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DEVELOPMENT OF INTRAOCULAR DELIVERY SYSTEM FOR CONTROLLED RELEASE OF THERAPEUTIC AGENTS USED IN THE TREATMENT OF PCO

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Cataract is the primary cause of blindness worldwide. Currently, the most effective treatment is surgery with implantation of an intraocular lens (IOL). Even though this procedure has proven effective in restoring vision, cataract shows a very high recurrence rate. This is due to the wound-healing response triggered by the lens epithelial cells that remain in the portion of the natural lens that is left after surgery. As a result, these cells undergo a transdifferentiation process, they encroach onto the posterior side of the IOL and deposit aberrant extracellular matrix proteins. Consequently, a secondary cataract forms. This pathology is also known as posterior capsule opacification (PCO). Due to the difficulties encountered when attempting to treat it, prevention of this disease is preferable. This can be achieved by formulating IOLs with biomaterials that can modulate cell adhesion, by including elements of design that control cell migration or by administering chemical agents that block the signalling pathways that lead to the development of PCO. Drug delivery systems using intraocular implants as platforms for their assembly have been developed to dispense drugs during surgery. While research on this area has shown promising results, there are still some issues that need to be overcome, such as the premature release of the drug. The present project aims to address these limitations by creating a hydrogel-based delivery system formulated to release a therapeutic agent for reduction of PCO only when this disorder starts to develop. This delivery system uses an IOL as a vehicle, thus making it minimally invasive for the patient. The drug that has been used in this study is an anti-VEGF molecule that has been shown to reduce PCO in recently published studies. The efficiency of this system has been evaluated through *in vitro* studies of release in a 2D cell culture system, and its effects on the cellular responses have been assessed.

BIOGRAPHY

Veronica Hidalgo-Alvarez is undertaking her PhD in Bioengineering at the University of East Anglia (UK) under the supervision of Aram Saeed and Michael wormstone. She graduated in 2013 with a MSc in Biotechnology from the University of Leon (Spain). After that, she undertook a placement at the Cancer Research Centre, affiliated with the University of Liverpool, where she worked on the detection of biomarkers for lung cancer. This was followed by a second placement at the Institute of Ageing and Chronic Disease, in the same University, working on the characterization of the limbal stem cell niche in the eye.

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