

Most cases of Essential Tremor (ET) are treated with medicines. In severe cases, despite medication, the tremor affects eating, drinking, writing, dressing, and many other activities requiring fine movements such as putting a key into a lock or entering a PIN number.

People with ET may be so embarrassed by their tremor that they do not leave their home and become depressed. This embarrassment may impact on jobs and income. As many as 25% of patients are forced to retire prematurely, and in one study 60% said they had chosen not to apply for a job or promotion because of uncontrollable shaking. In a recent UK [survey by the National Tremor Foundation](#), almost 20% of respondents had to stop working completely. In that survey, 12% said that they did not go out to socialise, 31% did so rarely, and 45% did go out but felt self-conscious. Only 12% said that their tremor did not significantly impact their social life. 18% of respondents felt that they were a burden on their family, 21% reported a severe impact on their mental health, 26% reported poor self-esteem, and 15% considered that ET had negatively affected their physical fitness. If the tremor becomes severe, the patient even may become unable to feed or toilet independently and require residential care or a carer at home.

Drug treatment is directed at symptom control and allows the majority of ET patients to maintain an acceptable quality of life. Surgery is considered for patients with severe disabling tremor and functional disability that interferes with activities of daily living. Surgical treatment is standard clinical practice when tremor is not adequately controlled with optimal medical therapy or who are intolerant of drugs.

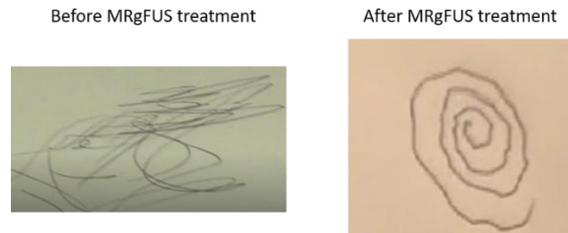
At present, the only non-pharmacological treatment for severe tremor is deep brain stimulation (DBS): as DBS is invasive surgery in which wires are permanently inserted into the brain, some people are not suitable for it due to other diseases (comorbidities) and some do not feel able to consent to a procedure which involves permanent implants and lifelong supervision. There is therefore an unmet need for this patient population.

Focused ultrasound treatment for ET works by cutting (ablating) nervous system circuits that effect tremor. These pass through the thalamus, a small area at the base of the brain which is difficult to reach without causing damage to other parts of the brain. In tcMRgFUS, ultrasound beams from 1024 sources are focused from outside the skull on a precisely-identified target, typically in a day-case procedure lasting about three hours.

The patient lies in an MRI scanner and is fully conscious. Because so many circuits pass through the thalamus, surgical treatment has to be applied very accurately to one area while avoiding side effects from unintended damage to closely adjacent areas. At appropriate points during the procedure, low power is used to temporarily disable the tremor circuits and the patient is asked to draw spirals and to report symptoms. If this confirms that the tremor is improved without unacceptable side-effects, full power is used to permanently disable the neural circuits in the target area.

The effects on tremor are immediate (Figure 1) and persist.

Figure 1: Drawing by one patient before and after treatment. Screenshots taken from the patient case study '[Geoff's Journey](#)', a film made by the National Tremor Foundation



tcMRgFUS has been used since 2010 and to date 4,100 procedures have been carried out. tcMRgFUS is a new way of performing a thalamotomy, a well-established procedure of more than 70 years. Originally performed by surgical incision and then using radiofrequency energy, thalamotomy is known to be a long-term effective treatment for severe ET which does not respond to drug therapy but imprecision in the techniques previously available meant that DBS was thought to be a safer option.

tcMRgFUS has been well studied over a long period. The first patient was recruited to a trial in man in January 2011: four-year follow-up data have been published. The first patient in a large randomised controlled trial [RCT] was recruited in May 2013: three-year follow-up data have been published. tcMRgFUS is now accepted clinical practice in many places around the world.

Estimates of the number of people in Scotland who might benefit from tcMRgFUS are imprecise. For comparison NHS England are currently proposing to commission 150 tcMRgFUS procedures per year for ET in England.

At present DBS is offered in Scotland when required, but some patients are unsuitable. tcMRgFUS is an option for the patients whose needs are agreed but for whom DBS is either unsuitable or unacceptable. A Clinical Panel advising NHS England on a commissioning policy in England has accepted that there is good evidence that tcMRgFUS is as effective as, and no less safe than, DBS. NHS England's Impact Report states that the average cost of a procedure and all associated costs in years 1-5 is £12,990, 51% of the cost of DBS.

In other words, for half the cost of a DBS procedure the NHS in Scotland can offer similar health gains to people whose needs are not being met at the moment but whose symptoms would otherwise be treated with a procedure which is twice as costly, which seems inequitable.

Briefing Paper providing references and further detail -

<https://1drv.ms/w/s!Ai0AD4peSmDMgYhAzocALJzaxqBJYg?e=4YpryM>

Detailed Dossier setting out data on effectiveness and safety of tcMRgFUS -

<https://1drv.ms/w/s!Ai0AD4peSmDMgYhBY4jJnUbueYUAFa?e=SQbPtV>

Letter to Convenor highlighting significant errors in the SPICe document and issues with the government response that was based upon this -

https://1drv.ms/w/s!Ai0AD4peSmDMgYg_DZMOIZ67TEoICA?e=08Ydiv

Film of patient recently treated - <https://www.youtube.com/watch?v=ah8tFzIHvKY>