

Dr. P. Murray, Professor M. White, Professor. D. Fernig

Two Projects: A systems biology approach to deciphering the molecular mechanisms that regulate the fate of embryonic stem cells

Embryonic stem cells (ESCs) are pluripotent cells that can generate all cell types present in the adult organism, and as such, they have a range of potential applications in regenerative medicine and drug discovery. Over recent years, much progress has been made in determining the key transcriptional factors (intrinsic regulators) and growth factors/cytokines (extrinsic regulators) required for maintaining both mouse and human ESCs in a self-renewing state. However, less is known about the mechanisms involved in regulating the fate of ESCs when they stop self-renewing and begin to differentiate. This lack of knowledge makes it difficult to direct the differentiation of ESC to a specific lineage, and is a major barrier to the development of useful ESC-based applications.

These two projects will take a systems biology approach to understand the processes that underly commitment of cells to become and remain pluripotential, and the reverse processes that underly stem cell differentiation. We have significant expertise in single cell imaging and analysis, with outstanding central facilities and a strong stem cell grouping. There is significant expertise in measurement of gene expression and dynamic cell signalling processes in living cells.

One of these projects (BBSRC funded) will be experimental, and will be suitable for UK students with a good Honours degree in Molecular Cell Biology, Biochemistry, or a related subject.

http://www.liv.ac.uk/biolsci/postgrad/studentships/2010/Project_B6_2010.html

The second project (available to EU students) will be theoretical, and a background in mathematics or modeling would be useful.

http://www.liv.ac.uk/biolsci/postgrad/studentships/2010/Project_B7_2010.html