System and method for generating a traveling field free line

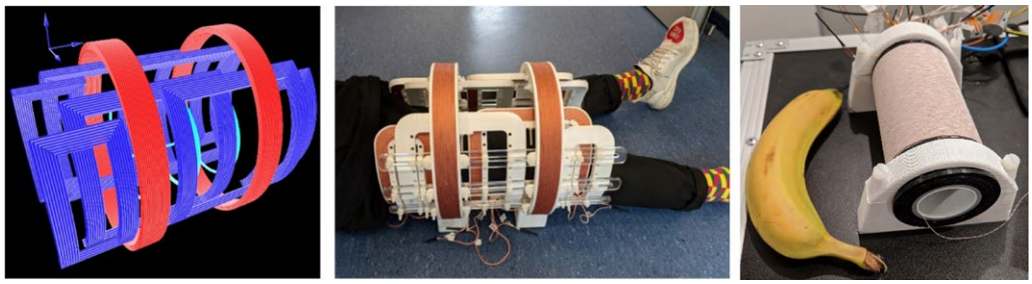
Reference No: B77202

CHALLENGE

Magnetic Particle Imaging (MPI) is a promising tomographic modality for the direct visualization of magnetic particle (MNP) distributions in 3D. It relies on the nonlinear magnetization response of MNPs to time-varying magnetic fields and can provide imaging with high good spatial resolutions (~mm) and high temporal resolutions (~ms) in pre-clinical scanner concepts. Since MPI is a tracer-based and radiation-free modality, it is of high interest for clinical applications, e.g. cardio-vascular intervention. However, until now, technical hurdles have been too high to realize an MPI scanner suitable for clinical applications. Particularly, upscaling proven MPI designs to human-size is technical quite complex and results in heavy and large MPI systems not suitable for clinical environment so far.

INNOVATION

The inventive concept provides a novel approach for the generation of the dynamic magnetic fields required for rapid and sensitive 3D imaging. A compact coil design allows more compact pre-clinical systems as well as lightweight human-sized systems. The combination of proven concepts, e.g., traveling wave concept for scanning huge field of views in short time or field-free line encoding for high sensitive data acquisition, provides novel MPI scanner concepts with a wide field of possible applications in (pre-)clinical environment.



Left: Basic design idea for human-sized interventional Magnetic Particle Imaging scanner (iMPI) using novel fully 3D generated encoding scheme for rapid data acquisition (<1s). Middle: First assembled iMPI prototype. Right: pre-clinical small animal MPI scanner.

COMMERCIAL OPPORTUNITIES

- Small animal studies
- Tumor diagnostic or cardiac imaging

DEVELOPMENT STATUS

Prototype

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