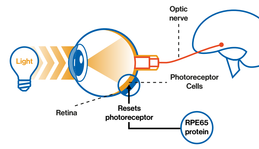
How does Luxturna®* (voretigene neparvovec) work?

What is the visual cycle?

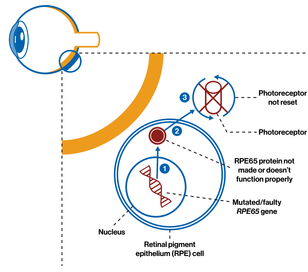
The visual cycle is the process that converts light entering the eye into electrical signals that are transmitted to the brain[1].

A particle of light (photon) hits a photoreceptor in the retina - the light-sensitive tissue that lines the back of the eye - triggering electrical signals along the optic nerve to the brain[1]. However the photoreceptor needs to be reset to be ready for the next photon[1]. A protein called **RPE65** is involved in this task[1].



Vision loss due to a genetic mutation in both copies of the *RPE65* gene

If the *RPE65* gene carrying the instructions to make the protein is mutated/faulty, the protein won't be made or will not function properly[1]. Therefore, the photoreceptors are unable to reset and will start to degenerate over time[1,2].



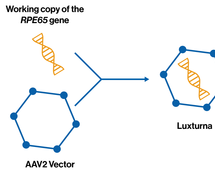
As the photoreceptors degenerate, people lose the ability to detect light, leading to night blindness and vision loss[1].

What is Luxturna?

Each person has two copies of the *RPE65* gene[3]. Luxturna is a one-time gene therapy for patients with vision loss due to a genetic mutation in both copies of the RPE65 gene, and who have enough viable retinal cells. This mutation is ultra-rare, affecting approximately **1 in 200,000** people worldwide[4].

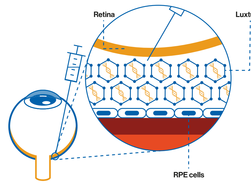
Luxturna provides a working copy of the *RPE65* gene to act in place of the mutated *RPE65* gene[2]. This working gene has the potential to restore vision and improve sight[2].

Luxturna consists of a piece of DNA – containing a working copy of the *RPE65* gene – that is packaged inside a transporter known as a vector, which is made from a modified, inactivated virus[2].



How is Luxturna administered?

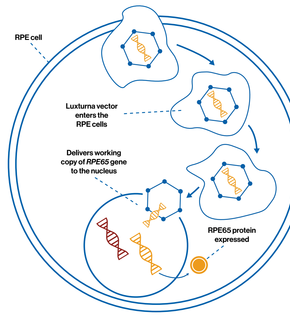
Luxturna is injected once per eye, for patients who have confirmed *RPE65* mutations and enough viable cells in their retina[5].



A specialised retinal surgeon injects the gene therapy behind the retina, into the subretinal space[5].

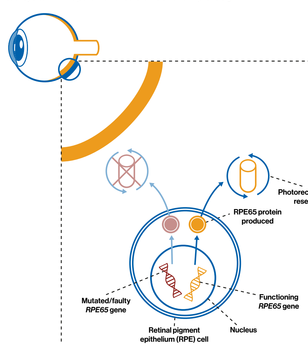
What does Luxturna do in the eye?

The Luxturna vector enters the RPE cells and delivers a working copy of the *RPE65* gene to the cell nucleus[5]. The cells then begin producing the RPE65 protein[5].



How does Luxturna restore vision and improve sight?

Luxturna provides a working copy of the *RPE65* gene to act in place of the mutated *RPE65* gene[2]. The working *RPE65* gene creates the RPE65 protein[2], thus restoring the visual cycle, with the potential to restore vision and improve sight[2].



* Luxturna is a trademark of Spark Therapeutics, Inc. in the United States and is registered in the EU

Luxturna is indicated for the treatment of adult and paediatric patients with vision loss due to inherited retinal dystrophy caused by confirmed biallelic RPE65 mutations and who have sufficient viable retinal cells.

Important Safety Information

Some patients who received Luxturna experienced red or painful eyes, corneal cell injury, an eye infection, cataracts, increased pressure in the eye, or temporary visual disturbances, like flashes or floaters, worsening of or blurred vision. Some of these may be related to the procedure used to inject Luxturna. This information is not comprehensive. For full information please see the EU Summary of Product Characteristics.

References

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3. NIH U.S. National library of medicine. What is a gene? Available at: https://ghr.nlm.nih.gov/primer/basics/gene
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