Advances and Applications In Magnetic Resonance Angiography

Dennis L. Parker, Ph.D.

Dept of Radiology and Medical Informatics
University of Utah
Medical Imaging Research Lab
Salt Lake City, Utah 84108
U.S.A.

In this talk I review the progress that has been made in Magnetic Resonance Angiography (MRA). Since the early days of Magnetic Resonance (MR), the signal from flowing blood has been evident. Beginning in the middle 1980?, with the development of gradient echo techniques, images of flowing blood have been obtained. With the steady improvement in MR hardware and the development of new imaging techniques, the quality of MRA has steadily increased. At the present time, MRA is being used in many medical centers to replace the more expensive and higher risk conventional X-ray angiography procedures. The hardware factors which have had a major influence on image quality include improved gradients and RF coils and electronics. Imaging technique improvements include: Flow compensation, tipped RF excitation, magnetization transfer and reduced echo times. A variety of post processing and display techniques have had a major impact from the simple maximum intensity projection (MIP) algorithm, to zero filled interpolation, and volume rendering and segmented image displays. Finally, with ultrafast imaging techniques, contrast enhancement using Gd. contrast agents have had a major impact on nearly every form of MRA.