YORK INSTRUMENTS

MEGSCAN®

York Instruments: Company Profile

York Instruments is a medical technology company set to radically transform the field of functional brain imaging. The company was founded by a pioneering group of medical executives and leading brain scientists who saw real commercial opportunities in the ever-expanding neurosciences market.

York Instruments was founded in 2015 and currently employs over 40 people between three offices in York and London in the UK, and Coral Springs, Florida. In addition, in July 2018 York Instruments acquired its largest competitor MEGIN (vendor of the Triux neo MEG product), which is based in Helsinki Finland, together with MEGIN's mature global sales and distribution network.

Our first product MEGSCAN is in development and is due to install at a university hospital in Texas in early 2019. Our system is a MAGNETOENCEPHALOGRAPH or MEG scanner. This is a substantial piece of medical technology, similar in scale to an MRI scanner. Unlike MRI, the MEG scanner picks up minute magnetic signals passively emitted by the brain as a result of normal neural activity. There are currently around 200 MEG scanners worldwide: they are used clinically to help localise specific areas of the brain: to identify key areas of abnormal electrical activity such epilepsy, or to aid neurosurgeons in effectively mapping functional areas of the brain as a precursor to brain surgery. In addition to bringing upgraded MEG technology to all

aspects of the MEGSCAN, York Instruments is dedicated to expanding the clinical utility of MEG and supplying as standard to every neuroscience department.

The future for York Instruments looks very promising. Already established as the major world supplier in MEG systems, we have a pipeline of confirmed global sales over the coming 24 months. We are working through strategies to expand existing markets for MEG to include new clinical applications such as concussion, oncology treatment planning, autism and a range of neurodegenerative and psychiatric disorders. We are working with leading neurologists and research universities to include the most up to date technology and medical advances in the products that we develop.

For additional information about York Instruments or any of its products please contact:

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MEG as part of multimodal approach to neuroimaging

MEG is well placed as a multi-modality imaging tool.

Neurosurgeons are able to rely on MEG for presurgical functional mapping and to accurately localize areas of epileptic activity.

With MEG at the heart of a hospital's neuroimaging department, clinicians can ensure improved accuracy of diagnosis on a range of conditions, as well as improve patient outcomes from brain surgery.

MEG combines synergistically with EEG, since each technology detects an orthogonal component to the other. MEG detects epileptic spikes in about 75% of patients, whereas EEG detects them in about 60%. When MEG and EEG are combined, almost all spikes are detectable.

MEG combines with MRI or CT scans to give a functional-anatomical image known as a Magnetic Source Image (MSI) which is extremely useful in presurgical mapping for epilepsy and oncological management.

MEG is the definitive measure of brain function. For many neurological conditions and brain damage, other imaging tools simply cannot give the necessary data to understand the effect of the condition or injury on the brain.

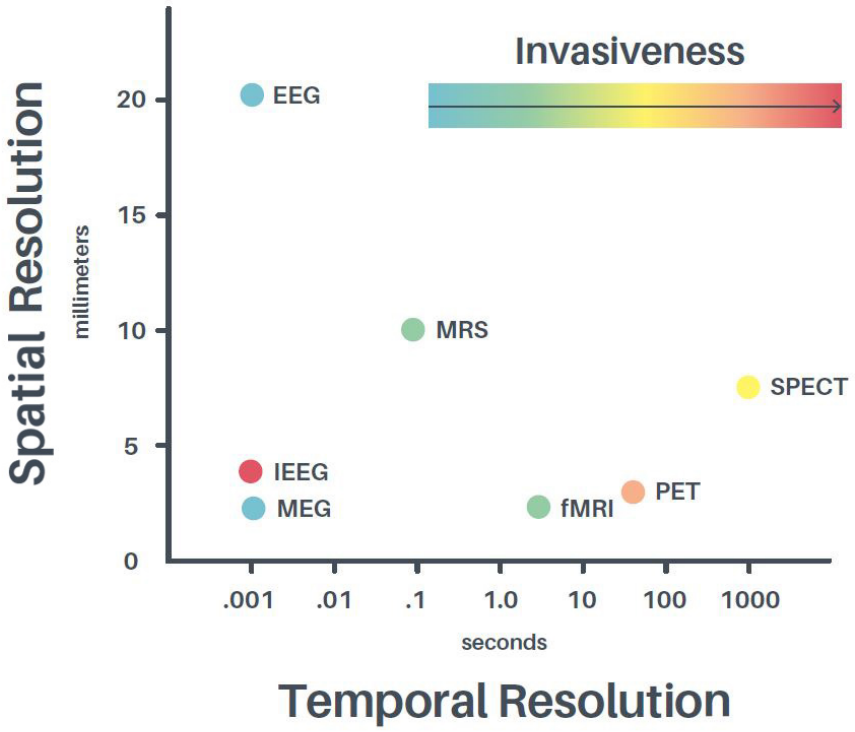
The unique features of MEG include:

- Direct measure of brain function. This is unlike MRI and fMRI which are secondary measures of function
- High temporal resolution. Events with millisecond duration/frequency can be resolved, unlike fMRI, PET and SPECT, which have much longer time scales
- High spatial resolution. Sources can be localized with millimetre accuracy. This includes those who have had past brain surgery, where EEG may be severely distorted
- Completely non-invasive, safe and silent

Comparison chart of leading brain imaging modalities.

	MEG	MRI	fMRI
Temporal resolution	High	Low	Low
Spatial resolution	High	High	High
Measures brain activity	Directly	Only measures structure	Indirectly (BOLD response)
Level of expertise	Some training required	Extensive training	Extensive training
Invasive procedure	Non-invasive	Uses contract agent in 40% cases	Non-invasive

Comparison graph showing common brain imaging modalities. MEG offers excellent spatial and temporal resolution while being minimally invasive for the patient.



Clinical Applications for MEG : Key Facts

EPILEPSY

3.4 million Americans are currently living with epilepsy
150,000 Americans are diagnosed with epilepsy every year
1 in 26 people will develop epilepsy
In the US more than $15.5 billion is spent caring for and treating epilepsy

It's a huge problem and has a massive impact on peoples' lives.

May lose your job

May lose your driving licence

Children miss school and learning opportunities

Affects normal social development

Causes social isolation and stigma

Treatment side effects

Linked to comorbidities

Leads to anxiety and depression

MEGSCAN is a powerful tool to help combat epilepsy and live seizure-free

MEG **accurately localizes epileptic activity** – means surgery has a greater chance of success

Localize brain function – means the surgeon is better prepared and surgery is therefore less likely to affect important brain areas

Scans are **peaceful and non-invasive** which is so important for children or vulnerable subjects

Published literature points to **vastly improved surgical outcomes** when MEG is used for surgical workup.

CONCUSSION

2.7 million young people received annually in Emergency Departments in the US for concussion
Leading causes of concussion are accidental falls/knocks, car crashes, assaults and sports

What effect does concussion have?

Trouble with short term memory

Headaches, trouble with bright lights

Affects your emotions and mood

Disturbs your sleep

Difficulty focussing and concentrating

May cause social isolation through low function

Can lead to anxiety and depression

A severe or repeated concussion can lead to permanent brain damage

We need to understand each concussion better in order to treat it

CDC defines a traumatic brain injury (TBI) as **a disruption in the normal function of the brain**

MEG **is the definitive measure of brain function**

Damage to the brain can be seen using **MEG when it is invisible in CT or MRI**

Concussion diagnosis **without MEGSCAN is highly subjective** "finger in the air"

Slow wave patterns in the brain signal are **the signature of brain trauma** and can be measured using MEGSCAN

Your doctor will recommend **a treatment plan for concussion** based on the results of the MEGSCAN

ONCOLOGY

2017 **23,880 adults** in the US were diagnosed with cancers of brain. Plus **3,560 children**
The 5-year survival rate for people with cancerous brain or CNS tumors is 34% for men and 36% for women.
40% people with brain tumours will experience epileptic seizures. (90% of those with glioma type of tumours)

What effect do brain tumours have?

Headaches, trouble with bright lights

Numbness, tingling in arms and legs

Seizures

Memory problems

Mood and personality change

Balance and walking problems

Nausea and vomiting

Fatigue, depression

Difficulty communicating

But treatment for a brain tumour brings its own hazards

MEG allows oncologist to **localize brain function** – means the surgeon is better prepared and surgery to remove a tumour is therefore less likely to affect important brain areas

MEG offers the highest level of accuracy to **define the edges** of cancerous cells for surgical planning

MEG accurately **localizes epileptic activity** caused by a tumour – means surgery has a greater chance of success

MEG gives an accurate **measure of brain function** before, during and after treatment. Allows oncologist to plan treatment to mitigate any negative effects

Scans are **peaceful and non-invasive** which is so important for children or vulnerable subjects