Bernard-Soulier syndrome

Description

Bernard-Soulier syndrome is a bleeding disorder associated with abnormal platelets, which are blood cells involved in blood clotting. In affected individuals, platelets are unusually large and fewer in number than usual (a combination known as macrothrombocytopenia). People with Bernard-Soulier syndrome tend to bruise easily and have an increased risk of nosebleeds (epistaxis). They may also experience abnormally heavy or prolonged bleeding following minor injury or surgery or even without trauma (spontaneous bleeding). Rarely, bleeding under the skin causes tiny red or purple spots on the skin called petechiae. Women with Bernard-Soulier syndrome often have heavy or prolonged menstrual bleeding (menorrhagia).

Frequency

Bernard-Soulier syndrome is estimated to occur in 1 in 1 million individuals; however, some doctors think the condition is underdiagnosed and may be more common.

Causes

Bernard-Soulier syndrome is caused by mutations in one of three genes: *GP1BA*, *GP1BB*, or *GP9*. The proteins produced from these genes are pieces (subunits) of a protein complex called glycoprotein (GP)Ib-IX-V. This complex is found on the surface of platelets and plays an important role in blood clotting.

The GPIb-IX-V complex can attach (bind) to a protein called von Willebrand factor, fitting together like a lock and its key. Von Willebrand factor is found on the inside surface of blood vessels, particularly when there is an injury. Binding of the GPIb-IX-V complex to von Willebrand factor allows platelets to stick to the blood vessel wall at the site of the injury. These platelets form clots, plugging holes in the blood vessels to help stop bleeding.

Most mutations in *GP1BA*, *GP1BB*, or *GP9* prevent the formation of the GPIb-IX-V complex on the surface of platelets. Other mutations impair the complex's interaction with von Willebrand factor. All of these mutations impair clot formation, which leads to the excessive bleeding characteristic of Bernard-Soulier syndrome.

Learn more about the genes associated with Bernard-Soulier syndrome

- GP1BA
- GP1BB
- GP9

Inheritance

Most cases of Bernard-Soulier syndrome are inherited in an autosomal recessive pattern, which means both copies of the *GP1BA*, *GP1BB*, or *GP9* gene in each cell have mutations. The parents of an individual with an autosomal recessive condition each carry one copy of the mutated gene. Although most people with only one copy of the mutated gene do not show signs and symptoms of the condition, some have platelets that are slightly larger than normal or very mild bleeding abnormalities.

Rare cases of Bernard-Soulier syndrome caused by mutations in the *GP1BA* or *GP1BB* gene are inherited in an autosomal dominant pattern, which means one copy of the altered gene in each cell is sufficient to cause the disorder. These individuals inherit the condition from an affected parent.

Other Names for This Condition

- BDPLT1
- Bleeding disorder, platelet-type, 1
- BSS
- Deficiency of platelet glycoprotein 1b
- Giant platelet syndrome
- Glycoprotein Ib, platelet, deficiency of
- Hemorrhagioparous thrombocytic dystrophy
- Macrothrombocytopenia, familial Bernard-Soulier type
- Platelet glycoprotein Ib deficiency
- Von Willebrand factor receptor deficiency

Additional Information & Resources

Genetic Testing Information

- Genetic Testing Registry: Bernard Soulier syndrome (https://www.ncbi.nlm.nih.gov/gtr/conditions/C0005129/)

Genetic and Rare Diseases Information Center

- Bernard-Soulier syndrome (https://rarediseases.info.nih.gov/diseases/2470/index)

Patient Support and Advocacy Resources

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

Catalog of Genes and Diseases from OMIM

- BERNARD-SOULIER SYNDROME, TYPE A2, AUTOSOMAL DOMINANT; BSSA2 (https://omim.org/entry/153670)
- BERNARD-SOULIER SYNDROME; BSS (https://omim.org/entry/231200)

Scientific Articles on PubMed

- PubMed (https://pubmed.ncbi.nlm.nih.gov/?term=%28Bernard-Soulier+Syndrome%5BMAJR%5D%29+AND+%28Bernard-Soulier+syndrome%5BTIAB%5D%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1800+days%22%5Bdp%5D)

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