The MEG Project

A wearable OPM-MEG and Light Mu-Room System at Young Epilepsy

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MEG

OPM magnetoencephalography shielded room project

WHAT

The MEG Project is an innovative, collaborative, proof of concept project between UCL GOS – Institute of Child Health (ICH), University of Nottingham (UoN), Magnetic Shields Ltd and Young Epilepsy, to develop and test the technical and clinical feasibility of the first lightweight magnetically shielded room for use with cutting edge, wearable OPM magnetoencephalography (MEG) technology.

The room, to be installed in the Neville Childhood Epilepsy Centre at Young Epilepsy in Surrey, will be the only MEG system in the UK accessible by children and adults with complex needs without the need for them to be sedated.

WHY

MEG is a vital part of neurological diagnostics and surgical evaluation which clinicians currently have extremely limited access to. Advances in imaging techniques over the last 10 years have been crucial to accurate diagnosis, early intervention and success in epilepsy surgery. Such advances have increased the number of children and young people for whom surgery is an option.

MEG offers an additional set of metrics, providing a far greater clarity of image, which other techniques do not. Current MEG systems are rare because of their size and expense to run. They are often unsuitable for children and people who cannot keep still without sedation. Patient movement results in high levels of movement artefact, which significantly reduce accuracy.

The development of the OPM-MEG within a shielded room overcomes the need to stay absolutely still and is therefore far more accessible and accurate for children - particularly those with complex needs.

Greater accessibility for children makes MEG an additional imaging option for clinicians when diagnosing epilepsy and evaluating candidates for epilepsy surgery.

Mu-Rooms

The wearable OPM-MEG system allows patients to move provided they operate within a magnetically neutral zone.

Mu-Rooms create a space shielded from any magnetic interference using Mu-metal and bespoke sheets of copper coils.

It is the combination of using OPM-MEG and Mu-Rooms which make this technology accessible to children and people with complex needs.

The Light Mu-Room

- Much cheaper materials and installation
- Lighter and takes up less space
- Feels like a room – not a safe!
- Moveable – therefore more accessible

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MEG & OPM-MEG

Magnetoencephalography (MEG) is a neuroimaging tool, like EEG (electroencephalography).

MEG records brain function by measuring changes in magnetic fields rather than changes in electrical signalling. It can pick up deeper signals, with greater signal gain than EEG.

CURRENT MEG SYSTEMS

- Require a chamber of liquid helium (-269C) for the sensors to work
- Are static and require patients to be static
- Are very expensive

OPM-MEG System

- Optically-Pumped Magentometers use individual sensors which pass light through a vapour into a photodiode
- Sensors can be worn
- 3-5 fold signal increase

PLUS…They are getting smaller, lighter and cheaper!

March – August 2019	September 2019 – February 2020	March 2020	April – August 2020	September – December 2020	January 2021+
Sensor development Shielding development	Light Mu-Room development	Light Mu-Room build at Young Epilepsy	Mu-Room testing	Light Mu-Room demonstration	Clinical trials of OPM-MEG and Light Mu-Room systems

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