



# Australasian Wound & Tissue Repair Society

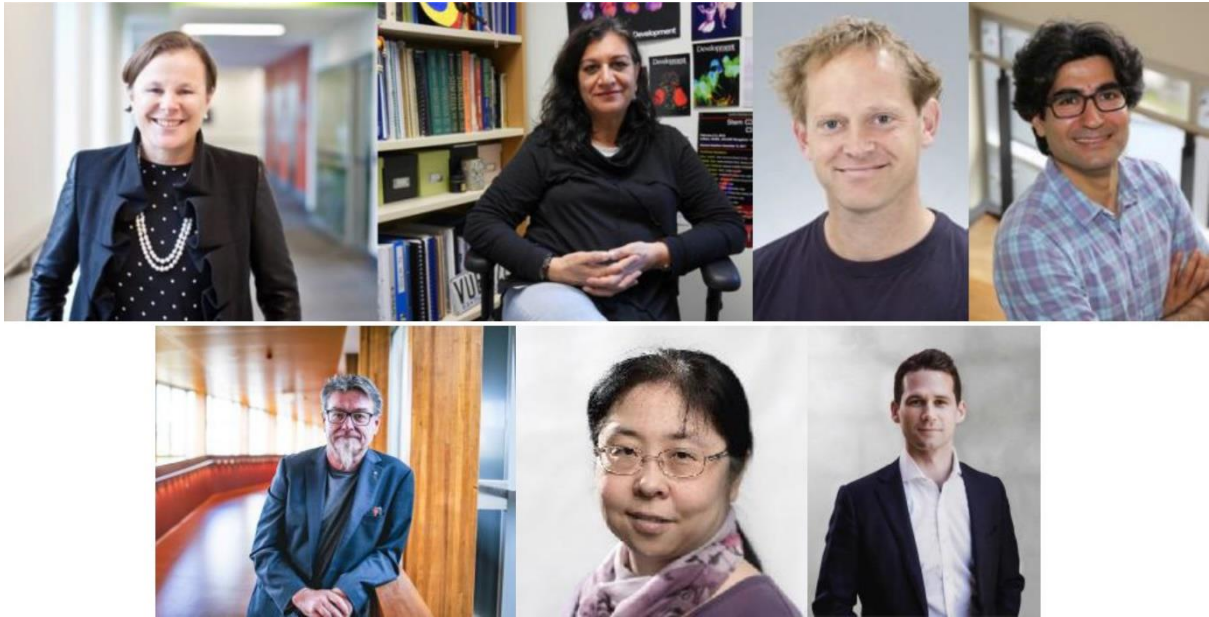
## **MRFF Skin Regeneration Project**

### **Associate Professor Pritinder Kaur**

In 2015, the Australian government established the Medical Research Future Fund (MRFF) with the goal of supporting a range of research initiatives to improve the health of Australians. Subsequently, a number of MRFF missions including the Stem Cell Therapies Mission were formed around targeted health initiatives as part of a 10-year plan. The goals of the Stem Cell Mission are to support world-leading translational stem cell research to develop and deliver innovative, safe and effective stem cell medicines to improve health outcomes, in partnership with patients and carers - underpinned by an investment of \$150 million over 9 years guided by the Expert Advisory Panel.

In January 2020, this MRFF Mission put out its first call for grants and a total of eight projects were funded by June 2020 – an investment of \$5.9 million to drive areas of unmet clinical need with a clear line of sight to developing improved stem cell-based therapies for patients. I was fortunate to head up an interdisciplinary team of outstanding investigators across the country - each a well-recognised expert, whose combined expertise could be applied to optimising a preclinical model for 3D bioprinting of skin to repair skin loss in patients. The team put together a competitive application that received \$737,690 as a one-year seeding grant to establish techniques for routine 3D bioprinting onto pigs as a large animal model of skin wound healing.

The project brings together basic scientists (like myself with skin stem cell biology expertise, Curtin University, Perth); clinicians such as Prof Fiona Wood (Burns Plastic & Reconstructive Surgeon, Perth); Dr Mark Fear (Skin Biologist with expertise in the biology of scarring, Perth); bioengineers and bioink specialists, Prof Gordon Wallace and Dr Zhilian Yue (University of Wollongong); an industry partner with expertise in developing 3D bioprinters, Dr Cameron Ferris from Inventia (Sydney); and early career researcher/tissue engineer with stem cell expertise, Dr Abbas Shafiee (Royal Brisbane & Women's Hospital); supported by Associate Investigators Prof Kiarash Khosrotehrani (Brisbane) and Dr Payal Mukherjee (Sydney).



The Skin Regeneration Team: L-R Top row: Fiona Wood, Pritinder Kaur, Mark Fear, Abbas Shafiee; Bottom row: Gordon Wallace, Zhilian Yue, Cameron Ferris

The project seeks to isolate specific subsets of primary skin cells from pig skin tissue i.e. basal keratinocytes, fibroblasts and pericytes for bioprinting onto excision wounds on the dorsal surface of pigs. We will also investigate the ability of specific cytokines and extracellular matrix proteins present in the microenvironment of keratinocytes (previously shown to enhance human skin regeneration) to facilitate keratinocyte regeneration when included in bioinks. Another aspect of the project is to incorporate endothelial cell progenitors in bioprinted skin to achieve vascularisation. Ultimately, the goal is to develop a means by which wounds can be assessed by computer assisted design and repaired by custom 3D bioprinted skin cells.