

AbstractID: 14521 Title: Advances in MR: State of the Art Today and Future Directions
– MR Instrumentation

Even though Magnetic Resonance as a modality is now several decades old, instrumentation continues to advance at a vigorous pace. The purpose of this presentation is to review recent advances in the current state of the art and to discuss directions of continued progress. The main magnet continues to be the central platform component from the standpoint of cost and footprint. There has been steady increase in the number of clinical systems at higher field strength (e.g., 3T vs. 1.5T), and the expected increase in signal-to-noise ratio is now being realized. Another significant trend has been the increase in bore diameter and decrease in magnet length, both of which are appreciated by patients. A number of systems for human in-vivo studies at even higher field strength (e.g., 7T) are now in use. These present significant technical challenges that are being addressed, especially in B0 and B1 homogeneity and in RF power deposition. The number of channels used for simultaneous signal reception also continues to increase, with related improvements in SNR and imaging speed through parallel imaging. A newer development is simultaneous RF transmission. This new field of “parallel transmission” promises to overcome problems with B1 homogeneity and perhaps power deposition. Hybrid systems that combine MR with other diagnostic or therapeutic modalities are also receiving attention. Among these hybrids are MR guided focused ultrasound, MR/PET, X-ray/MR hybrids, and systems for MR guided radiation therapy systems

Learning Objectives:

1. Recognize recent technology trends in Magnetic Resonance
2. Understand the benefits and disadvantages of parallel excitation and reception
3. Understand the challenges in combined modality systems
4. Examine possible future directions for Magnetic Resonance

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