

The signal-to-noise ratio (SNR) in MRI depends on a large number of variables including the type of pulse sequence, the radiofrequency coil(s) used to detect the signal, the static magnetic field strength, and acquisition parameters such as the echo and repetition times, flip angle, field of view, slice thickness, acquisition matrix, receiver bandwidth, and the number of signal averages. This session will discuss these factors, as well as additional factors impacting SNR, including slice crosstalk. These concepts will be extended to a general understanding of why various clinical MRI pulse sequences produce a variety of SNR characteristics, and a discussion of the inevitable tradeoffs between acquisition time, resolution, and SNR.

Educational Objectives:

The clinical medical physicist will understand how basic MRI pulse sequences and acquisition parameters affect SNR.

Upon completion of this course, participants will be prepared to:

1. Describe how field of view, slice thickness, and acquisition matrix affect SNR, resolution, and acquisition time.
2. Describe how echo times, repetition times, receiver bandwidth, and signal averaging affect SNR and acquisition time.
3. Describe how the choice of radiofrequency coils affects SNR.
4. Describe the slice crosstalk phenomenon and how it affects SNR.
5. Give examples of pulse sequences that produce high SNR and low SNR.