

The background underpinning the clinical use of techniques used on clinical systems to image tissues or tissue components with short T2 is reviewed. Tissue properties are discussed, and tissues are divided into those with a majority of short T2 relaxation components and those with a minority. Features of the basic physics are described including the fact that when the radiofrequency pulse duration is of the order T2, rotation of tissue magnetization into the transverse plane is incomplete. Consequences of the broad line-width of short T2 components are also discussed including their partial saturation by off-resonance fat suppression pulses. The need for rapid data acquisition of the short T2 is explained. Several different techniques suitable for imaging of short T2 components are available on clinical systems. These include gradient echo, ultrashort echo times (UTE) and swift imaging with Fourier Transformation (SWIFT). The 2D UTE pulse sequence with its half excitation pulse and radial imaging from the center of k-space is described together with options that suppress fat and/or long T2 components. Clinical features of the imaging of cortical bone, tendons, ligaments, menisci, and periosteum as well as brain, liver and spine are illustrated. Short T2 components in all of these tissues may show high signals. Possible future developments are outlined as are technical limitations.

Educational Objectives:

1. To explain the technical basis for imaging of short T2 tissue components with clinical MR systems
2. To explain the mechanisms determining contrast and the different appearances of short T2 tissues.

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