

Written Q&A

Patient support material for MRgFUS treatment of Essential Tremor

Purpose

This document acts as a source of information about MRgFUS for the general public, particularly for those with essential tremor, on what MRgFUS is, how it works, who it is used for, and the key benefits and potential adverse effects of the procedure.

This Q&A is intended to be used by the National Tremor Foundation as supporting material for use on their website and social media channels.

About Magnetic Resonance-guided Focused UltraSound (MRgFUS) treatment of Essential Tremor

What is MRgFUS?

MRgFUS, or Magnetic Resonance-guided Focused UltraSound, is an incisionless procedure for the treatment of Essential Tremor.

How does MRgFUS work?

Magnetic Resonance-guided Focused UltraSound (MRgFUS) combines two technologies – high intensity focused ultrasound (FUS), that is guided by Magnetic Resonance (MR) Imaging. MRgFUS works by using high intensity focused ultrasound to destroy one or two small areas of tissue in the brain which is responsible for the tremor.

Focused ultrasound technology uses ultrasound that pass safely through skin, bone, and muscle. The spot where the ultrasound waves are focussed heats to a temperature of about 55° centigrade which creates a tiny lesion in the targeted area of the brain.

The MRI system enables the medical team to identify and target the specific areas to be treated with high precision as well as to monitor the temperature during treatment.

Who is suitable for treatment with MRgFUS?

MRgFUS may be a suitable treatment option for patients with moderate to severe Essential Tremor who do not respond to medications or cannot tolerate them. The procedure is currently approved for the *treatment of tremor in ONE arm only*, generally the dominant arm because of concerns about the potential risk of speech impairment with bilateral procedures. Although, a trial of staged bilateral MRgFUS treatment is in progress, with the second arm being treated 9 months or more after MRgFUS treatment of the first arm, this should be regarded as experimental rather than routine medical practice.

Is a person conscious during the MRgFUS procedure?

A person is awake and fully conscious during the MRgFUS procedure. This is important so that the patient can provide feedback on the improvement of the tremor and any possible side effects that might occur.

How long does the procedure take?

The MRgFUS procedure is usually performed in an MRI Scan Unit without sedation and takes approximately 4-6 hours.

What does the MRgFUS procedure involve?

Immediately prior to MRgFUS the patient's hair is shaved off completely (because hair traps air bubbles, which deflect ultrasound). A frame is then bolted using pins to the patient's skull under local anaesthetic.

During the procedure the patient can report a feeling of dizziness and pressure on the head which may occur several times during the ultrasound pulses ('sonications') and lasts for about 10-20 seconds on each occasion. There can be some pain and discomfort from the pins which keep the frame fixed to the head.

To what extent will the tremor be decreased in the treated arm?

The extent of improvement in the tremor in the *treated arm* varies, depending on the patient's tolerance of the MRgFUS procedure.

The average improvement is about 70-75% but varies from no benefit to almost 100%. This in part depends on the type and severity of the tremor: For example, proximal tremor, which mainly affects the shoulder, is less responsive to MRgFUS than distal tremors that predominantly affect the hand. In addition the density of the patient's skull is important, as somewhat surprisingly, the *denser* the skull the *easier* it is for the ultrasound to penetrate the skull to reach the target within the brain.

How quickly does a person respond to the treatment?

Many patients experience an immediate reduction in their tremor. However, their ability to regain skills such as writing, picking up a cup, using cutlery, doing up buttons and zips, using a phone or computer may take longer to recover.

Is MRgFUS safe – What side-effects might occur?

The non-invasive nature of MRgFUS minimizes the risks of infection or bleeding inside the skull to negligible levels.

However, patients with speech impairments, unsteadiness when walking or significant cognitive impairments or dementia would be excluded as these problems could deteriorate after MRgFUS. Furthermore, frail patients or those with significant other co-existent medical problems may need to be excluded because these would increase the risks and diminish the benefits of MRgFUS.

The main adverse effects of MRgFUS are caused by cerebral oedema (temporary swelling around the target site in the brain which usually develops in the days after the procedure). This may lead to:

1. Slurred speech
2. Unsteadiness on walking
3. Weakness or numbness on the treated side of the body (including face, arm and leg)
4. Involuntary movements (chorea) on the treated side of the body (including face, arm and leg)

Although, these symptoms, should they occur, usually resolve within 3-6 months there is the small possibility that one or more of these adverse effects might remain permanently.

It is also important to appreciate that MRgFUS is a novel technique, with meaningful published data on patients to only three years after MRgFUS. *Thus the long term efficacy of MRgFUS treatment is not known.*

How long will I need to stay in hospital?

Usually patients who have had MRgFUS can return home the same or the following day.

Is MRgFUS available on the NHS?

Yes. MRgFUS will be available within NHS England from April 2021 for the treatment of medication-refractory Essential Tremor. There is currently one centre (St Mary's Hospital, Imperial College Healthcare NHS Trust) established to treat patients with Essential Tremor with MRgFUS. NHS England are intending to establish more centres but the timeframe for this is as yet unknown.

How would I find out if I am suitable?

An assessment of your suitability for therapy will ultimately need to be carried out by the team performing the MRgFUS. However, prior to that you should ask your GP to refer you to a local neurologist for an initial assessment. This should include establishing or confirming the diagnosis of essential tremor and a discussion about the management of your tremor including possible medical options, deep brain stimulation (DBS) and MRgFUS. Prior to the appointment note down the questions you would like to ask, you may even wish to print and take with you information about MRgFUS from this website.