AbstractID: 5961 Title: Advances in MRI Equipment Design, Software, and Imaging Procedures

The advances in MRI technology are relentless. Virtually every aspect of MR scanners is being modified and optimized. There are a myriad number of factors that drive these advances. Clinical requirements are the most obvious and important driver, but are significantly influenced by the clinical setting and/or business model. Is the scanner for a large hospital radiology department, or dedicated interventional procedures scanner, or for an orthopedic, cardiac, pediatric or breast practice or a walk-in radiological clinic? Each of these market segments places a different relative importance on the various MR system performance specifications. Consequently, the commercially available MR scanners have their own unique operating characteristics as the various MRI vendors seek to satisfy their customers' needs. This lecture will examine some of the various sub-systems and discuss selected development trends, such as:

1) Utilization of novel spatial encoding mechanisms to accelerate image acquisition: parallel imaging and the coil spatial response mechanism.
2) Magnet field strength is increasing and physical magnet size is changing: shorter magnets and larger apertures.
3) Increase the effective imaging volume with advances in moving couch methods: the couch becomes another spatial encoding mechanism.
4) Demands on the reconstruction engine are constantly growing: commercial consumer electronic technology advances help provide cost effective, faster solutions.
5) Parallel receive concepts are adapted to the transmit side: transmit-SENSE. It is not commercially available, yet.
6) More than pretty pictures: numbers. The growth in quantitative MRI and CAD.

While these technology advances are increasing system complexity, flexibility, sequence capabilities, image quality, throughput efficiencies etc, associated technology advances are also mitigating the package footprint and costs.

Educational Objectives:

1) Recognizing the advances in MRI
2) Understand the technology underlying these advances
3) Understand the scientific/medical reasons for these advances
4) Recognize that the commercial implementations are targeted at specific customer segments/requirements.

Conflict of Interest: The author is employed by Hitachi Medical Systems America, Inc.