Effects of Alternative Splicing of Capping Actin Protein (CAPZB) on Skeletal Muscle Cell - Proliferation & Differentiation

The capping actin protein of muscle z-line subunit beta (CAPZB) is involved in the assembly and function of actin filaments in skeletal muscle cells. Exon of 113 nucleotides (nt) of CAPZB gene is regulated by alternative splicing, and the two protein isoforms are localized in different places within cardiac muscle cells. However, little is known about the localization or functions of the two isoforms in skeletal muscle cells. The first aim of this thesis was to better understand the functions of the two CAPZB splice isoforms in skeletal muscle cells. To address this question, we used morpholino antisense oligonucleotides to force the expression of the variant lacking the exon in C2C12 mouse myoblast cells and determine the impact of the two isoforms on cell proliferation and differentiation. The second goal of this thesis was to develop ImageJ macros for the automatic quantification of myotube area, total number of nuclei, and myotube fusion using microscopy images from immunofluorescence experiments. First, we found that both CAPZB splice isoforms behave similarly when evaluating muscle cell proliferation and differentiation. Second, when we compared the values achieved from the macros developed here with manual quantification done by researchers, we observed a high degree of correlation between the two methods of quantification. Therefore, the macros successfully developed in this thesis provided accurate biological values.