

**AbstractID: 6489 Title: Evaluating the Effect of Dielectric Resonance on Image Uniformity at 1.5T and 3T in an ACR MRI Phantom Filled with Mineral Oil and Silicone Fluid**

**Purpose:** The use of oil-based phantoms instead of water-based ones is known to be a more suitable method of assessing image uniformity of high field magnets. This study aims to investigate the appropriateness of using oil or silicone in the ACR phantom for routine quality control for both 1.5T and 3T MRI systems paying particular attention to the dielectric resonance effect.

**Methods and Materials:** A prototype ACR phantom which was used to help develop the existing ACR MRI phantom was filled with three different materials and scanned in both a 1.5T and 3T magnets using the recommended ACR T1 sequence. The first material was the standard phantom water-based liquid, the second material was mineral oil and the third was a silicone fluid. Percent image uniformity (PIU) as well as low and high contrast resolutions were assessed for all three filling liquids at both fields.

**Results:** For the standard MRI phantom solution, the PIU was calculated to be 95% at 1.5 T and 80% at 3T. The same phantom filled with mineral oil produced a PIU of 99% on the 1.5 T and 95% on the 3T magnet. There was a marked decrease in SNR in going from standard aqueous solution to mineral oil, but this did not seem to affect the high contrast resolution or the low contrast detectability at either field. Results for the silicone fluid will also be presented.

**Conclusions:** Central brightening artifacts are often seen as high signal intensity in the center of the imaged object and have caused problems with the PIU analysis of the water-based ACR phantom on 3T systems. Filling the phantom with a material that has a lower dielectric value than water such as mineral oil or silicone provides images which are more uniform and tends to improve the artifactual lower PIU measurements.