

## Motion Compensation in MRI: Navigator Echo

### Overview of Technology:

This technology, developed by researchers at the University Health Network, allows for a method of motion compensation during magnetic resonance imaging (MRI) based on selecting data from the similarity of direct navigator echoes. In this system, navigator data is acquired directly from the anatomy of interest. Unlike conventional methods, the navigators are used to select specific data that differs only by rigid-body displacements. This is accomplished by selecting data based on the relative similarity, rather than the relative displacement between navigators. Thus, even if the overall anatomical motion is non-rigid-body, the image formed from the subset of selected data can—in theory—be completely motion corrected with the appropriate linear k-space phase factors.

This system performs the following functions:

- I. Acquires a line through the centre of k-space periodically. Optionally, additional lines through the centre of k-space could be acquired in other dimensions as well.
- II. Selects one or more of the navigators as a reference. The spatial extent of the navigator(s) used as a reference may be optionally reduced to improve efficiency.
- III. Calculates the similarity between every navigator.
- IV. Selects data based on maximal navigator similarity. Optionally, data could be selected if a set of navigators has been identified that is identical within the limits of noise.
- V. Any residual displacement is removed with the application of linear k-space phase factors.

### Related Publication:

Sussman, M.S., *et al.* Variable-Density Adaptive Imaging for High-Resolution Coronary Artery MRI. *Magnetic Resonance in Medicine*. **48**: 753-764 (2002)

### Patent:

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