Other Inherited Retinal Diseases:

Achromatopsia

Achromatopsia is a rare hereditary vision disorder affecting the cone photoreceptor cells, resulting in an absence of colour vision as well as additional visual problems. There are two main types of cells in the retina responsible for capturing the visual field; the rod cells and the cone cells. We use our rod cells at night-time and in low light, but they are not sensitive to colour and do not provide detailed vision. We use our cone cells in bright light. They are responsible for our colour vision and for our central, reading vision. Genetic changes or mutations in genes that function in cone cells are responsible for achromatopsia. Individuals with achromatopsia have reduced

visual acuity and are completely or almost fully colour blind however, the condition is not progressive, and it does not lead to blindness.

What are the symptoms of Achromatopsia?

The condition is often first noticed in a young child by their parents, as children with achromatopsia may dislike bright lights and often avoid the daylight (known as photophobia). Nystagmus is another symptom of the condition, where their eyes may involuntary move and "dance". Judging from their behaviour some parents may notice that their child's vision may be reduced or blurred. However, most children with achromatopsia have no problem with mobility or getting around.

What is the cause of Achromatopsia and how is it inherited?

To date, mutations in one of five genes are known to cause achromatopsia. The condition is inherited in an autosomal recessive manner, which means that an affected individual inherits a mutated copy of an achromatopsia-linked gene from both parents. Most often, the parents of an individual with achromatopsia each carry one copy of the mutated gene, but do not show signs and symptoms of the condition.

What treatments are available?

The vision of people with achromatopsia decreases as the levels of light increase. In regular home lighting indoors, or outdoors just after dawn or just before dusk, some people with achromatopsia adapt to their reduced level of visual function without resorting to tinted lenses. Instead, they use visual strategies such as squinting or shielding their eyes or they position themselves in favourable light. Others sometimes wear medium tinted lenses in such

settings. However, in full sunlight outdoors, or in very bright indoor spaces, almost all people with achromatopsia use very dark tinted lenses in order to function with a reasonable amount of vision, since they do not possess functioning cone photoreceptors needed in order to see well in these types of settings.

Two of the most common genes linked to the condition (CNGB3 and CNGA3) account for 75% of achromatopsia cases, making this condition potentially amenable to gene therapy. Retina Australia funded research into animal models of achromatopsia in 2016. Based on several successful results in animal models of achromatopsia, a number of groups are in preparation for human gene therapy clinical trials. In these trials it is planned to deliver a “normal” copy of the mutated gene back to retina, in theory restoring cone function and visual function.

Bassen-Kornzweig Syndrome

This syndrome is a form of Retinitis Pigmentosa with progressive neurological problems.

Fundus Flavimaculatus

Fundus Flavimaculatus is a condition similar to Stargardt Disease but varies in its age of onset and severity. When there is macular damage, vision can deteriorate to 20/200, although it usually remains between 20/50 and 20/80. Damage to the macula first appears in the adolescent and early adult years, and the area of damage may gradually spread.

Gyrate Atrophy

Gyrate atrophy is an autosomal recessive dystrophy caused by mutations in the gene for ornithine aminotransferase (OAT), located on chromosome 10. Originally thought to be a subtype of choroideremia, the disorder is the result of tenfold elevations of plasma ornithine, which is toxic to the Retina Pigment Epithelium (RPE) and choroid. Patients with gyrate atrophy have hyperpigmented fundi, with lobular loss of the RPE and choroid.

The finding of generalised hyperpigmentation of the remaining RPE helps to clinically distinguish gyrate atrophy from choroideremia. In the early stages, patients have large, geographic peripheral paving-stone–like areas of atrophy of the RPE and choriocapillaris, which gradually coalesce to form a characteristic scalloped border at the junction of normal and abnormal RPE. Affected patients usually develop night blindness during the first decade of life and experience progressive loss of visual field and visual acuity later in the disease course. The clinical diagnosis can be confirmed by measuring serum or plasma ornithine levels; molecular confirmation can be obtained by mutational analysis of the OATgene.

Occasionally, older patients present with an uncommon syndrome of peripheral chorioretinal atrophy that closely mimics gyrate atrophy; normal plasma ornithine levels in such patients exclude the diagnosis.

What treatments are available?

Although dietary restriction of arginine has been used to treat some gyrate atrophy patients, the diet is very difficult to maintain and must be monitored

by paediatricians with experience in metabolic disease. Vitamin B6 treatment lowers the plasma ornithine levels in a small percentage of gyrate atrophy patients.

Whether such a reduction improves the long-term visual outcome is unknown, but, unlike arginine restriction, vitamin supplementation is relatively easy to administer. Long-term vitamin therapy should be considered only for patients whose ornithine levels can be shown to drop in response to treatment.

Laurence Moon

Laurence Moon is a rarer, but similar condition to Bardet Biedel with retinal pigmental changes plus progressive neurological changes and learning difficulties. Polydactyly is not present. Laurence Moon and Bardet Biedel are both genetic and there are several genes that are currently being investigated by researchers around the world.

Peripapillary (Pericentral) Choroidal Dystrophy

Peripapillary (pericentral) Choroidal Dystrophy is a condition, which causes wasting of the blood vessels that surround the optic nerve. Patients first notice symptoms in the late adult years, when the macula is affected. Stationary cone disorders are present at birth and have symptoms decreased acuity, decreased colour vision, sensitivity to light – that do not worsen with age. There are several types of stationary cone disorders (for example, cone monochromatism, blue cone monochromatism, dichromatism, trichromatism) with differing prognoses for visual acuity.

Refsum Disease

Adult Refsum disease is a rare metabolic disorder that occurs in 1 in 1,000,000 people. It can be fatal if left untreated. A common symptom of Refsum Disease is Retinitis Pigmentosa – initial symptoms generally appear between the age of 10 to 20, with loss of night vision being common. Further information about other symptoms associated with Refsum Disease and current treatments can be found at the links below:

https://www.leukodystrophyresourceresearch.org/types-of-leukodystrophy/refsum-disease/

https://www.defeatadultrefsumeverywhere.org/