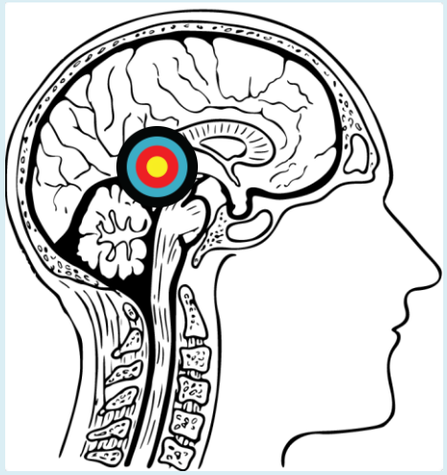
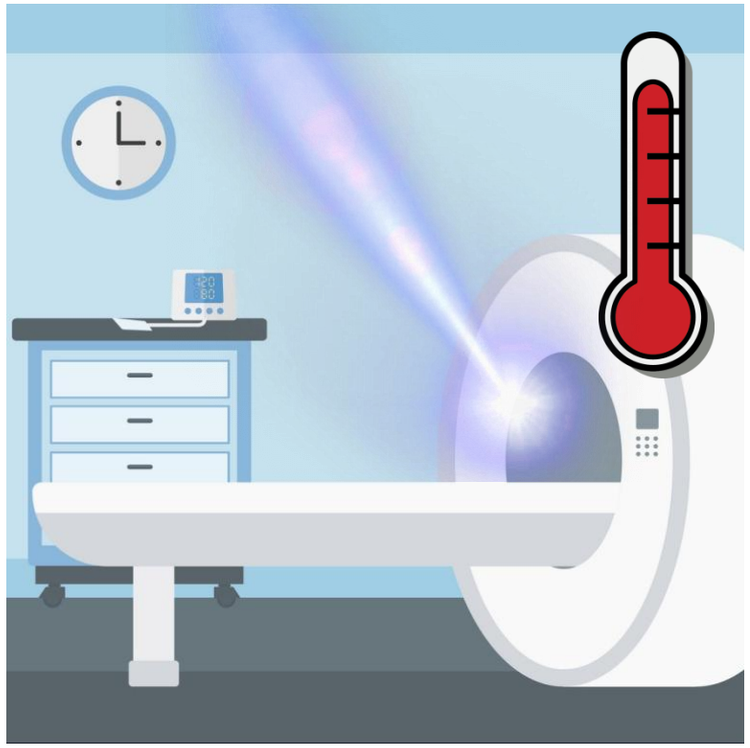
MR-Guided Laser Ablation

Brain conditions such as **tumours** or **epilepsy** regions can lie in hard-to-reach areas, or next to sensitive healthy tissue in the brain

This can limit the use of open surgery or radiotherapy treatments for certain patients

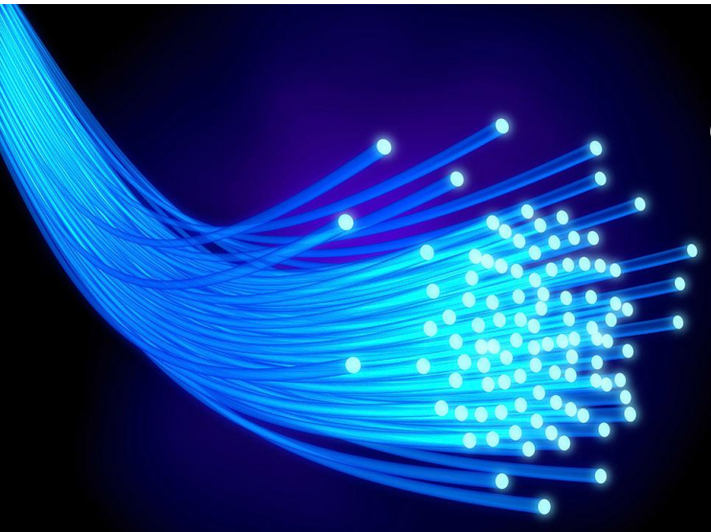
Laser ablation provides a treatment method to precisely target small areas





- **Magnetic Resonance (MR)** images are excellent for visualising soft tissues like those in the brain

- The **neurosurgeon** can therefore precisely locate the target region and position the laser used for ablation
- MR images also accurately monitor the temperature in real-time during the procedure. This process is called **MR thermometry** and ensures the ablation is successful while avoiding unnecessary damage to healthy tissue

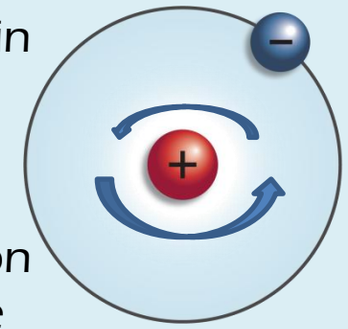


In **laser ablation** therapies, fibre optic cables guide laser energy to heat very small regions, without damaging healthy brain tissue

The procedure only requires a tiny entrance hole, and most patients can return home the next day

Medical Physics help to minimise the unique risks associated with laser systems and high magnetic fields, to ensure the **safety of patients and staff.** Special eyewear is required to protect users from the laser energy, and careful systems of work are followed to avoid metal objects being attracted to the magnet in the scanner

MR imaging uses the fact that protons in hydrogen atoms spin when placed in a strong magnetic field



The spinning speed depends on their temperature – this is the basis for **MR thermometry**

Medical Physics help ensure the MR scanner produces accurate temperature maps to guide the **neurosurgeon**. Physicists regularly test the image quality, to check the scanner is functioning correctly

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Healthcare Science