Q9. CT Spatial Resolution

The spatial resolution must be tested, with the CT conditions of operation of the scanner, using one of the following three methods. The spatial resolution depends on the reconstruction algorithm, so it is important that repeat measurements are made under identical conditions. If the resolution is determined visually from a bar phantom the display should be adjusted for optimum viewing.

1. The recommended method of measuring the spatial resolution is using the modulation transfer function curve, obtained from the Fourier transform of the point-spread function. The test device is a high contrast wire, typically 2 mm in diameter or less, placed in a tube of minimally attenuating material. The measurement of the 50% point and the 10% point of the MTF curve must be within 0.5 lp/cm or ± 15% of the established baseline value, whichever is greater. The manufacturers’ software often provides this information.

2. A quantitative measurement of modulation can be made using a bar pattern test device which contains line-pair patterns of different spatial frequencies. Using region of interest measurements, individual points along the MTF curve can be obtained. When measurements are made using a test object with line-pair patterns of varying spatial frequency or by noting the spatial frequency at which the measured modulation transfer function drops to 5%, the limiting high contrast resolution should be 5 line pairs per centimeter or more. Some manufacturers use this method.

3. An alternate method is through visual assessment using a test device consisting of a repeated pattern of holes, bars or lines. When measuring the limiting high contrast resolution using a phantom for high contrast resolution having sets of test objects of equal diameters and spacing, the high contrast resolution must be 1 mm or less. (For example the ACR phantom described elsewhere).