

Clinical Trials

- ClinicalTrials.gov (https://clinicaltrials.gov/search?cond=%22Lysinuric protein intolerance%22)

Catalog of Genes and Diseases from OMIM

- LYSINURIC PROTEIN INTOLERANCE; LPI (https://omim.org/entry/222700)

Scientific Articles on PubMed

- PubMed (https://pubmed.ncbi.nlm.nih.gov/?term=(lysinuric+protein+intolerance%5BTIAB%5D)+AND+english%5Bla%5D+AND+human%5Bmh%5D)

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