

Though Magnetic Resonance Spectroscopy (MRS) is finding increased clinical utilization as commercial software becomes more widely distributed, current techniques can still be prone to artifacts and incorrect data processing. A basic understanding of MRS is necessary for clinical/technical support by the medical physicist.

A review of the basic principles of MRS will be presented. Aspects of spectral features will be described including resonance frequency, line width, and interactions (J coupling). Basic methods for acquiring spectra utilizing single voxel and multiple voxel methods will be discussed. The concept of spectroscopic images will be introduced. Spectroscopy of nuclei other than proton will be presented. Data processing and alternative methods for display of spectroscopic results will be discussed. Differences between MRS and MRI will be described with emphasis on the constraints limiting MRS including homogeneity, SNR, bandwidth, frequency resolution, dynamic range, and water and lipid suppression.

Clinical applications in the brain and the prostate as well as future directions for MRS will be presented. Quality control and methods for evaluation of spectra quality will be introduced.

Educational objectives: This course is designed to introduce the clinical medical physicist to the principles underlining MRS.

Upon completion of this course the participant will be prepared to

1. Describe the differences between MRS/MRI.
2. Understand spectral features.
3. Describe single and multi-voxel acquisition methods
4. Understand the basis and use of spectroscopic images
5. Understand the current applications for MRS in the brain and prostate.
6. Support clinical applications including spectra interpretation and quality control.