

Graduate Studies in skeletal muscle biology: Dr. Judy Anderson

Two graduate student (MSc or PhD) positions are available to conduct research on the cellular and molecular biology of skeletal muscle in muscular dystrophy and aging. In aging, muscle atrophy leads to significant limitation of mobility, independent living, and disability, and Duchenne muscular dystrophy (DMD) is a progressive, lethal genetic disease that affects skeletal, smooth and cardiac muscle and cognition. The general aim of the lab is to understand how muscle stem cells (called satellite cells) are regulated in muscular dystrophy and age-related muscle atrophy so we can improve muscle repair and prevent muscle atrophy.

The processes of muscular dystrophy, satellite cell activation and muscle regeneration (repair) are the core of study in the laboratory. Topics such as the mechanisms of cell injury in normal and dystrophic muscle, muscle regeneration and the effects of therapies or exercise on growth, repair and stem cell activity are examined using a wide range of techniques to assay cellular, molecular and whole-animal function and structure. Students receive broad training in research through courses, direct laboratory experience, laboratory meetings and publications. Currently, a postdoctoral fellow, a PhD student and 3 undergraduate students work with a full-time technician in the laboratory.

Recent work on satellite-stem cell activation by nitric oxide has opened a new approach to muscle regeneration that links mechanical and biochemical signal transduction with cell and molecular biology studies. Our long term goals are to improve treatment of muscular dystrophy and to prevent skeletal muscle atrophy in aging muscles.

We use a variety of model systems to study muscle, including cell culture, muscle fiber cultures that are 'exercised' by stretching, and whole animal (mouse) treatment experiments on aging or dystrophic mice (the mdx mouse is the mouse homolog of X-linked dystrophin deficiency (Duchenne Muscular Dystrophy) in humans. We apply immunostaining, cell turnover (autoradiography, immunostaining, flow cytometry), functional assays of muscle strength and endurance and techniques such as in situ hybridisation (to localize mRNA expression of various genes) in combination with surgical, exercise protocols and therapeutic interventions, such as treatment with a newly developed drug to stimulate muscle regeneration and reduce dystrophy.

The laboratory has funded positions for 2 graduate students. They will examine the effectiveness of nitric-oxide-based drugs to prevent or treat muscle atrophy and muscular dystrophy. We also plan to study the molecular and cellular basis of satellite-stem cell activation in muscle of various species. Experience and/or interest in cell and molecular biology, imaging and/or muscle health and disease are highly desirable. Communications skills (English speaking and writing) are essential. Selection for these positions will include a review of academic record to date, reference letters (two) and experience with lab-based research. Stipendiary support is available and students will be expected to apply for independent scholarship funding.

For further information on graduate studies in skeletal muscle biology, please contact Dr. Anderson at janders@ms.umanitoba.ca.