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**Title:** Dental Magnetic Resonance Imaging: Making the Invisible Visible

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**Abstract:** Clinical dentistry is in need of noninvasive and accurate diagnostic methods to better evaluate dental pathosis. The purpose of this work was to assess the feasibility of a recently developed magnetic resonance imaging (MRI) technique, called SWeept Imaging with Fourier Transform (SWIFT), to visualize dental tissues. Methods: Three in vitro teeth, representing a limited range of clinical conditions of interest, imaged using a 9.4T system with scanning times ranging from 100 seconds to 25 minutes. In vivo imaging of a subject was performed using a 4T system with a 10-minute scanning time. SWIFT images were compared with traditional two-dimensional radiographs, three-dimensional cone-beam computed tomography (CBCT) scanning, gradient-echo MRI technique, and histological sections.

**Results:** A resolution of 100 mm was obtained from in vitro teeth. SWIFT also identified the presence and extent of dental caries and fine structures of the teeth, including cracks and accessory canals, which are not visible with existing clinical radiography techniques. Intraoral positioning of the radiofrequency coil produced initial images of multiple adjacent teeth at a resolution of 400 mm. Conclusions: SWIFT MRI offers simultaneous three-dimensional hard- and soft-tissue imaging of teeth without the use of ionizing radiation. Furthermore, it has the potential to image minute dental structures within clinically relevant scanning times. This technology has implications for endodontists because it offers a potential method to longitudinally evaluate teeth where pulp and root structures have been regenerated.

**Caries, dentin, enamel, imaging, MRI, pulp**

**Presentation:** Poster