

08 February 2016

Project title	Healing Mechanisms of Thermal Injury Wounds		
Key words	Healing, thermal wounds, skin grafts		
Expected duration of the project (years)	5 years		
Purpose of the project	Basic research	Yes	
	Translational and applied research	Yes	
	Regulatory use and routine production		No
	Protection of the natural environment in the interests of the health or welfare of humans or animals		No
	Preservation of species		No
	Higher education or training		No
	Forensic enquiries		No
	Maintenance of colonies of genetically altered animals		No
Objectives of the project	Thermal injury is a common cause of injury, particularly in children, worldwide with devastating lifelong consequences. Majority of wound healing research has been done on non-thermal, open and closed wounds to date. Little is known about thermal wound healing. The purpose of this project is to identify key mechanisms that can be altered to reduce scar formation including abnormal pigmentation and/or accelerate healing of a thermal injury (burn).		
Potential benefits likely to derive from this project	This work will discover mechanisms and mediators of healing of thermal wounds and may allow identification of novel drugs/factors that could be used to speed healing, reduce scarring and normalise pigmentation in man and animals. The results of this work will be of interest to both scientists and clinicians.		
Species and approximate numbers of animals expected to be used, and anticipated period of time	300 pigs over the duration of the project.		

<p>Expected adverse effects and the likely/expected level of severity. What will happen to the animals at the end.</p>	<p>We will create thermal and/or open wounds on the backs of the animals to study the rate of wound healing and function of resulting “new skin”. We will investigate effects of novel treatments/dressings on wound healing and “new skin”.</p> <p>The procedure can cause post-surgical pain of mild to moderate severity which will be controlled with pain killers.</p> <p>The animals will be humanely euthanized at the end of the study.</p>
<p>Application of the 3 Rs</p>	
<p>1. Replacement Why do animals need to be used, and why non-animal alternatives cannot be used.</p>	<p>Open or thermal wounds require cells from the circulating blood to interact with the local cells of the skin to allow complete healing of the wound and formation of the “new skin”. We can study some aspects of wound healing such as re-epithelialisation (healing of the top layer of the skin) in ex-vivo models which we are currently developing for thermal wounds. However, in order to study the full spectrum of wound healing i.e. development of the “new skin” after open/thermal wounds, requires animal studies and there are no alternative models available.</p>
<p>2. Reduction How the use of minimum numbers of animals will be assured</p>	<p>The block design of the experiments has been agreed with the statistician to ensure that minimum numbers of animals are used.</p>
<p>3. Refinement Reasons for the choice of species and why the animal model(s) to be used are the most refined, having regard to the objectives. General measures to be taken to minimise welfare costs (harms) to the animals.</p>	<p>The pig has been chosen as its skin has similar anatomy and physiology to human skin. Pigmentation in the pig skin, unlike the rat or mice, is akin to the human skin in that the pigment cells are present in the hair follicles and in the epidermis and both play a role in pigmentation. Mice and rats are loose-skinned with a panniculus carnosus and heal mainly by contraction that is much more rapid than by re-epithelialisation seen in ‘tight-skinned’ mammals such as humans and pigs.</p> <p>The animals will be given pain relief during the procedure to ensure minimal or no pain is felt after recovering from the anaesthetic. They will be observed closely thereafter and further pain relief administered as necessary.</p> <p>From our previous studies, we have now refined the</p>

	technique of surgical procedure and application of dressings and refined the dressings used, thereby reducing the frequency and the duration of general anaesthesia for the animals.
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