Amanda McCambridge

Biology
Year in School: Junior
Hometown: Lake Winnebago, Mo.
Faculty Mentor: Dr. Charlotte L. Phillips, Biochemistry
Funding Source: Biochemistry Department

Do type I collagen defects that cause Osteogenesis Imperfecta result in an inherent muscle pathology?

B. Weber, C.L. Phillips, S. Carleton, A. McCambridge, J. Ning, J. Ferreira, & M. Brown

Osteogenesis imperfecta (OI) is a congenital connective tissue disorder characterized by decreased bone mineral density and increased bone fragility and susceptibility to fracture. In addition to skeletal fragility, patients with OI reportedly have muscle weakness, although currently no systematic evaluation of muscle function or morphology in humans or animal models of the disease has been performed. Normal type I collagen is coded for by two genes located on different chromosomes: COL1A1 and COL1A2. The oim/oim mouse is homozygous for a null mutation in the COL1A2 gene and is a phenocopy of a human type III OI (severe disease phenotype). Heterozygous mice (oim/+) harbor the null mutation in only one allele of the COL1A2 gene and model human patients with type I OI (mild disease phenotype). One of our aims is to characterize and determine muscle mass and cross-sectional area of hind limb muscle fibers in wild type (+/+), heterozygous (oim/+), and homozygous (oim/oim) mice. We analyzed muscle mass, fiber morphology, cross-sectional area of hindlimb muscles, as well as fiber type composition of the soleus muscle of oim, oim/+ relative to +/+ mouse muscles and determined that significant differences do not exist between genotypes. We also determined that there is no evidence of necrosis, degeneration, regeneration, hypertrophy or atrophy in hindlimb muscles of oim/oim and oim/+ mice. We correlated our morphologic findings with a functional contractile assay and determined that muscle tension-force generation and nerve conduction are not impaired in oim mice. These findings suggest that oim and oim/+ mice do not have inherent muscle pathology. This knowledge is important in our ultimate understanding of skeletal muscle in OI model mice and ultimately, humans with this disease.