

Speaker : **A/Prof David Leavesley**
*Director, International E&R, Biomedical Sciences,
Queensland University of Technology*

Title : ***“Wound Healing – more to it than
meets the eye”***

Date : **28 November 2012 (Wednesday)**

Time : **11:00am – 12:00pm**

Venue : **Breakthrough Theatre, Matrix Level 4**

Host : **Prof Birgit Lane**
(Tel: 64070151, e-mail: birgit.lane@imb.a-star.edu.sg)



Abstract:

Skin repair is a complex process involving many cellular events acting cooperatively in both space and time. We identified changes in skin cell metabolism (keratinocytes and fibroblasts) coincident with these molecular events and demonstrated that extracellular environment components are critical regulators of these events. Recent evidence has identified small RNAs within the extracellular matrix of many mammalian tissues. We investigated the possibility that dysregulation of small RNAs may adversely affect the normal healing process by analysing small RNA populations isolated from human keratinocytes and fibroblasts. MicroRNAs previously associated with cell migration, proliferation and hypoxia were reproducibly detected in keratinocytes, and we observed increased expression of specific microRNA species in keratinocytes in hypoxic conditions (5% CO₂, 2% O₂, 93% N₂). Novel small non-microRNA species were also detected in primary keratinocytes, but not in dermal fibroblasts. Analyses of keratinocyte- and fibroblast-conditioned media revealed candidate miR species associated with microvesicle (16,000g) and exosome (140,000g) fractions. Notably these secreted miRs are resistant to RNAase, but were rendered sensitive by detergent treatment. Our data shows that human keratinocytes express and secrete populations of small RNA species. We specifically analysed miRs reported to regulate functions required for wound healing, ie cell migration and proliferation, finding preliminary evidence that small RNA species may have a role in the repair of traumatised skin. The presence of extracellular miRs associated with the extracellular environment, including microvesicles and exosomes, represent diagnostic and/or prognostic opportunities.

About the Speaker:

A/Prof Leavesley is recognized internationally for his research innovations addressing how cells interact with their environment, and how to remodel this environment and restore tissue function. He has held a research and teaching appointment at QUT since 2001, combining development of new undergraduate courses with cross-disciplinary research in QUT's Inst. Health and Biomedical Innovation. He is a founding member of the Tissue Repair & Regeneration Research Program (a consortium of ~50 researchers in biomaterials engineering, mathematical modeling, human physiology, immunology, cell biology and medicine), and Director of International Engagement and Recruitment for QUT's School of Biomedical Sciences (since 2010), and Deputy Director, China-Australia Tissue Engineering Centre, General Hospital of Ningxia Medical University, China (2012). With over 70 peer-reviewed publications, 5 patents granted and 2 pending, he has held over A\$18.5m in competitive research and industrial funding and was part of a successful bid-team (in 2009) for A\$100m public-private Wound Management Innovation (WMI) Cooperative Research Centre (Australia), where he is a research project leader. He is a co-inventor of technology unpinning the establishment and ASX-listing of Tissue Therapies Ltd. (TIS), and markets wound-healing products utilising this technology into Europe. His prolific record in cross-disciplinary team-based research with tangible outcomes includes development of the popular Transwell® Assay of cell migration, first description of cross-talk between growth factor receptors and matricellular adhesins (integrins), and translation of this for improved blood stem cell harvest from peripheral circulation. He co-developed the growth factor/extracellular matrix complex platform technology (VibroGro® ECM technology) currently being commercialised by Tissue Therapies Ltd for clinical and industrial applications, and co-developed the human skin equivalent (HSE) *in vitro* tissue platform.