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Biopharmaceuticals and mammalian cell culture based biotechnology

The acceptance of biopharmaceuticals as human therapeutics has been rapid, with global sales of such products now exceeding \$US100 billion per annum. These sales are now growing at over 20% per annum, and there are many new biopharmaceuticals making up the potential product 'pipelines' of biotech and pharma companies. Of particular note is the rapid acceptance of human and humanised monoclonal antibodies as therapeutic agents.

Antibodies, and the majority of other biopharmaceuticals, are large complex proteins that have to be produced by mammalian cell culture in order to have the correct post-translational modification they require for full biological activity.

The Gray and Munro Labs are focused on engineering mammalian cells in order to improve their efficiency and utility in the production of complex proteins. The approaches used to gain greater understanding of such systems are also being applied to even more complex cells, viz the development of bioprocesses based on embryonic stem cells.

Many of our research projects are collaborative, and often involve interactions with international biotech and pharma companies.

Examples of available projects are:

1. Developing transient protein expression systems which will allow researchers to rapidly produce larger amounts of protein needed for initial characterisation and testing.
2. Developing high throughput approaches which allow the rapid selection of clones which stably express high levels of the desired biopharmaceutical.
3. Using modern 'omics' approaches to gain better understanding of cellular metabolism which will allow maximal protein expression by mammalian cell cultures.
4. Development of novel therapeutic antibodies. A drug discovery program in this area aims to develop novel therapeutic monoclonal antibodies for infectious diseases. The drugs will be used for treatment of severe infections caused by antibiotic resistant bacteria. The discovery program aims to create antibody molecules that can be engineered for targeted delivery of polymer-based nanoparticles as well as other novel drugs.