

## Form 510: Transcranial Magnetic Stimulation - TMS

### Before TMS session

- Screen the healthy volunteer for contraindications to TMS using the TMS Safety Checklist.
- Make sure the healthy volunteer has been consented.

### Finding MEPs

1. Describe TMS test to the patient at the beginning of the test
2. Start at 30% MSO and go up in 10% steps until MEPs are found
3. Move the TMS coil on the patient's head in half-inch steps at each stimulus intensity to find MEPs
4. If you see a MEP, hold the coil still, and deliver 9 more stimuli. You need to see MEPs in at least 3 out of 10 traces at this intensity to say the patient is MEP+.
  - a. If you do, the patient is **MEP+** and you can stop the test.
  - b. If you don't, increase the intensity by 10% and repeat from step 3.
5. The EMG trace needs to be free from biological and non-biological noise throughout testing. Monitor the EMG trace and take steps to eliminate noise that occurs during the testing session.
6. If you get the sense the patient is uncomfortable and may ask to stop the TMS prematurely you can skip the remaining intensities and go straight to 100% MSO with active bilateral facilitation. This will hopefully allow you to determine MEP status without a second TMS session.
  - You need to perform systematic coil positioning by delivering at least 1 stimulus at a minimum of 5 different scalp sites at 100% MSO with bilateral facilitation to be sure the patient is MEP-
  - Only 1 MEP in 1 muscle is needed to call them MEP+ at 100% MSO with bilateral facilitation.

To classify a patient as **MEP-** you need to check no MEPs can be elicited while attempting all the following together:

- **Increasing stimulator intensity to 100% MSO, and**
- **Systematic movement of the coil to search for the optimal stimulation location, and**
- **Ask the participant to perform bilateral facilitation.** Patients should hug a pillow to their chest with both arms, attempting to activate their paretic UL as much as possible. Patients with no distal UL activity should elevate and retract the shoulder girdle while hugging the pillow.
- If you see at least 1 MEP in 1 muscle at 100% MSO with bilateral facilitation the patient is MEP+.
- The patient is MEP- if no MEPs are observed at 100% MSO with bilateral facilitation while systematically moving the TMS coil.

For more information: <https://verifytraining.blogs.auckland.ac.nz/tms-technique/>

Check gender identity <i>If unknown, leave blank</i>	
Male	
Female	
Another gender	
Prefer not to share	

Check ethnicity	
Hispanic or Latino	
Not Hispanic or Latino	
Unknown	

Check race <i>Check all that apply</i>	
American Indian or Alaska Native	
Asian	
Black or African American	
Native Hawaiian or Other Pacific Islander	
White	
Unknown	

Age years	
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Check informed consent was obtained prior to participation	
Yes	
No	

Date of informed consent <i>mm--dd--yyyy</i>	
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Total TMS sessions completed by this healthy volunteer, including this session	
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<b>If MEP+</b>	
Check muscles with at least 1 MEP	ECR <input type="checkbox"/> FDI <input type="checkbox"/> Both ECR and FDI <input type="checkbox"/>
Bilateral facilitation required	Yes                  No
Stimulator intensity producing MEPs	%

**Once MEP status has been determined it's good to deliver a few stimulations at 100% intensity while your healthy volunteer performs bilateral facilitation so you have some experience before doing it with stroke patients. Failing to do 100% stimulation or bilateral facilitation with stroke patients when needed can lead to an unusable MEP status.**

<b>If MEP-</b>	
Maximum stimulator output used	%
If 100% MSO was not attempted per study protocol, why not?	
Bilateral facilitation attempted	Yes                  No
If bilateral facilitation was not attempted per study protocol, why not?	

<p><b>General Comments:</b></p> <p><i>Please provide any relevant details of the session for the VERIFY TMS team to view</i></p>          
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**Post TMS Monitoring completed (15 and 30min):**

Check
N/A

Completed by: \_\_\_\_\_ Signature: \_\_\_\_\_ Date: \_\_\_\_\_

It is important to monitor VERIFY patients for any adverse effects of TMS. **Healthy volunteers do not need to be monitored.**

### **What are the risks?**

TMS is considered safe and very low risk for participants who pass the TMS Safety Screening Checklist. Adverse reactions to TMS are very unlikely (0.08% chance, or 8 in 10,000). Possible adverse reactions:

- Seizure – if this occurs it will usually begin during or immediately after the TMS test.
- Syncope – due to procedure-related anxiety.
- Mild headache – this is usually transient and resolves without analgesia.

These are adverse events of interest that ought to be documented using the VERIFY documentation.

### **Monitoring for adverse events**

Monitor the participant for seizure and syncope throughout the TMS test. This can be done by visually observing the participant. Pay particular attention to any sudden changes in their level of alertness or any involuntary or unexpected movements of their limbs. Decreased alertness could be related to syncope, seizure, or simply falling asleep. Some people fall asleep during TMS testing. Gently rouse them with voice and/or light touch on their non-paretic upper limb as needed. Repeated involuntary or unexpected movements of their limbs could indicate a seizure. See the next section for planning your management of adverse events such as seizure.

When the TMS test is complete, note the time of the last stimulus, and continue observing the participant while you remove their EMG electrodes and pack up the TMS equipment.

Check on the participant 15 minutes and 30 minutes after the time when the TMS test was completed. These repeat checks involve observing their level of alertness and looking for any repeated involuntary or unexpected movements of their limbs.

### **Managing adverse events**

Before you begin VERIFY you ought to have a plan in place for managing potential adverse events, no matter how unlikely they may be.

Seizure management will most likely involve calling the medical staff who will manage this event according to local protocol and procedures. Please establish an appropriate plan for your site in agreement with local medical staff.

Have a plan in place for managing syncope or a mild headache. The risks are minimal in both cases. The participant will be seated or in a bed and therefore well-supported if they experience syncope. If the participant volunteers that they are experiencing headache, reassure them that this is not unexpected and likely to be transient. They can be offered analgesia (such as acetaminophen) if their headache is troubling them and/or persistent. In both cases, communicate these events to the patient's medical team for their information and prescription of analgesia if required.