Cornea-on-chip

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Organisation

Name of the organisation University of Antwerp (UAntwerpen)

Department Translational Neurosciences

Country Belgium

Geographical Area Flemish Region

SCOPE OF THE METHOD

The Method relates to	Human health
The Method is situated in	Basic Research, Regulatory use - Routine production, Translational - Applied Research
Type of method	In vitro - Ex vivo
Specify the type of cells/tissues/organs	Corneal cells

DESCRIPTION

Method keywords

cornea-on-chip

Cornea

organ-on-chip

microfluidics

Scientific area keywords

Tissue engineering

in vitro 3D modelling

Ophtalmology

pharmacokinetics

Extracellular matrices

Method description

The main objective of this research project is to create the first full-thickness cornea-on-chip, which comprises a 3D construct with every cellular layer of the cornea. This construct is embedded in a microfluidic chip with two channels that are continuously perfused. The epithelial side of the construct is exposed to an artificial tear film and the endothelial side is connected to an artificial anterior chamber. The former allows injection of ophthalmic formulations and simulates the physiology of the tear film while the latter can be used for sampling and providing nutrients.

Lab equipment

Pumps

Method status

Still in development

PROS, CONS & FUTURE POTENTIAL

Advantages

- Controlled environment for compound testing

- Human tissue

- *In vitro* method with near *in vivo* accuracy

Challenges

- No fundamental studies on corneal development

Modifications

- Corneal nerves,

- Corneal microbiome,

- Corneal immune system,

- Integrated readout.

Future & Other applications

- Corneal disease modelling,

- Pharmacodynamics.

REFERENCES, ASSOCIATED DOCUMENTS AND OTHER INFORMATION

Links

An Overview of Advanced In Vitro Corneal Models: Implications for Pharmacologic…

Building the human cornea on a chip

Establishing and validation of a human cornea-on-chip for preclinical drug deve…

Artificial Lithographic MODel for COrNeal drug Screening (AL MOD CONS)

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