Williams-Beuren syndrome

By its nature, **Williams(-Beuren) syndrome** (OMIM 194050 (https://omim.org/entry/194050)) is one of the **microdeletion syndromes**. Microdeletion syndromes are one type of **chromosomal aberration**, which are referred to as submicroscopic (also cryptic), i.e. not identifiable by basic cytogenetic analysis. In practice, this means that these aberrations cannot be observed microscopically using conventional stripping methods, but can in most cases only be detected using molecular biological or *molecular cytogenetic* methods. A typical example is the FISH method.

Microdeletion syndromes

🔎 *For more information see Microdeletion Syndromes.*

Microdeletion syndromes, among which the Williams-Beuren syndrome is one of them, are the most frequent in the population of submicroscopic aberrations and also have the most clinically severe manifestations. The cause of their occurrence (as is already evident from the microdeletion designation) is interstitial microdeletions on various chromosomes, also known as haploinsufficiency. The characteristic feature is the involvement of multiple geness that are adjacent to each other in a given region. This is the origin of another name; *contiguous gene syndromes*. This results in a relatively wide range of symptoms - genes can have very different functions.

In addition to microdeletions, other submicroscopic aberrations include **microamplifications** and **translocations** of small chromosome segments.

Etiology

Williams-Beuren syndrome affects about one in 10,000 newborns. In most cases (95%), its cause is identified as a **microdeletion** of a stretch (1.5-1.8 Mbp; 26-28 genes) of the long arm of chromosome 7 (7q11.23 band). Molecular cytogenetic analysis is used to determine this.

Clinical manifestation

Most patients have prominent suprapalpebral arches, full, prominent cheeks, thick lips and anteverted nostrils. The face thus gives an **elfin** impression (elfin face). Other characteristic features of Williams-Beuren syndrome include small, whitish, circularly arranged inclusions on the iris referred to as **irides stellatae**, abnormal dentition and hypercalcaemia.

Vascular stenosis, which occurs to varying degrees in all patients, can cause serious health problems. They are caused by deletion of the gene ***ELN*** (OMIM 130160 (https://omim.org/entry/130160)), which lies in the critical region 7q11.23. As a consequence of its haplo-sufficiency, the control of **elastin** synthesis is disrupted, leading to abnormal development of the vessel wall, resulting in reduced patency. In particular, the presence of supravalvular aortic stenosis is characteristic. This results in significant arterial hypertension and an increased risk of infarction already in childhood.

Mental retardation of individuals with Williams-Beuren syndrome is either moderate or mild. In rare cases, the intellect may not be affected at all. Individuals tend to be hyperactive, friendly in nature, and have good memory for people and places. The most likely cause of mental retardation is a deletion (or other mutation) of the **LIMK1** locus (OMIM 601329 (https://omim.org/entry/601329)), which lies in close proximity to the *ELN* gene. The *LIMK1* gene controls the synthesis of the enzyme LIM-kinase, which is involved in brain development. Familial microdeletions are rare.

Links

Related articles

- Microdeletion syndromes
- Chromosomal Abnormalities
- Structural chromosomal aberrations

Sources

- KOČÁREK, Eduard – PÁNEK, Martin – NOVOTNÁ, Drahuše. *Klinická cytogenetika I.: úvod do klinické cytogenetiky, vyšetřovací metody v klinické cytogenetice.* 1. edition. Karolinum, 2006. 120 pp. ISBN 80-246-1069-8.