



2027 Summer Research Project – A/Prof Ng

Section	Description
Project title	How do immature muscle cells decide when to turn into mature muscle?
Hours & delivery	Minimum 4 days or 29 hours per week typically Mon to Thurs. On campus only at UQ, St Lucia Campus.
About the project (150–250 words)	Skeletal muscle forms when precursor cells called myoblasts stop dividing, commit to a muscle cell fate, and fuse together to form mature muscle fibres. While this process is essential for growth and regeneration, many of the cellular mechanisms that control it remain poorly understood. This project investigates how centrioles, centrosomes and primary cilia regulate the key steps of myoblast differentiation and fusion. We are particularly interested in signalling proteins such as KRas, JNK and Aurora kinase, and how their functions within these cellular structures influence muscle development. A major focus is understanding centrosome reduction and centriole degradation, two unusual processes that occur as muscle cells mature but whose biological significance remains unclear. By uncovering how these pathways control muscle formation, this research will provide fundamental insights into muscle biology. In the long term, the findings may support the development of muscle regeneration therapies and improve the bioengineering of muscle tissue for biotechnology and clinical applications. Students will contribute by investigating the localisation and function of key proteins, analysing muscle cell differentiation and fusion, and helping to uncover the molecular mechanisms that drive muscle formation using biochemical and analytical techniques.
What you'll do (100-150 words)	Students will gain hands-on experience in cell and molecular biology techniques used to study muscle development. They will learn how to culture myoblasts (immature muscle cells) and induce their differentiation into mature muscle fibres in the laboratory. Using immunofluorescence and microscopy, students will examine the localisation of key proteins and assess muscle cell maturation, differentiation and fusion. They will also prepare protein extracts from cultured cells and measure the expression and activity of proteins involved in centrosome, cilia and signalling pathways. Techniques will include immunoblotting (Western blotting) and microtitre plate-based biochemical assays. Through these activities, students will contribute to understanding how centrosomes, primary cilia and associated signalling proteins regulate muscle cell development and maturation.
What you'll learn (100–150 words)	Students will develop practical skills in mammalian cell culture, muscle cell differentiation, protein analysis, fluorescence microscopy and image analysis. They will gain experience in experimental design, data collection, quantitative analysis and interpretation of biological data. Laboratory training may include immunofluorescence staining, immunoblotting (Western blotting), enzyme activity assays and the maintenance of sterile cell cultures.



Project outcomes
(75–125 words)

Given the short duration of the project, the primary outcomes will be student training and skills development. Students will gain hands-on experience and participate in an active research program. Although experimental outcomes are expected to be modest, the project may generate preliminary data that advances molecular understanding of how our cells form mature muscle fibres.

Who should apply?
(75–125 words)

The ideal student is motivated, reliable and able to commit regular in-person time in the laboratory. They should be organised, detail-oriented and capable of managing research activities alongside other academic and personal commitments. A genuine curiosity about the molecular and cellular mechanisms that govern life is essential, as is enthusiasm for laboratory-based research. This project is particularly suited to students who have enjoyed and performed well in courses such as biochemistry, cell biology, genetics, or integrative cell and tissue biology, and who are interested in pursuing further research in the biomedical sciences (e.g. considering honours).

Team & supervision
(75–125 words)

The project will be based in the Kinase Biology Laboratory within the School of Biomedical Sciences at UQ's St Lucia campus. Students will work in a modern, well-equipped Physical Containment Level 2 (PC2) research laboratory and have access to advanced research infrastructure, including imaging, molecular biology, analytical and animal research facilities. The laboratory is a collaborative and supportive environment comprising research staff, PhD, Honours and undergraduate students. Students will be supervised by Associate Professor Dominic Ng and senior research staff, including Dr Matthew Morris, and will receive day-to-day mentoring and hands-on training from experienced laboratory members throughout the project.

Additional opportunities
(optional)

Students will have opportunities to engage with the broader research community through participation in laboratory meetings, where they may present their work and discuss scientific findings. They will also be encouraged to take part in research, training and social events organised by the School of Biomedical Sciences, providing opportunities to network with students and researchers across different disciplines. Students who generate high-quality and impactful data may have the opportunity to contribute to research publications. The project may also provide a pathway to future Honours, HDR or ongoing undergraduate research opportunities within the laboratory.

Additional requirements
(if applicable)

Before commencing laboratory work, students will be required to complete laboratory onboarding and compliance processes. This includes a range of mandatory online training modules relevant to working in a PC2 research environment, such as biosafety, occupational health and safety (OHS) responsibilities, manual handling, chemical safety, and laboratory risk management. Students must follow all laboratory safety procedures and maintain accurate experimental records.

Contact

Yes, students may contact the supervisor before applying.

Direct enquiries to: d.ng1@uq.edu.au