NANYANG TECHNOLOGICAL UNIVERSITY

School of Biological Sciences

Reg. No. 200604393R

Research Theme: **Cell Signaling**

Research Project Title: Regulation of embryonic stem cell pluripotency and differentiation by biochemical and biophysical cues

Principal Investigator/Supervisor: A/Prof KOH Cheng-Gee

Co-supervisor/ Collaborator(s) (if any): NA

Project Description

Cell adhesion to the extra-cellular matrix regulates many cellular functions such as morphogenesis, migration, differentiation and survival. The adhesion to the matrix is mediated by integrins which in turn drive formations of focal adhesions (FAs), a complex network of proteins that act as an interface to the contractile acto-myosin network within cells. Various studies have elucidated the protein components and their disposition within FAs but little is known about the FAs formed by embryonic stem cells. Our preliminary work shows that FA proteins are expressed at low levels in the mouse embryonic stem (mES) cells, which could underlie their preference to form cell-cell clusters rather than attach to the matrix. One critical regulator of cell adhesion is the activity of the actomyosin network. Cell differentiation and remodelling of the cytoskeleton can be driven by the assembly of the FA complex. Subsequent FA "maturation'' is linked to cell-generated traction forces. It is also believed that the rigidity sensor located within the FA complex evaluates the local behaviour of the ECM. Aside from substrate sensing and force transduction, the turnover of FAs is a requirement of effective cell migration, and driven by the interplay of signals emanating from small G-proteins of the Rho GTPase family. In this project, we plan to decipher the composition of member proteins in the focal adhesions of ES cells. We are also interested to investigate how the focal adhesions in the ES cells can affect the mechanosensing and differentiation of the ES cells.

Supervisor contact:

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