

AbstractID: 1846 Title: Orientational Dependence of Trimethyl Ammonium (TMA) Signal in Human Muscles by ^1H Magnetic Resonance Spectroscopic Imaging

^1H magnetic resonance spectroscopic imaging (MRSI) was used to investigate the effect of orientation on spectral characteristics of trimethyl ammonium (TMA) in human muscle at rest. Four different muscles in the healthy calf were studied: soleus, gastrocnemius, tibial posterior and anterior. The data demonstrate that the muscle orientation can profoundly change the apparent spectral characteristics of proton metabolites. In particular, muscle orientation can cause concerted changes in the spectral pattern of TMA/methyl (tCr) and methylene (Cr2) protons of creatine for a given muscle, a switch of TMA/tCr spectral patterns among different muscles. at the 0° orientation, the soleus spectra are characterized by relatively strong signal amplitudes for both tCr and TMA and a TMA/tCr peak height ratio equal to or greater than one. In contrast, the gastrocnemius spectra are characterized by relatively low signal amplitudes for both tCr and TMA and a TMA/tCr peak height ratio less than one. After the 70° rotation, however, the features in the spectral patterns of TMA/tCr between soleus and gastrocnemius muscle have reversed. A significant correlation was detected between TMA/tCr peak ratio and the Cr2 peak splitting ($r=0.62$, $p<0,001$). *In vivo* ^1H MRSI has the potential to simultaneously evaluate the orientation of muscle fibers and biochemical changes induced by a disease process or physiological activity.