IUVENTA AGE-REVERSAL AS A GAMECHANGER IN OPHTHALMOLOGIC DISEASES

Introduction

Ageing eye diseases (cataract, presbyopia, glaucoma, diabetic retinopathy (DR) and age-related macular diseases AMD) are caused by formation of advanced glycation end products (AGEs), causing stiffness, inflammation and finally leading into blindness. Cataract is the major cause of blindness in the developing world, where cataract surgery is too expensive. No efficient treatment for blindness is available for patients over 65 years of age (AMD, DR). In 9/10 patients (dryAMD), there is no treatment, whereas 1/10 patients (wetAMD, late stage DR), develop a malignant haemorrhage or persistent edema. For the latter group, anti-vascular endothelial growth factor (VEGF) antibody injection in the eye can delay blindness. **There is an unmet need for less invasive treatments and early treatments tackling the real problem.**

Technology

Researchers at Ghent University have identified 2 enzymes that break down the AGEs, tackling the real problem and causing reversal both in front of the eye and back of the eye diseases. Validation of monotherapy and combination therapy is ongoing in all above mentioned eye diseases. Both enzymes were validated in vivo in rodent animal models for the different indications and a first pilot study in cataract dogs showed restoration of sight. The enzymes can be used for intravitreal injection but also work as eye drops. This opens potential for non-invasive front of the eye applications, preventive applications and animal applications. For the back of the eye diseases this is a real game changer as early treatment of all patients will avoid progression into blindness.

Applications

The technology will be further developed towards use for non-invasive treatment of cataract, presbyopia and glaucoma using eye drops. Another non-invasive application is prevention or delay of ageing eye diseases for human application. Next to that it can also be used as a therapeutic for domestic animals. The technology will be further developed for efficient treatment of blindness for patients over 65 years of age (diabetic retinopathy and AMD) either applied intravitreal or via eye drops.

Advantages

- The enzymes tackle the real problem of the ageing eye diseases, while now we just treat symptoms.
- The real game changer is that for diabetic retinopathy and AMD we will be able to treat early all patients and treat, delay or potentially avoid that patients evolve into blindness.
- The treatments can be used in a non-invasive manner allowing to treat patients that cannot be helped with cataract surgery.
- Cataract surgery in animals is expensive and rarely performed; the eye drops allow to treat more animals.

State of development

Iuventa Biologicals is a Ghent University spinoff project with patented enzymatic products, IU1 and IU2, that can eliminate AGE's by removing the glycation, currently we have 3 patent families. Validation studies were performed in vitro on cadaveric animal eyes, ex-vivo in human eyes and in vivo in 2 rodent animals and in vivo in a pilot cataract dog study. Results were obtained for both front of the eye applications and back of the eye applications. A spin-off team is readying "Iuventa Biologicals" aiming to start the spinoff in 2022, fine-tuning the business plan and starting to raise Series A funding to complete the development plan. The spinoff will advance IU1 and IU2 towards the market as game-changing ocular therapies.

Partnership

- We are interested in interacting with VCs, BA towards raising Series A budget.
- We are interested in interaction with companies in the Animal Health field, companies with CMC activities and CROs with expertise in ophthalmology and diabetic animal models both rodent and non-rodent.

Intellectual property

Compositions for use to treat cataract: WO2019149648, priority date 30/01/2018

1. **Compositions for use to treat advanced glycation end products-dependent ocular diseases,** WO2020053188 priority date 14/09/2018
2. **Treatment of diseases with the second enzyme**, patent not public yet

Figure

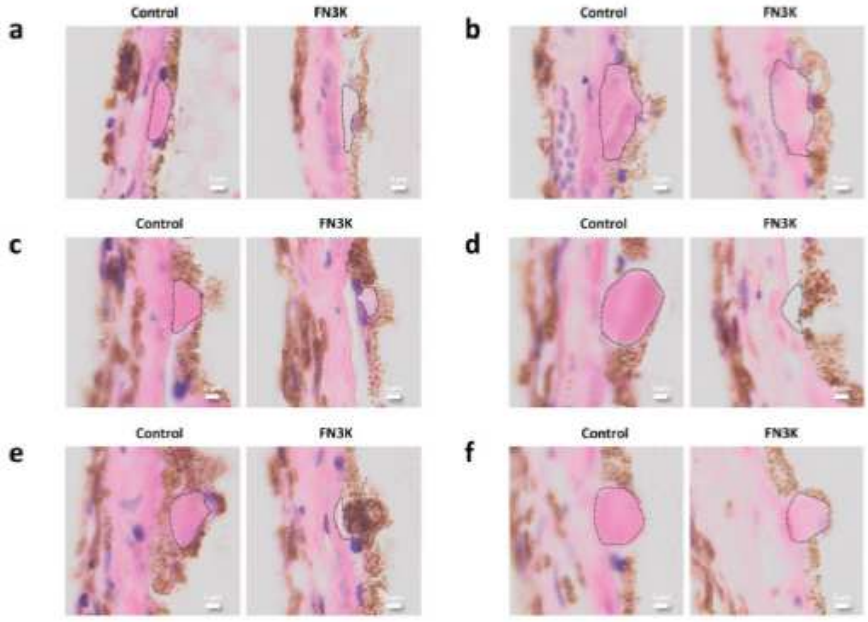

Figure 4. (a–f) Pairwise comparison on hematoxylin and eosin stained adjacent slides of 6 out of 17 control- and fructosamine-3-kinase (FN3K)-treated drusen originating from two patients with stage 3 AMD. Drusen are delineated with dotted lines. The scale bars are 5 μm.

Fructosamine-3-Kinase as a Potential Treatment Option for Age-Related Macular Degeneration. De Bruyne S, et al., J Clin Med. 2020 Sep 4;9(9):2869.

The Scientist(s) (optional)

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References

A Potential Role for Fructosamine-3-Kinase in Cataract Treatment. De Bruyne S, van Schie L, Himpe J, De Somer F, Everaert I, Derave W, Van den Broecke C, Huizing M, Bostan N, Speeckaert M, Callewaert N, **Van Aken E**, Delanghe JR.Int J Mol Sci. 2021 Apr 7;22(8):3841. doi: 10.3390/ijms22083841.

Fructosamine-3-Kinase as a Potential Treatment Option for Age-Related Macular Degeneration. De Bruyne S, Van den Broecke C, Vrielinck H, Khelifi S, De Wever O, Bracke K, Huizing M, Boston N, Himpe J, Speeckaert M, Vral A, Van Dorpe J, **Van Aken E**, Delanghe JR.J Clin Med. 2020 Sep 4;9(9):2869. doi: 10.3390/jcm9092869.

Keywords

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