Science and Technology in Medicine

Research Project Proforma (School of Medicine)

Research Title: **Keywords (up to 5)**	**Investigating the potential of human umbilical cord derived-stem cells for wound healing** **Cell therapy, regenerative medicine, MSCs, pressure sores in skin**
Supervisor: **Job Title:** **Department:** **Email Address:** **Telephone:** **Webpage link:**	Dr Claire Mennan PhD, Dr Karina Wright PhD, Mr AE Osman FRCS & Mr JR Chowdhury MBBS, MRCS and Sally Roberts PhD RJAH Orthopaedic Hospital, Oswestry (BASED HERE) and ISTM Claire. mennan@rjah.nhs.uk or sally.roberts@rjah.nhs.uk
Type of projects offered (delete as appropriate)	Both (Intercalation (1 year) or Studentship (4-8 weeks)

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

Pressure sores are a common and devastating medical complication of spinal cord injury (SCI); they can be life threatening, cause infections that can spread to major organs as well as leading to amputations. About 8% of those with spinal cord injuries die from pressure sores; indeed, one of the most famous SCI patients (Superman actor, Christopher Reeve) died from complications arising from pressure sores. There is considerable need for improved treatments and mesenchymal stromal/stem cell (MSC) therapy has potential for this.

The Robert Jones and Agnes Hunt Orthopaedic Hospital NHS Foundation Trust hosts the Midlands Centre for Spinal Injuries (MCSI). The 'scratch-wound assay' is an *in vitro* model of skin wound healing; confluent monolayers of fibroblasts and/or keratinocytes are scored

with a sterile point, e.g. a pipette tip, and the cells are observed as they repopulate the scratch area, mimicking healing of the wound. Fibroblasts and keratinocytes represent the majority of cells present in the epidermis and dermis respectively, and are responsible for closure, contraction and re-epithelialisation of cutaneous wounds. Using this model we have previously shown that conditioned medium from human bone marrow derived stem cells (MSC) accelerates scratch assay closure (Walter *et al*., 2009).

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

Umbilical cords (UC) represent an attractive source of stem cells for off-the-shelf therapies and have been shown to promote cutaneous wound healing (Leng *et al*., 2012; Shohara *et al.,* 2012; Zhang *et al.,* 2012). We have characterised MSCs from the umbilical cord for musculoskeletal repair (Mennan *et al*., 2013); the student will examine the influence of UC-MSC on skin repair using the scratch assay. Scratch wound closure will be recorded and quantitated using a state-of-the-art Cell IQ live cell imaging platform. This project would take place at the Robert Jones & Agnes Hunt Orthopaedic Hospital based within the spinal studies research group. Students will gain skills and understanding in cell culture of both primary human cells and cell lines, live cell imaging and basic flow cytometry.

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