Usher syndrome

What is Usher syndrome?

Usher syndrome is the most common cause of syndromic inherited retinal disease (IRD)[1], where a person has other manifestations of disease apart from their eyes. There are four subtypes of Usher syndrome, which have varying levels of vision, hearing and vestibular (balance) problems.

The vision loss in Usher syndrome is caused by a form of retinitis pigmentosa (RP), and visual symptoms often start in late childhood. Hearing loss and balance issues present earlier than this, with hearing loss often detected in newborn hearing screening.[1]

Usher syndrome is the leading cause of deafblindness, but the rate of progression of vision loss can vary widely from person to person, even within members of the same family.

It is responsible for the majority of cases of deafblindness, but the rate of progression of vision loss can vary widely from person to person and even within members of the same family. Some people may also have problems with their balance.

What are the symptoms of Usher Syndrome?

All forms of Usher syndrome present with both hearing and vision loss, with subtypes 1 and 3 also often causing balance and vestibular problems. Types 1 and 2 are the most common, accounting for around 95% of all cases.

The approximate timing of the symptom onset for each subtype are as follows:

1. USH1

- Known genes – *MY07A, USH1C, CDH23, PCHD15* and *USH1G*
- Hearing – Profound deafness at birth
- Sight – Initial symptoms of night blindness start by age 10, progressing to severe vision loss by mid-life
- Balance – Vestibular problems present from birth (often leading to delayed motor milestones like crawling and walking)

2. USH2

- Known genes – *USH2A, GPR98,* and *WHRN*
- Hearing – Moderate to severe hearing loss at birth
- Sight – Initial symptoms of night blindness generally start in the teens, progressing to severe vision loss by mid-life
- Balance – No issues

3. USH3

- Known genes – *CLRN1*
- Hearing – Normal hearing at birth, with loss beginning in childhood
- Sight – Initial symptoms of night blindness generally start in the teens, progressing to severe vision loss by mid-life
- Balance – Variable issues

4. USH4

- Known genes – *ARSG*
- Hearing – Normal hearing at birth, with loss beginning in adulthood
- Sight – Vision loss typically starts in later life, with milder loss typical
- Balance – No issues

What is the cause of Usher syndrome and how is it inherited?

The prevalence of Usher syndrome varies globally, but it is a rare condition affecting approximately one in 6,000 people.[(2)] The gene mutations (as highlighted in the above) affect the function of both the photoreceptor cells in the retina and the hair cells in the cochlea, or inner ear. This is why vision, hearing and balance can all be affected in the syndrome.

Usher syndrome is an autosomal recessive condition. Autosomal recessive inheritance means each parent is a carrier, but is not affected by the disease themselves. Each of their children will have a 25% chance of being affected, with males and females having an equal chance of being affected. The children have a 50% chance of being a carrier (having one healthy and one mutated copy of the gene).

If a family member is diagnosed with Usher syndrome, it is strongly advised that other members of the family also have an eye exam by an ophthalmologist. As hearing loss becomes obvious at a much earlier age than vision changes in patients with Usher syndrome, it is particularly important that younger siblings with a hearing problem have a careful eye examination.

Genetic testing is now often offered to families of a child with hearing loss, to determine whether they may have a syndrome which will affect other senses (such as vision) in the future.

What treatments are available?

Children with Usher syndrome benefit greatly from early intervention. This will likely involve a multidisciplinary team to care for hearing, vision and balance issues.[3]

One significant treatment option for these children is cochlear implants, which can vastly improve a child's hearing and language capabilities. Other hearing devices can be useful, including hearing aids and assistive listening devices. Vision supports, including low vision services and mobility training are advised, as well as management of vestibular dysfunction.

A number of emerging treatments are being developed that may assist in the future.

References

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Contact Retina Australia

info@retinaaustralia.com.au

(03) 9650 5088