Technical factors for fat quantification
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Course name: Fat quantification in MSK imaging

Lecture: Technical factors

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Target audience: MSK radiologists and MR scientists

Objectives:
• Understand methods for fat quantification
• Identify main confounding factors and solutions
• Understand choices in protocol design

Introduction
MR-based fat quantification is often performed using chemical shift encoded techniques, ranging from multi-echo imaging with a few echo times (high spatial resolution, low spectral resolution) to single voxel spectroscopy (high spectral resolution).

Fat quantification: technical aspects
Fat quantification techniques in general, and in MSK applications in particular, are faced with a number of technical challenges, including:
• B0 field inhomogeneity
• Spectral complexity of the fat signal
• T2 or T2* relaxation
• T1 bias
• Noise-related effects
• Different lipid compartments, eg: extramyocellular vs intramyocellular

If not accounted for, these challenges (“confounding factors”) can introduce bias and poor robustness in fat quantification. These confounding factors can be addressed through a combination of acquisition and reconstruction techniques.

Conclusion
Chemical shift encoded fat quantification can provide accurate and robust fat quantification in MSK applications as long as relevant confounding factors are addressed.

References