Motion correction in intravascular MRI using projection reconstruction
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**Purpose:** Consistency criteria were used earlier for motion compensation during projection reconstruction MRI (PR-MRI). Here we show a method suitable for intravascular PR-MRI that corrects for rigid body motion by tracking the location of active internal probes in every projection. This reduces the sensitivity to motion from the time-scale of individual images to the time-frame of each projections, or TR.

**Methods:** MRI of an orange was performed on a Philips 3T Achieva scanner using a loopless antenna receiver with radial k-space traversal. The fruit was mechanically shaken (± 3mm) during acquisition and the raw data Fourier transformed in one-dimension. Two methods were explored for probe localization in the image-space projections: (A) Identification of high signal intensity closest to the receiver, wherein the amplitude plot of each projection resembles a volcano (Fig. 1a). The probe is identified as lying at the ‘crater’ in all projections (Fig. 1b). (B) Identification of a signal phase-reversal at the probe location in each and all projections (Fig. 1d). For the loopless antenna receiver, the signal phase direction reverses diametrically and abruptly across the probe (Fig. 1c). The probe was located in each projection and aligned using both methods. An absolute-valued reconstructed image was obtained from filtering and backprojecting the real and imaginary parts of the aligned projections, and reconstructing the image with the probe as its center.

**Results:** Both the amplitude- and phase-based methods produced superior images compared to conventional scanner reconstruction (Fig. 1e, f), but some radial streaking remains compared to a no-motion image (Fig. 1g). While Method B performed marginally better, Method A is more general and can be used with intravascular probes (e.g. loops) that are employed for both transmission and reception as in MR endoscopy.

**Conclusions:** Compensating for rigid-body motion by sensing phase reversals and/or amplitude changes effectively reduces motion artefacts on the time-scale of individual projections in projection-reconstruction MRI.