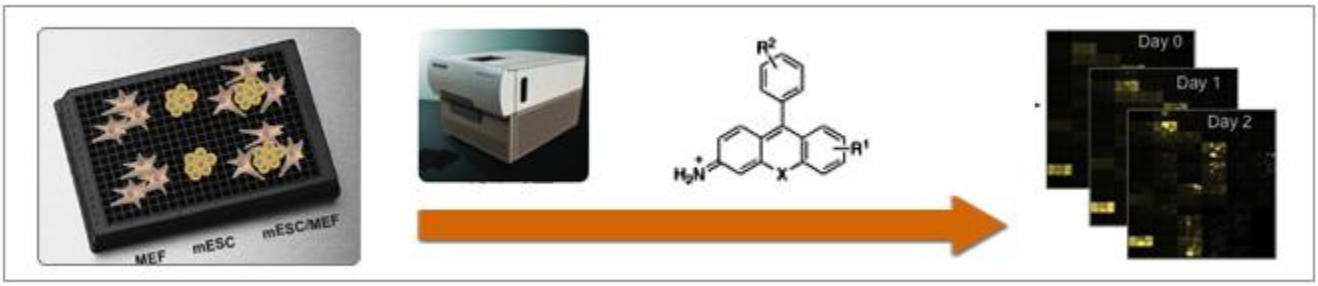
Stem Cell Probe Development by Diversity Oriented Fluorescence Library Approach

Assoc Prof Chang Young-Tae, Department of Chemistry



Recently, hot issues about cell therapy for regenerative medicine are autologous method that is transplantation of stem cells from self-patient. In this case, adult stem cell are usually used and tried because there is no immune rejection response and no ethical problems. Although totipotent cells exist only in the early embryo, fortunately, the adult still contains numerous multipotent (e.g. hematopoietic stem cells) and unipotent stem cells (e.g. basal cells of epidermis). But, there are several limitations. 1) Multipotent and unipotent are just able to differentiate within a certain lineage. 2) There is lack of exact technique for adult stem cell selection, purification and differentiation from other tissue. Therefore, many scientists have investigated and tried the **reprogramming of the adult somatic cells** into pluripotent cells for regenerative medicine.

Strategies to induce reprogramming are that somatic cells have been converted to a pluripotent state, using several methods. Among these methodologies, the ectopic expression method of the transcription factor (direct reprogramming) is called **induced pluripotent stem cell (iPS)** and most promising so far. Although this iPS technology can potentially overcome many important obstacles, including immune rejection after transplantation and ethical concerns regarding the use of human embryos, several problems yet to be solved. The viral vector methods leave concerns in the safety of the transgenes potentially remained in iPS for clinical usage. Also, the reprogramming efficiency is very low (in 0.1% range) and the iPS detection can be measured by stem cell markers only after a couple of week incubation time period.

We want to tackle this challenging problem by ES or iPS selective fluorescent probe development, and apply them for high throughput screening iPS generation. This project will be conducted by multidisciplinary research team including chemistry, bioimaging, epigenetics, and stem cell biology.

Website: http://ytchang.science.nus.edu.sg