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Intravitreal drug distribution from novel in situ forming injectable implants

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Eye diseases that originate at the back of the eye, such as age-related macular degeneration, diabetic macular edema, diabetic retinopathy, and uveitis account for the majority of blindness worldwide. Currently, intravitreal injections (i.e., direct injection into the eye) of drug formulations are clinically employed, due to multiple ocular barriers that restrict entry of drug following topical (e.g. eye drops) and systemic (e.g. oral tablets) administration. However, injections cause significant tissue trauma, injection-related infections (e.g. endophthalmitis), rise in intraocular pressure, uncomfortable and painful to patients, high drug-induced toxicities, and higher costs. Furthermore, diffusion of drug, convection of vitreous outflow, enzymatic reaction (metabolism), drug binding and efficacy of delivery system mainly control the bioavailability of drug after its intravitreal injection.

Our proposed project is to formulate novel in situ forming injectable implants to control drug delivery and model intravitreal drug distribution in normal and diseased eyes. In this regard, during the 3-years of this PhD project, the student will (i) design, development and characterize injectable implants, (ii) develop analytical techniques for polymer and drug analysis, (iii) investigate in vitro drug release, (iv) computational modelling of drug disposition in healthy and aged eyes in in vitro models, and (v) evaluate optimized systems in preliminary in vivo setup so as to determine the suitability of these delivery system for human application. This multidisciplinary project will also provide ample opportunity for the PhD student to gain exceptional knowledge in various aspects of pharmaceutical product development, computational modelling and ophthalmological techniques. It will also provide opportunity for the PhD student to present their research at national and international conferences.

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How to Apply

Postgraduate applications should be made using Queen's University [Direct Applications Portal](#). Please note that there are two application processes: one for admission to the university and another for postgraduate awards.

Further Information

Additional information for prospective postgraduate students can be found on the [School of Pharmacy website](#) and the [Queen's Postgraduate website](#).