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DYNAMIC CHANNEL CONFIGURATION - MR SURFACE COILS

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Fewer channels are better for receiving magnetic resonance (MR) signals from tissues deeper within the body and more channels increase reception of MR signals from tissues closer to the surface.

SPECIFICATION

The idea is to dynamically change the channel configuration of a coil during the image processing sequence. Such a coil would be designed with many channels to optimize the MR signals received from tissue near the surface of a body. Let's say this is 32 channels. And, for a chosen application, sequences are run that reduce the number of channels, thereby changing the active coil geometry and improving reception of MR signals from tissue situated deeper within the body. Let's say the area of interest is 10 inches deep. And let's say that we've determined that we can optimize the signal by reducing the number of channels by 8 for every two inches of depth. So, the first sequence runs at 32 channels, then 24, then 16, then 8 and then 4. This would then optimize the MR signals of the deeper tissue two inches at a time. A sequence like a propeller would benefit from this technique. Perhaps the over-sampling of the center of K-space would be advantaged further by over sampling the depth of the tissue layers by progressively reducing or increasing the signal channels.

This would require the scanner sequence to dynamically change the configuration files, and this would enable the scanner to ascertain from which channels the MR signals will be received. We will also need to determine whether to electronically re-route MR signals when the number of channels being received has changed. Finally, there may be some implications for the transmit side of the equation which must be explored.

MR surface coils have a static number of channels that are utilized by the scanning system via configuration files which indicate the meaning of each channel so that the signal information can be transformed by the scanner’s signal processing system.

The novelty of this idea is to dynamically change the number of channels (signals) that are presented to a scanner during the course of a scan sequence to take advantage of the fact that more channels improve the signal-to-noise ratio (SNR) obtained from tissue near the surface of the body and fewer channels improve the SNR obtained from deeper tissue.