

MRI Physics

SMPCETS Open Day 2022

Jennifer Summersgill, Clinical Scientist

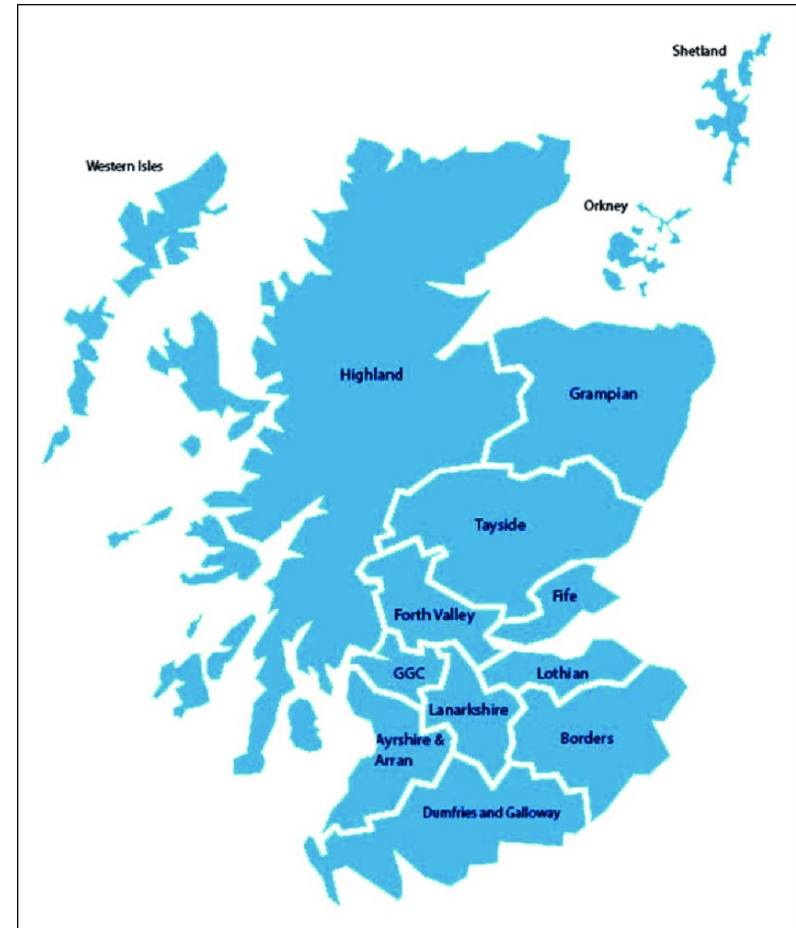


Tayside MRI Physics

- 5 MRI Physicists
- Cover 3 sites, Perth, Dundee and Stracathro
- Four 1.5T scanners, one 3T scanner
- MR guided Focused UltraSound (MRgFUS)

Outside of Tayside

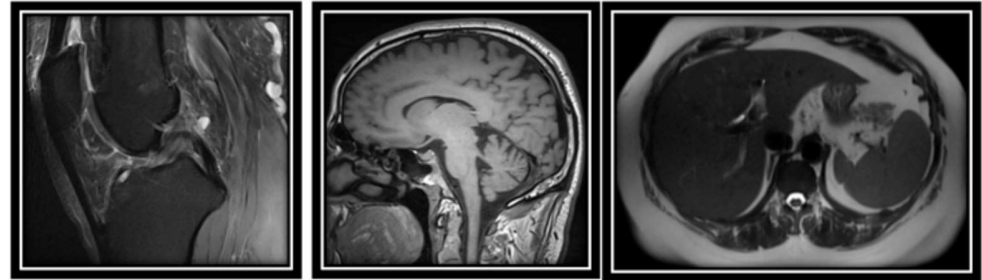
- Glasgow - ultra-high field 7T scanner
- Scotland wide - MR Simulators for Radiotherapy treatment planning



Source: NHS Education for Scotland (NES), 2018 (<https://www.nes.scot.nhs.uk>).

What is Magnetic Resonance Imaging?

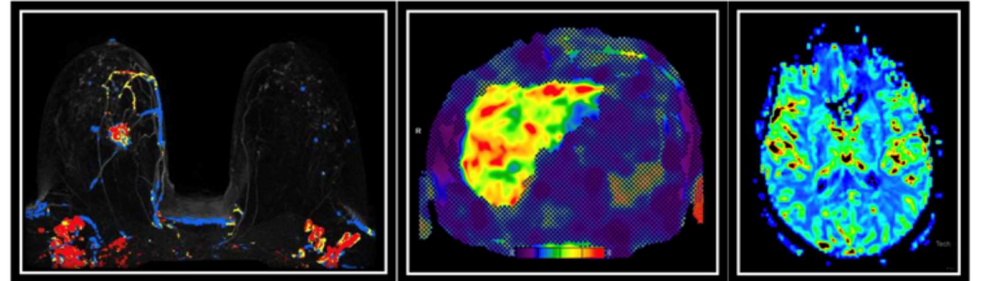
- **Magnetic resonance imaging (MRI)** uses strong magnetic fields to produce high resolution images of the human body.
- No ionising radiation - safe imaging modality.
- Magnetic Field Strength of 1.5 or 3 Tesla (30,000 - 60,000 times the strength of the Earth's magnetic field).
- Anatomical imaging - what anatomy looks like
- Functional imaging - how tissues behave



SAGITAL KNEE

SAGITAL BRAIN

AXIAL ABDOMEN



BREAST MRI (COLOR MAP)

ELASTOGRAPHY (LIVER)

PERFUSION (BRAIN)



SPINE

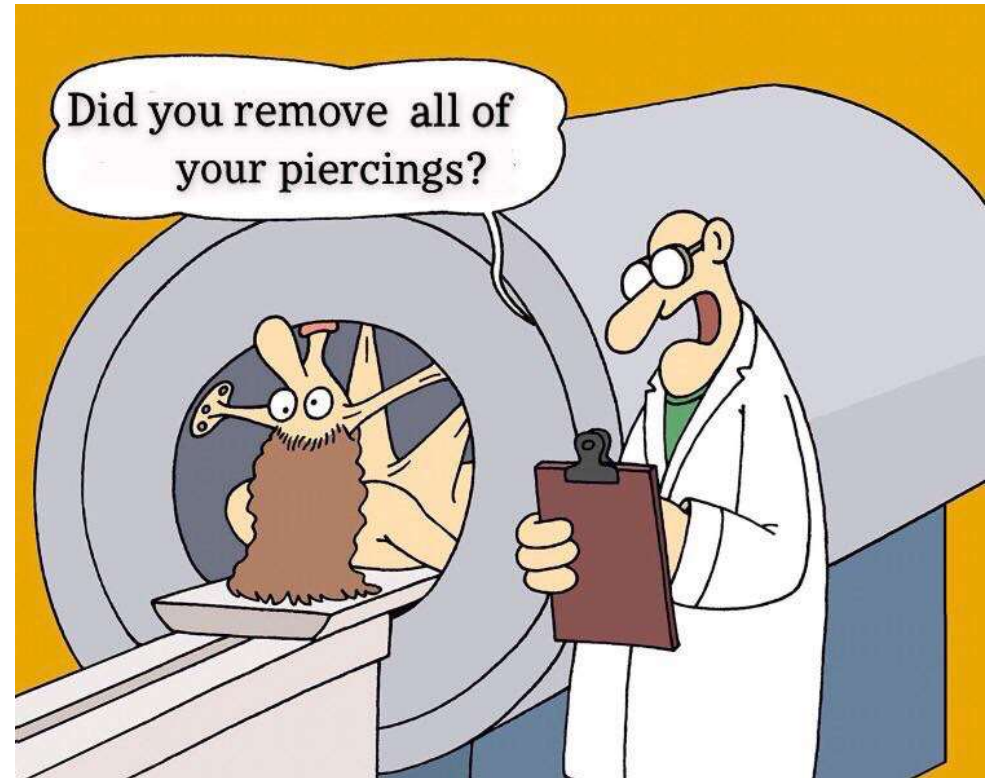
ELBOW

WRIST

HEAD ARTERIES

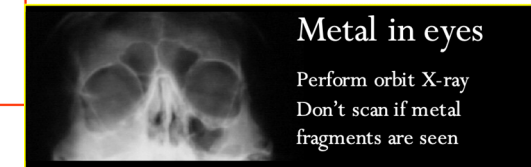
MRI Physics Role

- MRI Safety
- Equipment Support
- Clinical & Technical Support
- Research & Development
- Teaching & Training



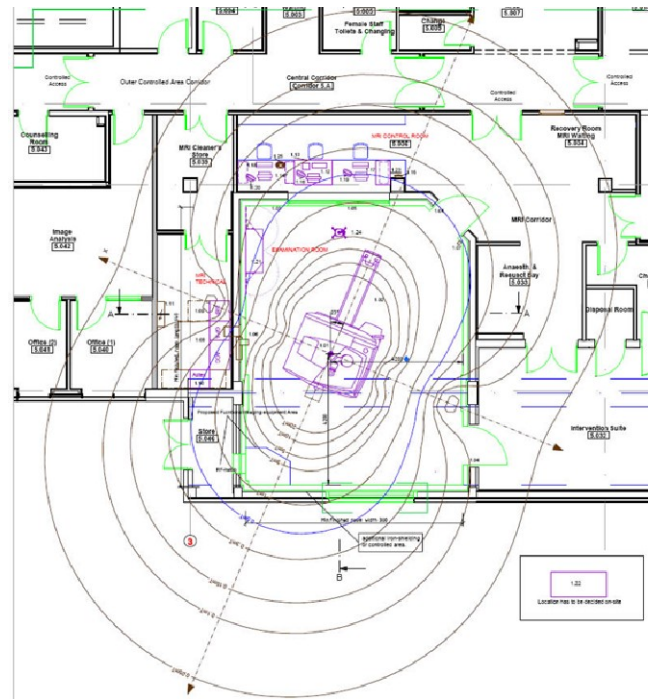
MRI Safety

- Safety is the main priority in our work.
- Safety work includes:
 - MRI Safety queries/implant policies
 - Local Rules
 - Risk Assessments
 - Incident Reporting
 - Individual Site Support



Equipment Support

- Procurement of new MRI scanners and ancillary equipment
- Acceptance testing
- Routine Quality Assurance



Mapping MRI field lines as part of planning scanner position



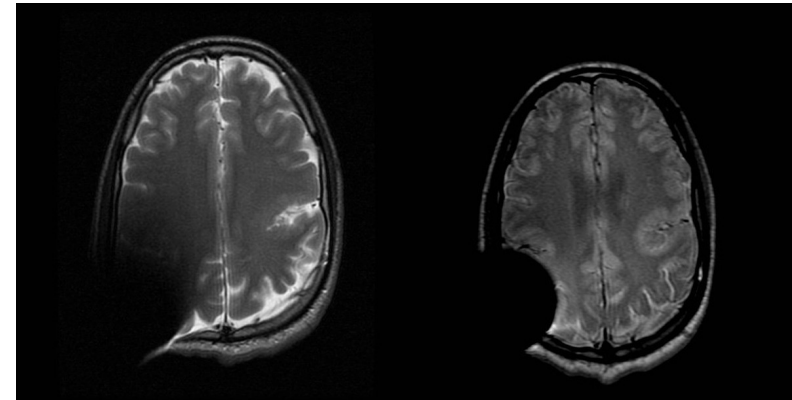
2020 installation of 1.5T scanner in Stracathro

Clinical & Technical Support

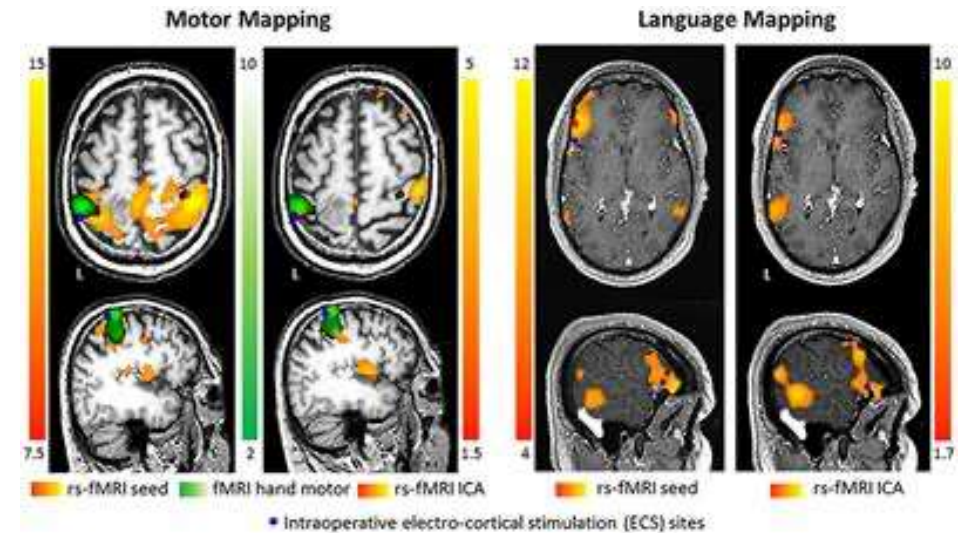
- Protocol Optimisation
- Artefacts
- Advanced scanning
 - Clinical fMRI
 - MRgFUS



Tayside physicists performing pre-treatment MRgFUS QA. New article:
<https://news.stv.tv/north/miracle-treatment-has-stopped-the-tremors-in-my-hand>



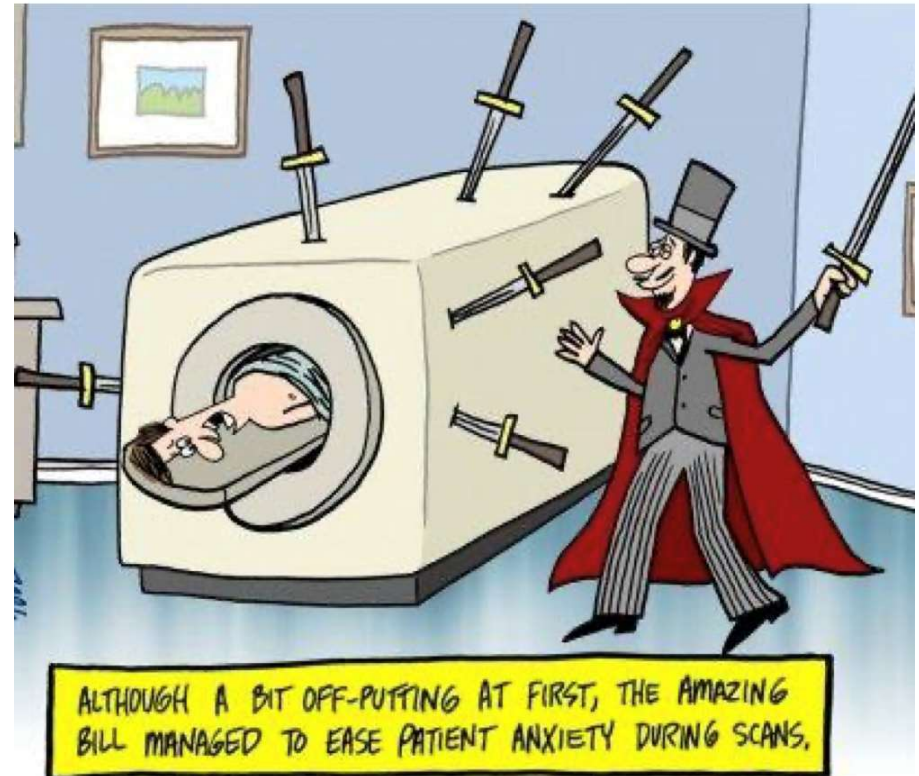
Metallic susceptibility artefact, brain scan of a cochlear implant.



Pre-surgical Brain Mapping: To Rest or Not to Rest? Rosazza et al. *frontiers in Neurology*.
<https://www.frontiersin.org/articles/10.3389/fneur.2018.00520/full>

Research & Development

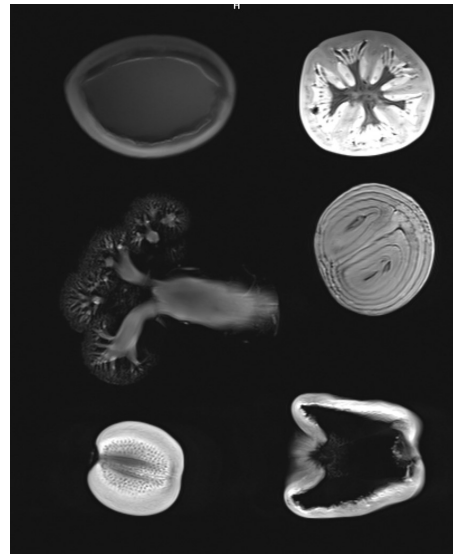
- Commercial and University research projects
- Service Development
 - Investigating new technologies
 - Developing apps
 - MRI Physicists developed a VR app to reduce patient anxiety
 - Want to try it download: [“Virtual reality MRI”](#) (from Belfast Trust) from your app store



Source: https://www.cartoonstock.com/directory/m/mri_scan.asp

Teaching & Training

- Safety training for different MRI staff groups
- MRI physics lectures for Physicists, Engineers and Radiologists
- Trainee supervision
- MSc/PhD supervision



Thank you for listening!

