Mast Cell Quantity and Localization in the Hearts, Quadriceps, and Diaphragms of a Duchenne Muscular Dystrophy Model

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Duchenne muscular dystrophy (DMD) is a severe genetic muscle degeneration disease. Although it is known that DMD is caused by an absence of the protein dystrophin, the exact mechanism of muscle wasting is unknown. Given the high level of inflammation present in dystrophic muscle, understanding the nature of the immune response involved in DMD may provide important insight into the development and progression of the disease. Mast cells have been demonstrated as an important modulator of inflammation in dystrophic skeletal muscle. In this study, we used Toluidine blue staining and microscopy to assess mast cell quantity and localization in hearts, quadriceps, and diaphragms from both C10 mice (wild type) and Mdx mice (a model of DMD). Our data show a significant increase in the density of mast cells in Mdx hearts and quadriceps compared to C10 hearts and quadriceps, which supports the hypothesis that mast cells play an important role in the mediation of DMD (C10 Hearts: 0.7±.05 mast cells/mm^2; Mdx Hearts: 1.7±.072; C10 Quadriceps: 2.3±.33; Mdx Quadriceps: 6.4±.59; C10 Diaphragms: 7.9±.80; Mdx Diaphragms: 8.64±1.1). Surprisingly, we observed similar quantities of mast cells per mm^2 in both C10 and Mdx diaphragms, despite the significant dystrophy present in the Mdx diaphragm. We also noted a high concentration of mast cells in the serous membranes surrounding the hearts and diaphragms. Finally, we observed differences in mast cell localization in the three tissues, suggesting that mast cells exhibit tissue-specific responses during the physiological progression of DMD.