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Title: Fast Field-Cycling NMR(FFC-NMR) – A novel way to age thrombus in vivo?

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Abstract:

Purpose:

To ascertain quantifiable information about in-vivo thrombus in an attempt to characterise thrombus age. This study expanded upon previous work by members of this group regarding the detection of fibrin with FFC-NMR to involve in-vivo study.

Method(s):

A volunteer diagnosed with a leg deep vein thrombosis (DVT) agreed to participate in our preliminary study.

Doppler ultrasound (US) confirmed the presence and extent of the DVT in the leg. The leg was then imaged using a conventional MRI sequence. Finally, an FFC-NMR sequence was performed in the region of interest.

The volunteer returned for 2 follow up studies with approximately 1month interval between.

Results:

Initial US of the leg demonstrated a large non-occlusive thrombus extending from the distal iliac vein to the distal femoral vein.

With the prototype coil conventional MR imaging was possible of the thigh, but not at the level of the iliac veins. The initial FFC-NMR imaging of the iliac veins didn't yield detectable signal.

The first follow up study focused on the thigh and showed a decreased burden of thrombus on US, but a detectable FFC-NMR signal for the thrombus. On further review this signal was found to have originated from a superficial vein, not the deep femoral vein as intended. Obtaining signal from the deep femoral vein proved elusive with the prototype coil.

A final follow up study demonstrated near-complete resolution of the thrombus on US, with clearance of the thigh veins and therefore no detectable signal on FFC-NMR.

Conclusion:

Although an FFC-NMR signal wasn't obtained from the deep venous system as aimed, this study did yield a positive result. It is likely that the signal obtained from the superficial system represents fibrin within a superficial thrombus. With further improvements in the prototype MR coil, it will be possible to try in-vivo studies again.

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