

P018 MMP-9 activity in myoblasts and fibroblasts is interactively influenced by mechanical load and substrate

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The ECM of both skeletal and cardiac muscle is remodelled during hypertrophy due to mechanical stimulus. Both muscle cells and fibroblasts can express MMPs although it is not known which cells are responsible for the remodelling of which spatial component of intramuscular ECM. Our initial work aims to measure the relative response of myoblasts versus fibroblasts to mechanical stimuli in terms of MMP expression and enzyme activity.

Fibroblasts (R_2) and myoblasts (C_2C_{12}) were plate-cultured on either collagen-I, fibronectin or laminin substrates. The activity of MMP-9 expressed into the medium by each cell type was measured using gelatine zymography. R_2 and C_2C_{12} were also cultured on collagen-I, fibronectin or laminin coated silicon elastomer loading plates and subject to 8% biaxial strain at 1 Hz for 24 hrs using a Flexcell FX4000T system. MMP-9 activity for fibroblasts is generally greater than for an equivalent density of myoblasts. MMP-9 activity is higher on laminin or fibronectin coatings (compared to non-coated controls) for fibroblasts, whereas myoblasts exhibit no significant changes. However, at the strain used, MMP-9 activity of myoblasts cultured on fibronectin increased significantly with mechanical loading, whereas fibroblast activity is unchanged.

The results demonstrate an interaction between cell type, substrate type and mechanical stimulus which may be important in controlling the turnover of ECM in muscle response to exercise or overload.