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Participant Guide to MEG Scanning with a head-cast



Participating in neuroimaging experiments

What is neuroimaging?

You may have seen pictures of brains with bright blobs on them and headlines claiming that researchers have unlocked the secrets of the human mind. Although neuroimaging is a rapidly evolving field which can tell us a great deal about how the brain works, the purpose of neuroimaging is not to produce colourful images. It is to design and carry out clever experiments to answer interesting questions.

For example, we could ask you to calculate, look at, experience emotions, learn and remember, navigate around, or make predictions about something for an experiment. By measuring brain activity when you do such tasks in the scanner, we can identify characteristics of normal brain activity and test specific hypotheses about how mental operations work. If we understand how these are supported in the healthy brain, we may be able to do more to help patients with difficulties in these domains.

Participating in neuroimaging experiments

The research has been designed to find out what happens inside your brain when you perform certain tasks or behaviours. This can be used to understand normal and diseased brains but is not intended for performing diagnostic procedures and cannot be regarded as a health check. This document is meant as an overview of practical considerations/safety precautions involved in scanning with a head-cast.

The head-cast will be made specifically for you and requires you to come in and have an MRI (magnetic resonance imaging) scan first. This takes about an hour and **you cannot have any metal on or in your body during the scan**. If you have a tattoo it is best to let us know when you are being recruited, as some may contain traces of metal.

Do I have to take part?

It is up to you to decide whether or not to take part. If you decide that you would like to take part then you will have this information document to keep, be asked to sign consent forms, copies of which you are also welcome to keep. **If you decide to take part you are still free to withdraw at any time and without giving a reason**. This will not affect the standard of the care you receive and you can decide at any time before or during scanning that you do not want to continue. Because the head-casts are tightly fitted to your head we recommend that you do not participate if you suffer from claustrophobia or are prone to head-aches.

What is MEG?

MEG is an acronym for magnetoencephalography. It is a brain scanning method to record magnetic fields that result from the normal activity of brain cells. These magnetic fields are extremely small but pass through the scalp and skull and can be measured outside the head as they happen, on a millisecond time basis.

MEG research is shedding light on fundamental workings of the human brain. Studies that involve normal volunteers form the basis of this and are therefore a central part of our research program, contributing to the growing knowledge about brain function and activity. The aim is to try to understand how the brain generates different types of behaviour and then relate them to the disturbed behaviour caused by different kinds of illnesses.

There are no side-effects or after-effects of being scanned and it doesn't hurt. It is completely safe, painless, and silent.

The scanner looks a bit like a large hairdryer and is located in a magnetically shielded room to block external magnetic fields (see picture on front page).

Throughout the experiment at least two researchers will be present and able to hear you over the intercom and see you on a video-feed. You will also have access to a panic button at all times and can press this to get our attention or if you wish to stop the scan.

Because the signals from the brain are so small and easily drowned out, anyone who has a cardiac pacemaker, metallic implants in the upper half of their body or metal in their eyes or teeth will not be suitable for a MEG study. This is because the metal will cause interference to the MEG signal that is recorded.

If you are on any medication, have vision or hearing difficulties or suffer from any psychiatric conditions or neurological diseases such as epilepsy, or if you could be pregnant please let us know. Please note that the MEG studies are not diagnostic procedures and cannot be regarded as a health-check.



MEG scanning with head-cast. The cables are connected to small coils which record the position of your head. The scanner and coils only passively record; there is no stimulation involved.

Scanning procedure

If you agree to participate, you will be invited to the Wellcome Trust Centre for Neuroimaging in Queen Square, London. The closest tube station is Russell Square. To cover your travel and expenses, you will receive compensation, around £20 per hour, depending on the study.

When you arrive, a researcher will welcome you, explain the exact procedures planned, and answer any questions you may have. None of the tests we do are invasive.

On your first visit, your head will be scanned using a magnetic resonance imaging (MRI) scanner. This is painless and safe but quite noisy so we will give you a set of ear plugs to wear. You will have to be metal-free for the scan which will take around 1 hour. Once you have removed any metal you are carrying or wearing (coins, zippers on clothes, under-wire bras, make-up, etc), you will be asked to lie down in the scanner. During the scan, you do not need to do anything; you can even fall asleep during the MRI. From these scans we will make your individual foam head-cast that we will then use in the magnetoencephalographic (MEG) scanner.

The MEG scanner, like the MRI, is safe and non-invasive. The flexible head-cast looks and feels like a tight helmet or hat and is designed to fit your head specifically. During each MEG scanning session, you will be asked to wear it while performing a simple task. The task will be explained to you beforehand and you will be given an opportunity to practice and ask questions before we begin. You will sit in a special chair which will be raised up and securely locked in position at the height where the top of your head just touches the inside of the scanner. This is important because when you are inside the scanner wearing the head-cast your movement will be severely restricted. For this reason, we lock the MEG system and chair in place for the duration of the experiment so that the only moving part will be you. This is necessary to minimize any risk of neck damage.

The head-cast has been designed to have 'ear flaps' that extend down over your ears, by pressing these you will be able to easily get in and out of the scanner. We will help you try on your head-cast outside the scanner practice using it and getting in and out by pushing in on the ear-flaps and sliding in and out of the scanning chair. Small devices called head localiser coils will be placed in the head-cast and allow us to measure the position of your head. Some studies require additional equipment such as earphones, eye-tracking, or breathing belts. The researcher will set all of this up to make sure you are as comfortable as possible. The head-cast does not obstruct breathing, vision, or talking although hearing may be mildly compromised.



Head-cast made from flexible foam. The head-cast goes on top of your head and covers the top half of it. The picture on the right shows the eye holes through which you will be able to see. On the right, a side view of the head-cast shows the 'ear flaps' which extend down the sides of your head and which will help you to position yourself correctly in the scanner. Some participants say wearing the head-cast in the scanner feels like wearing a tight hat.

Whilst inside the MEG scanner with your head-cast, you will feel that your movements are restricted. We will explain to you in detail how to slide out of the scanner in case you feel unwell. **Please be ensured that you can get out of the scanner at any time if necessary, even though your head will feel tightly fixed inside the scanner**

Two researchers will always be present during scanning and we will be able to hear you over the intercom and see you on a video-feed. There will be breaks every 10-15 minutes where you can exit the scanner and take off the head-cast if you want to. **You will also have access to a panic button at all times and can press this to get our attention or if you wish to stop the scan.** You always have the right to withdraw from the experiment at any time and without giving a reason, should you wish to do so. You will still be compensated the agreed hourly compensation. If you start to feel uncomfortable for any reason please let us know right away. **The data is only useful if you are relaxed and comfortable enough to focus on the task. It is always better to take a break or stop completely if this is not the case.** Your safety and comfort is of utmost importance.

For more information please watch the online safety and instruction video [HERE](#)

Questions and Answers about MEG scanning with a head-cast

What happens when I arrive?

Report to reception desk inside the main entrance; give your name and the name of the researcher who has asked you to come. He or she will be called and will take you to the scanning waiting area where you will receive an explanation of the plan and procedures for scanning. You will have the opportunity to ask questions and will be asked to fill out a safety and consent form before the scan can take place. You will need to remove any metallic items such as credit cards, under-wire bras, belts, coins, shoes, etc. If you are wearing make-up you will be asked to remove this as well. There are lockers for storing valuables.

What are the benefits for me?

Participating will not be of direct benefit to you. However, your data may contribute important theoretical information to our understanding of how the brain works, and in the future this may help rehabilitation and/or treatment in patients with brain injury or disease. Moreover, you will receive compensation for taking part and, if you would like one, a mug as a souvenir.

How long will it take?

Depending on the task and including breaks, your visit to the centre including preparation, explanation, practicing, scanning, and debriefing afterwards may take 2-3 hours. The MRI scan only takes 1 hour and only needs to be done once whereas we may ask you to come back for more experiments in MEG.

How do I prepare?

Before you are invited to the centre, a researcher will check that you are suitable for scanning using a head-cast. For neuroimaging scans it is important that you do not wear any metallic items: non-removable piercings, cardiac pacemakers, dental bridges, metal plates or screws in/on bones, aneurysm clips, underwire bras, permanent makeup, etc. It is best to

wear loose soft warm clothes with no metal fixings. If you have worked in the metal industry and may have metal embedded in your body then you cannot be scanned. Dental fillings from after 1970 are usually unproblematic. You do not need to prepare anything or restrict your lifestyle in any way for the experiment. Please email any questions or concerns to the researcher if you are unsure about whether you will be able to participate or what the experiment will entail. It is a good idea to get a good night's sleep before an experiment so you are rested and ready to do the tasks. Please don't be late for scheduled appointments and make sure to cancel as far in advance as possible if you cannot make it.

If I have a complaint

If you are unhappy with how you have been treated during your participation, information about how to make a complaint is given on the signed consent form, a copy of which you will be given to keep. The department is covered by the UCL/UCLH liability insurance.

Confidentiality

All information collected from you during the course of the research will be kept strictly confidential, anonymised, and will be collected and stored in accordance with the Data Protection Act 1998. Data will be kept in secured accommodation and on secured computers at the Wellcome Trust Centre for Neuroimaging, Institute of Neurology, UCL. The data will be used only for the purpose of informing the research questions in the studies you partake in, and will only be accessible by the relevant research teams. The data will be retained indefinitely and securely, and may be accessed by the research teams for comparison with future data.

Will my GP be informed?

Your GP will not be notified of your participation in this research. However, for our records, we may request you provide the name and address of your GP. Should your MEG scan unexpectedly reveal any potentially clinically relevant abnormality, we would like your permission to notify your GP.

Who has reviewed this research?

A Research Ethics Committee reviews all proposals for research using human participants before they can begin. This research has been approved by the University College London Research Ethics Committee.

What happens to the results of the research study?

If you wish to be contacted with a summary of the findings once the study is complete, has been written up, peer-reviewed, and accepted in a scientific journal, we are happy to contact you. You can then choose whether you would like to receive a full copy of the report. You will not be identified personally in any publication.

Further information:

If you have any questions after reading this information sheet please ask the researcher that you have been in contact with, who will provide you with their telephone number and/or email address on initial contact. Other members of the research team include:

Mr Peter Aston, Laboratory Manager (020-78337472)
Mr David Bradbury, Head of Imaging Support (020-78337463)
Professor Ray Dolan, Centre Director (020-78337456)

Thank you for taking the time to consider participating in our research.