# **TISSUE ENGINEERING OF THE HUMAN OCULAR SURFACE** - Developing cell therapies to cure corneal blindness -



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# The Cornea

THE HUMAN CORNEA IS THE TRANSPARENT TISSUE COVERING THE EYE AND IT CONSISTS OF THREE CELL LAYERS: AN EPITHELIUM, A STROMA AND AN ENDOTHELIUM WITH RESIDENT STEM CELLS THAT ARE CRUCIAL FOR IN VIVO TISSUE REGENERATION. TOGETHER WITH THE CONJUNCTIVA, THIS FORMS THE OCULAR SURFACE.

CORNEAL BLINDNESS, RESULTING FROM A STEM CELL DISORDER

DISEASE OR TRAUMA, IS ONE OF THE LEADING CAUSES OF (IR)REVERSIBLE BLINDNESS WORLDWIDE. CURRENTLY THE SOLUTION FOR THESE PATIENTS IS CORNEAL ONLY TRANSPLANTATION. UNFORTUNATELY, A GLOBAL DONOR SHORTAGE LIMITS TREATMENT TO ONLY 1 IN 70 PATIENTS.

THE RELATIVE SIMPLY ARCHITECTURE OF THE OCULAR SURFACE AND THE DIRE NEED FOR LAB-GROWN ALTERNATIVES, HAS MADE IT A POPULAR CANDIDATE FOR TISSUE ENGINEERING. A FULLY **BIOMIMETIC CORNEA THAT IS EASILY TRANSPLANTED COULD SOLVE** THE CURRENT DONOR SHORTAGE. IN OUR LAB WE ARE **DEVELOPING SEVERAL CELL TECHNOLOGIES TO RELIEVE PATIENTS FROM THEIR VISUAL IMPAIRMENT OR BLINDNESS.** 



# CURRENT ONGOING RESEARCH PROJECTS 1. DEVELOPING AN INNOVATIVE DRUG DELIVERY VEHICLE TO TREAT THE MOST COMMON FORM OF CORNEAL BLINDNESS 2. DESIGNING A CORNEA-ON-CHIP TO OVERCOME THE LIMITATIONS IN PRECLINICAL



#### DRUG DEVELOPMENT OF OCULAR DRUGS



1. DEVELOPING AN INNOVATIVE DRUG DELIVERY VEHICLE TO TREAT THE **MOST COMMON FORM OF CORNEAL BLINDNESS** - Hendrik Vercammen

2. DESIGNING A CORNEA-ON-CHIP TO OVERCOME THE LIMITATIONS IN PRECLINICAL DRUG DEVELOPMENT OF OCULAR DRUGS - JORIS VAN MEENEN



**ORGAN-ON-CHIP-**



## **USED TECHNIQUES:** PRIMARY CELL CULTURE, HIGH CONTENT LIVE CELL IMAGING, IMMUNOCYTOCHEMISTRY, HIGH THROUGHPUT COMPOUND SCREENING



### USED TECHNIQUES: PRIMARY CELL CULTURE, 3D CELL ENCAPSULATION, MICROFLUIDICS, IMMUNOCYTOCHEMISTRY, qPCR

