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Towards the development of a cell-engineered human cornea

Currently, corneal diseases are a leading cause of vision loss that affects more than 10 million people worldwide. Treatment of these conditions is the widely accepted corneal transplant from a human donor. The difficulties inherent to corneal transplantation (mainly primary rejection and organ supply shortage) have led to an interest in the development of artificial corneas that can replace the natural organ. Until now, alternatives to the use of donor tissue include artificial substitutes (keratoprosthesis) that are used to restore vision after organ transplant rejection. However, these implants have limited use, as none of them allow for a perfect integration in the patients´ cornea, and in most of cases, prostheses are rejected and extruded. Our goal is to create a cell-engineered cornea like the human one. We have previously demonstrated that mesenchymal stem cells can differentiate into functional corneal epithelial cells as well as corneal stromal cells (keratocytes) *in vivo*. The generation of a prosthesis like the natural human corneal stroma, capable of being colonized by stem cells and capable of adequate bio integration avoiding rejection and inflammatory reaction, will provide an advance in the treatment of patients requiring a corneal transplant due to suffering from corneal stroma pathologies that are at high risk of organ transplant rejection, and will aid in the shortage of donor tissue.

Biography

Maria P de Miguel serves as Director for the Cell Engineering Group at La Paz University Hospital Health Research Institute, IDiPAZ, Madrid, Spain. Her Doctorate was completed at the Department of Cell Biology and Genetics of Alcala University in Madrid, followed by Post-Doctoral studies on stem cells at Utrecht University in the Netherlands, and later at the NIH-Frederick, MD, and at the Kimmel Cancer Center, Thomas Jefferson University in Philadelphia, where she was Research Instructor as well. She was the Assistant Professor at the Institute for Cell Engineering, Johns Hopkins Medical Institute, Baltimore, USA. Her work is focused on the molecular mechanisms involved in cellular reprogramming both in normal and neoplastic environments and in the application of such knowledge to the development of new techniques and therapies in organ transplants. She has widely published and lectured on these topics.

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