Magnetoencephalography (MEG)

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Talk Transcript

Hi, I'm **Lydia**. I'm a PhD researcher in the **ARM lab** at UCL and I'm going to introduce you to a technique called **Magnetoencephalography**. Or **MEG**, for short.

Our **brains** are made up of **billions** of **cells** called **neurons.** These **neurons communicate** with each other through **electrical** and **chemical signals**.

We **can't record** from **single neurons non-invasively**. But, when a **large collection** of **neurons** do the **same thing** at the **same time**, we can **detect** this from **outside** the **head**.

Let's think about how this works

Imagine you're at a **football stadium**. Before the game starts **everyone** is having **conversations** between themselves. From the **outside** this just sounds like **noise**.

But then **imagine everyone starts doing the same thing**, like **singing** the **national anthem**. Then you can **hear the song** from the **outside**.

This is **similar** to what **happens inside** the **brain**. **Large collections** of **neurons work together** to perform **specific functions**. When they are all **working simultaneously**, we can **detect** this from **outside the head**.

After stroke, these **neurons might not work as well together**. If we think back to **our analogy**, you could imagine that a **proportion** of the **stadium** are **singing** the **wrong song** and this makes the **song quieter** and **less clear.**

We can **detect** this **activity** using **specific instruments** and one of these **instruments** is **MEG**.

In our case, we are particularly interested in using **MEG** to study in how **neurons work together** after **stroke**, and also how **recovery** and **rehabilitation** help to **reinstate** some of their **original function**.

How we record MEG at UCL

The **MEG scanner** is located at the **Wellcome Centre for Human Neuroimaging**, at Queen's Square.

If you were to **participate** in **MEG research**, you'd be met here by a **researcher**, who would take you downstairs to the **MEG scanning room**. This **building** is equipped with **elevators**, so that **everyone** can **access** the **scanning room**.

Once here, you'd be asked to **remove all metal** on you and **sit** in the **MEG scanning chair**. It would be important that you made yourself comfortable as the **participant** has to **sit as still as possible** during the **recording**. At this point you also might have **electrodes** placed on your **forehead** and **chest** to **record** things like **eye blinks** and **heartbeat**.

MEG is completely **safe** and **silent**, and you wouldn't feel anything if you were having a scan. However, anyone with a cardiac pacemaker or metal implanted in their upper body, would not be able to have a scan as this would cause interference.

Typically, we **record** the **brain** at **rest**, where you'd be asked to **look** at a **cross on the screen** and **relax**, or while you **perform a task**.

Depending on the focus of the research the **task** could include **movements**, **detecting items** on a screen or **interpreting language**. Once the scan is finished you'd be helped out the chair and back out the building. This **completes** the **testing session**.

MEG enables us to **record brain activity** at **millisecond precision**. This allows us to study **brain dynamics**

For instance, we can look at **how specific parts** of our **brain work together**, when we **move** our **hand** or **arm**. If stroke affects these parts of the brain, then the signal we detect with MEG is a lot weaker.

But interestingly, over recovery this signal becomes more similar to the healthy brain.

If you'd like to know more about MEG research visit our website or the centre website, using the links below, or feel free to drop us an email.

Glossary

Magnetoencephalography (MEG): a **non-invasive brain imaging** method which allows us to **record brain activity** at the **millisecond timescale**.

Neurons: **brain cells** which **send** and **receive signals**

Non-invasive brain stimulation: a set of **techniques** and **technologies** that have the ability to **change brain activity** without any invasive or surgical procedures

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