Department of Molecular and Cellular Biology

Graduate Seminar MCB*6500

Friday, February 2, 2024 @ 1:30 p.m.

presented by:

Elma Misini

(Advisor: Dr. John Dawson)

"Analysis of Myopathies and Disease Mechanisms using Zebrafish as a Model"

Cardiovascular disease is the second leading cause of death in Canada, and it is currently estimated that 1 in 12 Canadians live with a diagnosed form of heart disease. Cardiomyopathy is one of the most commonly inherited cardiovascular diseases affecting the cardiac muscle and is a leading contributor in cases of sudden cardiac related death. Cardiomyopathies can be categorized into two distinct subtypes, namely hypertrophic cardiomyopathy and dilated cardiomyopathy, both of which can be a result of mutations in genes encoding for proteins in the sarcomere. The sarcomere is the contractile unit of muscle fibers and is composed of hundreds of proteins that form thick (myosin) and thin (actin) filaments necessary for muscle function and movement. The alpha cardiac actin 1 (*ACTC1)* gene in humans was the first sarcomere gene found to have mutations leading to both hypertrophic cardiomyopathy and dilated cardiomyopathy which highlights cardiac actin as a pivotal protein for studying the disease mechanisms of both cardiomyopathies. To investigate the effects of human mutations in the *ACTC1* gene, this project aims to use a transgenic CRISPR/Cas9 zebrafish line as a model to study cardiac disease progression during key stages of development. Microscopic imaging techniques along with molecular biological techniques will be used to characterize the effects of mutations in the actin gene on cardiac, skeletal and smooth muscle development. This research sets the stage for a comprehensive understanding of the role of actin mutations in cardiomyopathy, utilizing zebrafish as a model to explore disease mechanisms and potential therapeutic interventions.

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