Blau syndrome

Blau syndrome is an inflammatory disorder that primarily affects the skin, joints, and eyes. Signs and symptoms begin in childhood, usually before age 4.

A form of skin inflammation called granulomatous dermatitis is typically the earliest sign of Blau syndrome. This skin condition causes a persistent rash that can be scaly or involve hard lumps (nodules) that can be felt under the skin. The rash is usually found on the torso, arms, and legs.

Arthritis is another common feature of Blau syndrome. In affected individuals, arthritis is characterized by inflammation of the lining of joints (the synovium). This inflammation, known as synovitis, is associated with swelling and joint pain. Synovitis usually begins in the joints of the hands, feet, wrists, and ankles. As the condition worsens, it can involve additional joints and restrict movement by decreasing the range of motion in many joints.

Most people with Blau syndrome also develop uveitis, which is swelling and inflammation of the middle layer of the eye (the uvea). The uvea includes the colored portion of the eye (the iris) and related tissues that underlie the white part of the eye (the sclera). Uveitis can cause eye irritation and pain, increased sensitivity to bright light (photophobia), and blurred vision. Other structures in the eye can also become inflamed, including the outermost protective layer of the eye (the conjunctiva), the tear glands, the specialized light-sensitive tissue that lines the back of the eye (the retina), and the nerve that carries information from the eye to the brain (the optic nerve). Inflammation of any of these structures can lead to severe vision impairment or blindness.

Some individuals with Blau syndrome develop kidney disease (nephritis) due to inflammation. They may also have deposits of calcium in the kidneys (nephrocalcinosis) and often develop chronic kidney failure. Inflammation of blood vessels (vasculitis) can cause scarring and tissue death in the vessels and impedes blood flow to tissues and organs.

Less commonly, Blau syndrome can affect other parts of the body, including the liver, spleen, salivary gland, brain, blood vessels, lungs, and heart. Inflammation involving these organs and tissues can impair their function and cause life-threatening complications. Rarely, affected individuals have episodes of fever or high blood pressure in the blood vessels that carry blood from the heart to the lungs (pulmonary hypertension).

Frequency

Although Blau syndrome appears to be uncommon, its prevalence is unknown.
Causes

Blau syndrome results from mutations in the *NOD2* gene. The protein produced from this gene helps defend the body from foreign invaders, such as viruses and bacteria, by playing several essential roles in the immune response, including inflammatory reactions. An inflammatory reaction occurs when the immune system sends signaling molecules and white blood cells to a site of injury or disease to fight microbial invaders and facilitate tissue repair.

The *NOD2* gene mutations that cause Blau syndrome result in a NOD2 protein that is overactive, which can trigger an abnormal inflammatory reaction. However, it is unclear how overactivation of the NOD2 protein causes the specific pattern of inflammation affecting the joints, eyes, and skin that is characteristic of Blau syndrome.

Inheritance Pattern

Blau syndrome is inherited in an autosomal dominant pattern, which means one copy of the altered gene in each cell is sufficient to cause the disorder. Most affected individuals have one parent with the condition.

In some cases, people with the characteristic features of Blau syndrome do not have a family history of the condition. Some researchers believe that these individuals have a non-inherited version of the disorder called early-onset sarcoidosis.

Other Names for This Condition

- arthrocutaneouveal granulomatosis
- early-onset sarcoidosis
- familial granulomatosis, Blau type
- familial juvenile systemic granulomatosis
- granulomatous inflammatory arthritis, dermatitis, and uveitis, familial
- pediatric granulomatous arthritis

Diagnosis & Management

Genetic Testing Information

- What is genetic testing? /primer/testing/genetictesting
Other Diagnosis and Management Resources

- Merck Manual Consumer Version: Overview of Dermatitis
- Merck Manual Consumer Version: Uveitis

Additional Information & Resources

Health Information from MedlinePlus

- Encyclopedia: Synovial Fluid
  https://medlineplus.gov/ency/imagepages/19698.htm
- Encyclopedia: The Uvea
  https://medlineplus.gov/ency/article/002337.htm
- Encyclopedia: Uveitis
  https://medlineplus.gov/ency/article/001005.htm
- Health Topic: Arthritis
  https://medlineplus.gov/arthritis.html
- Health Topic: Eye Diseases
  https://medlineplus.gov/eyediseases.html
- Health Topic: Skin Conditions
  https://medlineplus.gov/skinconditions.html

Genetic and Rare Diseases Information Center

- Blau syndrome

Additional NIH Resources

- National Eye Institute: Uveitis
  https://nei.nih.gov/health/uveitis/uveitis
- National Institute of Arthritis and Musculoskeletal and Skin Diseases: Arthritis
  https://www.niams.nih.gov/health-topics/arthritis

Educational Resources

- MalaCards: blau syndrome
  https://www.malacards.org/card/blau_syndrome
- Merck Manual Consumer Version: Overview of Dermatitis
- Merck Manual Consumer Version: Uveitis

- Orphanet: Blau syndrome
  https://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=90340

Patient Support and Advocacy Resources
  - Autoinflammatory Alliance
    http://autoinflammatory.org/blau.php
  - Ocular Immunology and Uveitis Foundation
    http://www.uveitis.org/
  - Stop Childhood Auto Inflammatory Diseases (CAID) Now
    https://www.stopcaidnow.org/

Scientific Articles on PubMed
  - PubMed
    https://www.ncbi.nlm.nih.gov/pubmed?term=%28blau+syndrome%5BTIAB%5D%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1800+days+%22%5Bdp%5D

Catalog of Genes and Diseases from OMIM
  - BLAU SYNDROME
    http://omim.org/entry/186580

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