



# School of Pharmacy PhD Projects 2015

**Project Title**  
**Supervisors**

**Microneedle-mediated drug delivery**  
**Professor Ryan Donnelly and Professor David Woolfson**

**Description**

Microneedle arrays are minimally invasive devices that can be used to by-pass the *stratum corneum* barrier of the skin and thus achieve transdermal delivery of drugs not normally capable of administration by this route. Microneedles are applied to the skin surface and painlessly pierce the epidermis, creating microscopic holes through which drugs diffuse to the dermal microcirculation. Microneedles are long enough to penetrate to the dermis, but are short and narrow enough to avoid stimulation of dermal nerves. Microneedles puncture skin prior to application of a drug-loaded patch or are pre-coated with drug prior to insertion. *In vivo* studies using microneedles have demonstrated delivery of oligonucleotides, desmopressin and human growth hormone, reduction of blood glucose levels from insulin delivery, increase of skin transfection with DNA and elicitation of immune response from delivery of DNA and protein antigens.

In this project, novel microneedle arrays will be investigated with a view to enhance delivery of drugs substances across the skin.

The benefits of the proposed project are two-fold. Firstly, it will develop a sophisticated value-added product that, importantly, is simple and cost effective to manufacture and addresses a specific, and currently unmet, delivery need, namely microneedle-mediated drug delivery. Secondly, it will provide training in a range of analytical methods, design and assessment of novel delivery systems and biological models for assessment of the clinical efficacy of formulations. Furthermore, student training will take place within an active research culture. In addition to laboratory based-skills, the student will also undergo training in research methodology and statistics and will have opportunities to develop both verbal and written communication skills.

**Contact Details**  
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**How to Apply**  
Postgraduate applications should be made using Queen's Online:  
<http://go.qub.ac.uk/pgapply>

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:  
<http://www.qub.ac.uk/pha>  
and the Queen's Postgraduate website:  
<http://www.qub.ac.uk/home/ProspectiveStudents/PostgraduateStudents/>

**Start Date**

Sept 2015

**Keywords**

Microneedle, drug delivery

