Honours projects

Dr Lucia Zacchi

Project 1: Discovery of blocking antibodies for Angiotensin type II receptor.

(Supervision: Dr Lucia Zacchi)
ARC Training Centre for Biopharmaceutical Innovation

Monoclonal antibodies (mAbs) are a major class of biologics used for the treatment of chronic disease indications, principally cancer, inflammatory diseases and infectious disease. The angiotensin II type 2 receptor is a clinically-validated target for the relief of peripheral neuropathic pain. The small molecule drug EMA401, that binds the receptor, can effectively relieve peripheral neuropathic pain. Due to some advantages mAbs have as therapeutic entities over small molecules, *the goal of this project is to isolate blocking mAbs against the angiotensin II type 2 receptor.* We will use state-of-the-art antibody engineering and antibody discovery methodologies to find new mAbs that bind the angiotensin II type 2 receptor, and to fully characterize the mAbs, including specificity and affinity. After extensive analysis of the isolated panels of antibodies, a suitable lead mAb will be selected for further development along the drug development pipeline.

Methodology: transformation of plasmids in bacteria, plasmid extraction and verification by restriction digestion. Maintenance and transfection of mammalian cell cultures. Antibody phage display biopanning of stably expressing or transiently transfected mammalian cells. FACS to enrich for better binders and ELISA to identify best candidates. Reformatting of most promising candidates into full length monoclonal antibodies. Expression of candidate antibodies in CHO cells, mAb purification, and mAb functional testing through cell culture assays.

To discuss further details of this project please contact Dr Lucia Zacchi (Email: l.zacchi@uq.edu.au; https://researchers.uq.edu.au/researcher/12165)

Enrolling school: School of Chemistry & Molecular Biosciences (SCMB).
Suitable academic background: BSc in Molecular Biology, Biotechnology, Biochemistry, Microbiology, Immunology.
Skills to be obtained in the project: antibody discovery, protein expression and purification, functional antibody screening. Writing and oral presentation techniques.
Publication & postgraduate career potential: All our projects will lead to refereed publications and will provide a solid foundation for postgraduate studies.
Contact: Lucia Zacchi l.zacchi@uq.edu.au
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Project 2: Expression of antibodies in yeast.

(Supervision: Dr Lucia Zacchi)
ARC Training Centre for Biopharmaceutical Innovation

One novel class of therapeutic antibodies with enormous potential are bi and tri-specific antibodies. However, these type of antibodies suffer from major biosynthetic bottlenecks in CHO cells that lead to poor yield, increasing industrial production cost. We will use the yeast *Saccharomyces cerevisiae* to develop a suitable expression system for antibodies and help identify and solve production bottlenecks. We will then test in CHO cells if the targets identified in yeast translate into increased antibody production in mammalian systems.

Methodologies: Recombinant protein engineering. Transformation of plasmids in bacteria, plasmid extraction and verification by restriction digestion. Diverse genetic, molecular, cellular, and biochemical techniques in yeast. SDS-PAGE, mass spectrometry proteomics and HPLC characterization of antibodies. Mammalian cell protein expression.

To discuss further details of this project please contact Dr Lucia Zacchi (Email: l.zacchi@uq.edu.au; https://researchers.uq.edu.au/researcher/12165)

Enrolling school: School of Chemistry & Molecular Biosciences (SCMB).
Suitable academic background: BSc in Molecular Biology, Biotechnology, Biochemistry, Microbiology.
Skills to be obtained in the project: genetic and protein engineering, protein expression and purification, yeast protein expression and genetic manipulation, antibody characterization, mammalian cell protein expression and purification, mass spectrometry proteomics and HPLC. Writing and oral presentation techniques.
Publication & postgraduate career potential: All our projects will lead to refereed publications and will provide a solid foundation for postgraduate studies.
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