Docket #: S16-460

Passive MRI-guided tracking of metallic objects using artifact-reduced imaging with selective excitation

MR-guidance for biopsy procedures features high intrinsic soft-tissue contrast. However, artifacts induced by the metallic needle such as signal void and distortions can reduce the localization of the needle and thus prevent the targeting of smaller lesions. Stanford researchers have designed a method to visualize both a metallic object such as a needle, as well as the tissue around it, using artifact reduction methods and novel tracking. The method images the region surrounding the needle with reduced artifacts and highlights the needle contour for tracking. We have shown a particular case of this proposed method in a phantom containing different biopsy needles.

Applications

- Real-time tracking of a needle under MR guidance such as in biopsy with visualization of the region surrounding the needle for more precise needle localization e. g. for targeting small lesions.
- MR guidance of needles made of higher susceptibility material for better cutting performance that cannot be visualized with conventional methods due to too strong needle artifacts.

Advantages

- Imaging very close to a needle with minimal artifact. Off-resonance regions used for highlighting are intrinsically aligned with the underlying MR image.

- Selecting the off-resonance frequencies allows to choose coverage of the area surrounding the object.
- Allows for using higher susceptibility needle materials for better cutting performance and thus biopsy sample quality.
- A way to visualize the contour of the needle for tracking, intrinsically aligned with the underlying image.
- A way to image a needle made of conventional materials such as stainless steel with massively reduced artifacts.

Patents

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