

Honours research projects currently available:

Molecular genetics of cell division

We are currently investigating the genes that control entry into cytokinesis, the final stage of cell division. This is a critical step in proliferation, and one that is the target of many anti-cancer drugs. Unfortunately, many cancers become resistant to current chemotherapy when they lose their mitotic checkpoint, so we are looking for ways of blocking cytokinesis that will work even in checkpoint defective cancer cells.

We have identified a set of proteins that interact to set up cytokinesis, but their roles in the process are not clear yet. To find out how they work, we want to tag them with fluorescent markers so we can watch them live during mitosis in normal or mutant cells. This is easy to do with GFP, but we want to watch more than one protein, and we want to see where and when they interact. To do this, we will make use of a new fluorescent tag called TagRFP-T, developed by 2008 Nobel Prize winner Roger Tsien. This fluorophore was specifically developed to be bright and long-lasting, and should be ideal for our purpose.

The Honours project will be to take several of our genes of interest and clone them into the Drosophila expression vector I have made that carries TagRFP-T. These constructs will be used to make transgenic animals, and the localization of the tagged protein will be followed live in dividing neuroblasts. When we have these RFP tagged lines, we will cross them to GFP tagged lines that we already have, so that we can observe where and when the two tagged proteins co-localize. If time permits, we will try some cutting edge microscopy techniques like FRET and FLIM to give us a quantitative measure of protein interaction in the dividing cells.

There are several other projects including a genetic screen for genes that affect cell division in the absence of a checkpoint. If you would like further information on any of the work we do, please email me (stephen.gregory@adelaide.edu.au), or drop in to have a chat (1st floor, room 1.30 MLS building).