

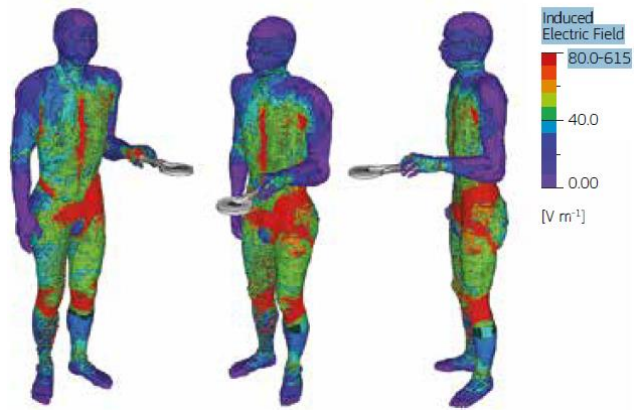
ELECTROMAGNETIC FIELDS:

CASE STUDY 3: RISK ASSESSMENT EXAMPLE: TRANSCRANIAL MAGNETIC STIMULATION (TMS) (2018 example)

A transcranial magnetic stimulation (TMS) device intentionally produces pulses of electromagnetic fields for the purpose of inducing currents in the brain, and can be used in a number of applications (e.g. brain stimulation and behaviour research).

Typical TMS devices consist of a main unit producing a high current pulse and a handheld stimulation coil. Energy is stored in large, high voltage capacitors and these capacitors discharge into the coil using a thyristor, capable of switching large currents; pulsing can be rapid or several seconds apart.

Two coil designs are in widespread use and are used at the University; the circular coil and figure-of-eight coil (although other coil designs exist).



Typical EMF Exposure Profile for the Researcher/Operator

The coil is placed close to the participant/patient's head, and an electromagnetic pulse or series of pulses will be generated to induce currents in the patient's brain. The probe may be fixed in position or, more often than not, held in position by the Researcher.

The images on the left show a distribution of the induced electric field in the human model from exposure to the TMS coil when standing with the coil held 30 cm from the body.

The Researcher (and the participant) will be exposed, in the short-term, to high levels of EMF. Therefore, a number of operational controls are required to eliminate and reduce risks, principally risks which could adversely affect those at "Particular Risk".



TMS 'Figure of 8' Coil

Equality Statement:

It is recognised that exclusion of those with medical devices or implants from participating, operating or observing use of the TMS may occur where there is a risk. All effort should be made to support those at risk to observe use of the TMS.

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Risk Assessment (RA) Title:	Transcranial Magnetic Stimulation (TMS)		
Summary of Activity RA Covers:	The hazard and risks associated with from the location and use of TMS within the College of Human Sciences. It considers both ' <i>Persons at Particular Risk</i> ' and other users		
Location(s) RA Covers:	Various – wherever TMS operated by the School	Person(s) RA Covers:	All persons operating TMS and participant equipment being used on
College / Service:	College of Human Sciences	School / Section:	School of Psychology
RA Assessor(s):	Health and Safety Services	Contact Details:	01248 38 3847
Date RA Created and / or Reviewed ¹ :	May 2018	Next RA Review Date:	General review by School: <ul style="list-style-type: none"> • every 2 years and; • upon changes to room design, or introduction of new TMS or other potentially hazardous equipment
RA Version Number:	TMS 01/2018		

¹ Remember to complete Footer details

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Risk Assessment (RA) Title:	Transcranial Magnetic Stimulation (TMS)		
Date:	May 2018	RA Version Number:	TMS 01/2018

Ref	Hazard - EMF Exposure From:	Persons at Particular Risk	ADDITIONAL SPECIFIC CONTROLS: Persons at Particular Risk
1.	Indirect Effects of TMS: Interference with Active and Passive Medical Implanted Devices (AMIDs), effect on Expectant Mothers	<p>Consider:</p> <ul style="list-style-type: none"> • Expectant mothers • As potential for interference with Passive and Active Medical Implanted Devices (AMIDs) consider: <ul style="list-style-type: none"> ❖ Persons operating and working in close proximity to TMS 	<p>As General Controls below PLUS</p> <ol style="list-style-type: none"> a. NEVER treat persons fitted with AMIDs b. PROHIBIT Expectant Mothers and PROHIBIT persons fitted with AMIDs from: <ol style="list-style-type: none"> c. Operating the equipment d. Remaining in the room during treatment (unless outside of the EMF zone) e. Person to seek advice regarding precautions from their Medical Consultant and advise their Line Manager / Supervisor if precautions recommended f. Line Manager / Supervisor to prepare individual Risk Assessment if precautions recommended by Medical Consultant can be put into place g. Line Manager / Supervisor to assess new TMS equipment, or if adjustments to the existing TMS machines are made with the person concerned h. Person concerned to seek further advice from their Medical Consultant if necessary i. Line Manager / Supervisor to review Risk Assessment and associated procedures e.g Signs, Safe Operating Procedures as required

Ref	Hazard - EMF Exposure From:	Risk to Any Person	Persons at Particular Risk	General Controls
2.	<p>Transcranial Magnetic Stimulation (TMS):</p> <p>Direct Effects: There is a likelihood that Exposure Limit Values will be exceeded</p>	TMS Operator & Participant	<p>YES</p> <p>Expectant Mothers, interference with Implanted Devices</p> <p>SEE ABOVE</p>	<p><u>TMS Operator</u></p> <p>See above for Persons at Particular Risk</p> <ol style="list-style-type: none"> a. See Manufacturer's advice regarding: <ul style="list-style-type: none"> ❖ EMF exposure taking into account different handling positions TMS Operator uses during procedure

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	<p>(short-term) in the Researcher and the Participant</p> <p>Indirect Effects: Interference with Implanted Devices, effect on Expectant Mothers</p> <p>Indirect Effects: Potential for electromagnetic interference with sensitive medical devices</p>			<ul style="list-style-type: none"> ❖ Provision of a diagram detailing exposure in various Operator positions ❖ Suitable signage for general area and TMS Equipment and which details specific clearance distance to protect <i>Persons at Particular Risk</i> <p>b. General Controls to consider:</p> <ul style="list-style-type: none"> ❖ Where possible mount the TMS on a remote device so the TMS Operator can stand further away from the probe during procedures ❖ Fit physical access controls to entry door eg SALTO, Key Pad ❖ Post required Warning Strong Magnetic Fields signs on the entrance door ❖ Display Warning / Prohibition Signs on entrance door and TMS equipment for people wearing AMIDs and Expectant Mothers and which details specific clearance distance to protect <i>Persons at Particular Risk</i> ❖ Provide information, instruction and training to those affected, includes operators and those being treated ❖ Arrange inspections and maintenance with a competent person as required ❖ Keep records eg all maintenance, authorised operators, training
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