

High End Clinical Applications of Parallel Imaging

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As clinical MR scanners with a high number of receiver channels are becoming available, the benefits of scan time reduction through parallel imaging methods are becoming more widespread. This presentation will focus on new applications that could not be successfully pursued without the acceleration offered by parallel imaging techniques.

Parallel MRI is used to perform high resolution imaging over a large field-of-view in a short time. If a target organ is deep within the body, such as liver lesions, the aorta, or the heart, parallel imaging can be used to capture that region of interest without suffering classic fold-over aliasing. Further, if the object being imaged exists over a large shallow field of view, such as the cortex of the human brain, many small coils can be used to image that large area in a short time with high signal-to-noise ratio.

Another primary area of application of parallel methods is to increase the frame rate of realtime MRI to a level that is necessary to monitor physiological function and device manipulation during MRI guided intervention. With parallel acceleration on the order of factors 3 to 4, realtime imaging can be performed in multiple planes concurrently, with frame rates that are sufficient for guiding therapy. The ability to visualize devices from multiple angles simultaneously significantly simplifies device navigation and targeting.

For each application, the optimal coil arrangement and acceleration direction needs to be determined. This places a high demand on coil manufacturers to supply affordable coils with many channels in different geometries. Using well designed coil arrays, parallel acceleration can be achieved in two orthogonal directions making realtime volume imaging possible.