

Science and Technology in Medicine



Research Project Proforma (School of Medicine)

Research Title:	Drugs used in knee surgery procedures: how do they affect the health of cells in autologous chondrocyte implantation (ACI)?
Keywords (up to 5)	Cell therapy, Regenerative medicine, cartilage repair, chondrocytes, MSC
Supervisor: Job Title: Department: Email Address: Telephone: Webpage link:	Helen McCarthy PhD, Sally Roberts PhD RJA Orthopaedic Hospital & ISTM, Oswestry (project based here) Helen.mccarthy@rjah.nhs.uk ; sally.roberts@rjah.nhs.uk 01691 404660/4
Type of projects offered (delete as appropriate)	Studentship (4-8 weeks)

(1) Outline the broad aims of your research and its medical relevance (150 words):

Hyaline cartilage is a highly organised tissue which lacks the capability for spontaneous self-repair. Symptomatic full-thickness chondral defects in articular joints such as the knee have been treated for many years worldwide with autologous chondrocyte implantation (ACI); this is a two stage procedure whereby the patient's own cells are culture-expanded *in vitro* and then implanted into the defect beneath a membrane. At the RJA Orthopaedic Hospital, we have treated patients with ACI for more than 15 years, with the cells being prepared in our MHRA-licensed GMP facility. A common practice during arthroscopy and arthrotomy, such as occurs in ACI and other cartilage repair techniques, is to administer local anaesthetics (eg Bupivacaine or Lignocaine) and steroid analgesics (eg Kenlog and Depomedrone) to tissues within the joint. However, the use of these may inadvertently impact on the health of the resident cells or those being implanted and influence their ability to repair or regenerate the damaged cartilage. We aim to investigate the effect that these commonly used drugs have on the cells within the joint tissues.

(2) Indicate the skills/techniques the student will learn (100 words)

Cultured chondrocytes and fat pad or synovial cells will be exposed to these drugs at doses equivalent to those experienced *in vivo*. Cell phenotype will be assessed using the a longitudinal time lapse image capture system (Cell IQ2) to quantify cell morphology and proliferation following exposure to the drugs. The cells will also be analysed using flow cytometry for apoptosis (using 7-AAD) and stem cell characteristics (using MSC criteria defined by Dominici *et al.*, (2006) *Cytotherapy* 8:315-317).

This project will be based in the Robert Jones and Agnes Hunt Orthopaedic Hospital in Oswestry. During this 8 week project, students will gain knowledge of human cell culture, become skilled at using the Cell IQ machine to both capture and analyse data, be able to carry out simple flow cytometry as well as gain skills in microscopy, cell labelling and other histological techniques. This project will also offer the rare opportunity of interfacing with scientists and clinicians delivering cell therapy products manufactured on site and at the forefront of running regenerative medicine clinical trials.

Please submit this form electronically to Prof Divya Maitreyi Chari on d.chari@keele.ac.uk by 31 July 2015