

EU research reconstructing human corneas will help more people to see

European Union funded research to reconstruct the human cornea can revolutionise eye surgery and help reduce the number of tests carried out on animals to assess the effects of chemicals on the eye. Scientists will use nanotechnology for tissue engineering to create a three-dimensional human cornea in vitro. They aim to replace the outside layer of the cornea to help restore sight, develop a hemi-cornea to replace the outer half of the cornea and reconstruct the whole cornea. A consortium of 14 research teams from 9 countries, Belgium, Finland, France, Germany, Israel, Italy, Sweden, Turkey and the United Kingdom, is conducting the “Cornea Engineering” project.

“European research is literally opening our eyes! This cutting-edge research will help more people to see and reduce animal testing”, European Research Commissioner Philippe Busquin said. “Developing tissue-engineered corneas will help address the international shortage of cornea donors and mean more people can undergo this surgery allowing more people to see. The Cornea Engineering project shows how a true European Research Area can bring top European expertise together to achieve a critical mass in knowledge and improve Europeans’ quality of life.”

Overcoming the world-wide cornea shortage

The increase in corrective eye surgery, which renders corneas unsuitable for grafting, has contributed to the international shortage of cornea donors. Cornea engineering will help tackle this shortage and reduce the risk of passing on transmissible diseases through surgery.

Reducing animal testing

Tissue-engineered corneas can also help reduce the number of cosmeto-pharmacotoxicity tests carried out on animals. The engineered corneas can reduce the use of rabbits in testing the effect of a chemical substance on the eye. EU legislation banning the marketing of cosmetic products involving testing on animals will soon come into force, further reducing this practice. Although proposed EU legislation calling for an increase in tests on chemical substances will impact on animal testing, tissue engineering can provide alternatives.

Revolutionising eye surgery with nanotechnology

The “Cornea Engineering” project involves cornea construction using recombinant human proteins made in a culture that closely simulates the cornea’s natural components. This should help eliminate problems with artificial corneas, made from synthetic polymers that often fail to integrate into the surrounding tissue once grafted.

Existing tissue engineering approaches also use proteins from non-human sources such as bovines to support the cells, risking the degenerative disease, Bovine Spongiform Encephalopathy (BSE or mad cow disease).

For further information please visit:

<http://www.cordis.lu/nanotechnology/src/pressroom.htm>

http://www.ibcp.fr/fr/project_presentation.pdf

http://www.ibcp.fr/en/ibcp_eq_DH_PS.html

Cornea engineering

Total cost (€): 4.37 M€

Commission funding (€): 2.56 M€

Participants in *Cornea Engineering* include European scientists, top ophthalmologists and innovative small and medium sized enterprises (SMEs):

- Centre National de la Recherche Scientifique -Délégation Rhône Alpes France
- Assistance Publique Hôpitaux de Paris France
- Banque Française des Yeux France
- Laboratoires Ioltech France
- Coletica France
- Universitätsklinikum Hamburg-Eppendorf Germany
- Fondazione Centro San Raffaele del Monte Tabor Italy
- Fondazione Banca Occhi del Veneto-Onlus Italy
- University of Dundee UK
- University of Liège Belgium
- University of Lund Sweden
- University of Oulu Finland
- Tel Aviv University Israel
- Middle East Technical University Turkey