Bannayan-Riley-Ruvalcaba syndrome

Description

Bannayan-Riley-Ruvalcaba syndrome is a genetic condition characterized by a large head size (macrocephaly), multiple noncancerous tumors and tumor-like growths called hamartomas, and dark freckles on the penis in males. The signs and symptoms of Bannayan-Riley-Ruvalcaba syndrome are present from birth or become apparent in early childhood.

At least half of affected infants have macrocephaly, and many also have a high birth weight and a large body size (macrosomia). Growth usually slows during childhood, so affected adults are of normal height and body size. About half of all children with Bannayan-Riley-Ruvalcaba syndrome have intellectual disability or delayed development, particularly the development of speech and of motor skills such as sitting, crawling, and walking. These delays may improve with age.

About half of all people with Bannayan-Riley-Ruvalcaba syndrome develop hamartomas in their intestines, known as hamartomatous polyps. Other noncancerous growths often associated with Bannayan-Riley-Ruvalcaba syndrome include fatty tumors called lipomas and angiolipomas that develop under the skin. Some affected individuals also develop hemangiomas, which are red or purplish growths that consist of tangles of abnormal blood vessels. People with Bannayan-Riley-Ruvalcaba syndrome may also have an increased risk of developing certain cancers, although researchers are still working to determine the cancer risks associated with this condition.

Other signs and symptoms that have been reported in people with Bannayan-Riley-Ruvalcaba syndrome include weak muscle tone (hypotonia) and other muscle abnormalities, and seizures. Some affected individuals have thyroid problems, such as an enlargement of the thyroid gland, known as multinodular goiter, or a condition called Hashimoto thyroiditis. Skeletal abnormalities have also been described with this condition, including an unusually large range of joint movement (hyperextensibility), abnormal side-to-side curvature of the spine (scoliosis), and a sunken chest (pectus excavatum).

The features of Bannayan-Riley-Ruvalcaba syndrome overlap with those of another disorder called Cowden syndrome. People with Cowden syndrome develop hamartomas and other noncancerous growths; they also have an increased risk of developing certain types of cancer. Both conditions can be caused by mutations in the *PTEN* gene. Some people with Bannayan-Riley-Ruvalcaba syndrome have had

relatives diagnosed with Cowden syndrome, and other individuals have had the characteristic features of both conditions. Based on these similarities, researchers have proposed that Bannayan-Riley-Ruvalcaba syndrome and Cowden syndrome represent a spectrum of overlapping features known as *PTEN* hamartoma tumor syndrome instead of two distinct conditions.

Frequency

The prevalence of Bannayan-Riley-Ruvalcaba syndrome is unknown, although it appears to be rare. Several dozen cases have been reported in the medical literature. Researchers suspect that the disorder is underdiagnosed because its signs and symptoms vary and some of them are subtle.

Causes

About 60 percent of all cases of Bannayan-Riley-Ruvalcaba syndrome result from mutations in the *PTEN* gene. Another 10 percent of cases are caused by a large deletion of genetic material that includes part or all of this gene. The protein produced from the *PTEN* gene is a tumor suppressor, which means that it normally prevents cells from growing and dividing (proliferating) too rapidly or in an uncontrolled way. If this protein is missing or defective, cell proliferation is not regulated effectively. Uncontrolled cell division can lead to the formation of hamartomas and other cancerous and noncancerous tumors. The protein produced from the *PTEN* gene likely has other important functions within cells; however, it is unclear how mutations in this gene can cause the other features of Bannayan-Riley-Ruvalcaba syndrome, such as macrocephaly, developmental delay, and muscle and skeletal abnormalities.

When Bannayan-Riley-Ruvalcaba syndrome is not caused by mutations or deletions of the *PTEN* gene, the cause of the condition is unknown.

Learn more about the gene associated with Bannayan-Riley-Ruvalcaba syndrome

- PTEN

Inheritance

This condition is inherited in an autosomal dominant pattern, which means one copy of the altered gene in each cell is sufficient to cause the disorder.

Other Names for This Condition

- Bannayan-Ruvalcaba-Riley syndrome
- Bannayan-Zonana syndrome
- BRRS
- BZS
- Myhre-Riley-Smith syndrome

- Riley-Smith syndrome
- Ruvalcaba-Myhre syndrome
- Ruvalcaba-Myhre-Smith syndrome

Additional Information & Resources

Genetic Testing Information

- Genetic Testing Registry: Bannayan-Riley-Ruvalcaba syndrome (https://www.ncbi.nlm.nih.gov/gtr/conditions/C0265326/)

Genetic and Rare Diseases Information Center

- Bannayan-Riley-Ruvalcaba syndrome (https://rarediseases.info.nih.gov/diseases/5887/index)

Patient Support and Advocacy Resources

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

Clinical Trials

- ClinicalTrials.gov (https://clinicaltrials.gov/search?cond=%22Bannayan-Riley-Ruvalcaba syndrome%22)

Catalog of Genes and Diseases from OMIM

- COWDEN SYNDROME 1; CWS1 (https://omim.org/entry/158350)

Scientific Articles on PubMed

- PubMed (https://pubmed.ncbi.nlm.nih.gov/?term=%28Hamartoma+Syndrome,+Multiple%5BMAJR%5D%29+AND+%28%28bannayan-riley-ruvalcaba+syndrome%5BTIAB%5D%29+OR+%28bannayan-zonana+syndrome%5BTIAB%5D%29+OR+%28bannayan-ruvalcaba-riley+syndrome%5BTIAB%5D%29+OR+%28ruvalcaba-myhre-smith+syndrome%5BTIAB%5D%29+OR+%28BRRS%5BTIAB%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+3600+days%22%5Bdp%5D)

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