

MRI COIL ARRAY ENABLING FOCUSED ULTRASOUND OUTSIDE THE MRI ENVIRONMENT

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ADDRESSED NEED

Neuromodulation involves stimulating specific brain regions to modify neurological activities, often to treat patients with severe chronic conditions. Currently available solutions are either highly invasive with precise targeting or noninvasive with limited precision. **Focused ultrasound (FUS)** represents a promising noninvasive technique, but its wider adoption is hindered by challenges in image guidance and MRI integration. This technology directly addresses these challenges by providing a **high-precision, patient-specific solution** that enables FUS delivery outside the confining MR environment.

KEY BENEFITS

- **Superior precision** with targeting accuracy under 1mm, outperforming conventional techniques that achieve only 2-3mm under ideal conditions
- **Patient-specific design** creates customized treatment plans tailored to individual anatomy
- **Reduced acoustic dosage** due to improved targeting, enhancing patient safety
- **Greater accessibility** by enabling treatment outside the MRI environment, reducing facility requirements and costs

TECHNOLOGY FEATURES

- **Novel RF coil array design** that significantly increases signal-to-noise ratio (SNR) for enhanced functional MRI capabilities
- **Dual-purpose functionality** supporting both fMRI usage and sufficient thermometry during thermal ablation
- **MR-guided mapping** using thermometry or acoustic resonance force imaging (MR-ARFI) to build patient-specific frames
- **Custom stereotactic frames** that maintain precise contact with the skull for optimal ultrasound delivery

SUMMARY

This technology pairs a novel coil design with patient-specific stereotactic frames for precise delivery of focused ultrasound (FUS) during neuromodulation therapies. This innovative methodology enables patients to receive therapy while outside the MR environment and significantly increases the precision of noninvasive neuromodulation techniques, making treatments more accessible and effective.

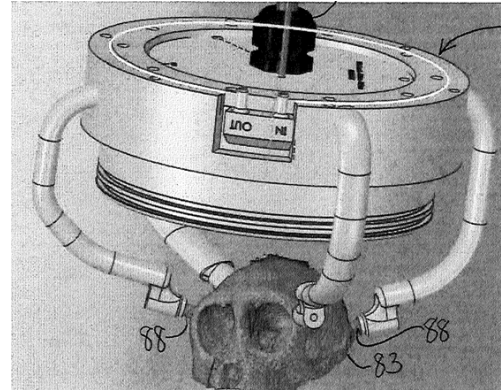


Figure 1: The specialized MRI coil array device shown with its stereotactic frame attached to a non-human primate skull, demonstrating the precise positioning required for focused ultrasound delivery.

OTHER DETAILS

Intellectual Property Status:

Patent Pending (US- 2023-0398380-A1)

Stage of Development:

The device has been constructed with preliminary data gathered in non- human primates.

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