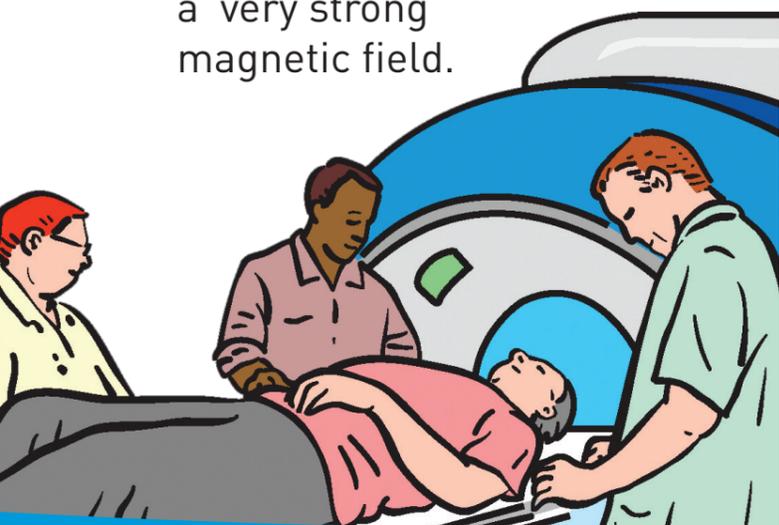


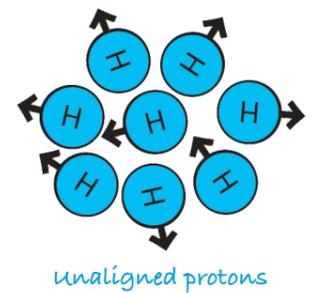
# Seeing inside the body with MRI

Magnetic resonance imaging (MRI) is one of the most powerful ways to look inside the human body. Using strong magnetic fields and radio wave pulses, it produces highly detailed images of soft tissues, which are used for medical investigations and in research.

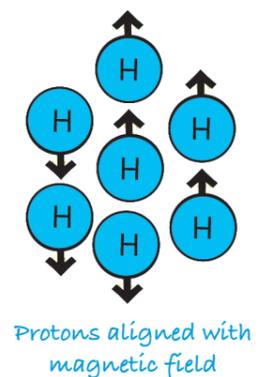
Medical physicists, doctors and radiographers work together to produce and interpret MRI scans. They place the patient in the MRI scanner, where a powerful magnet creates a very strong magnetic field.



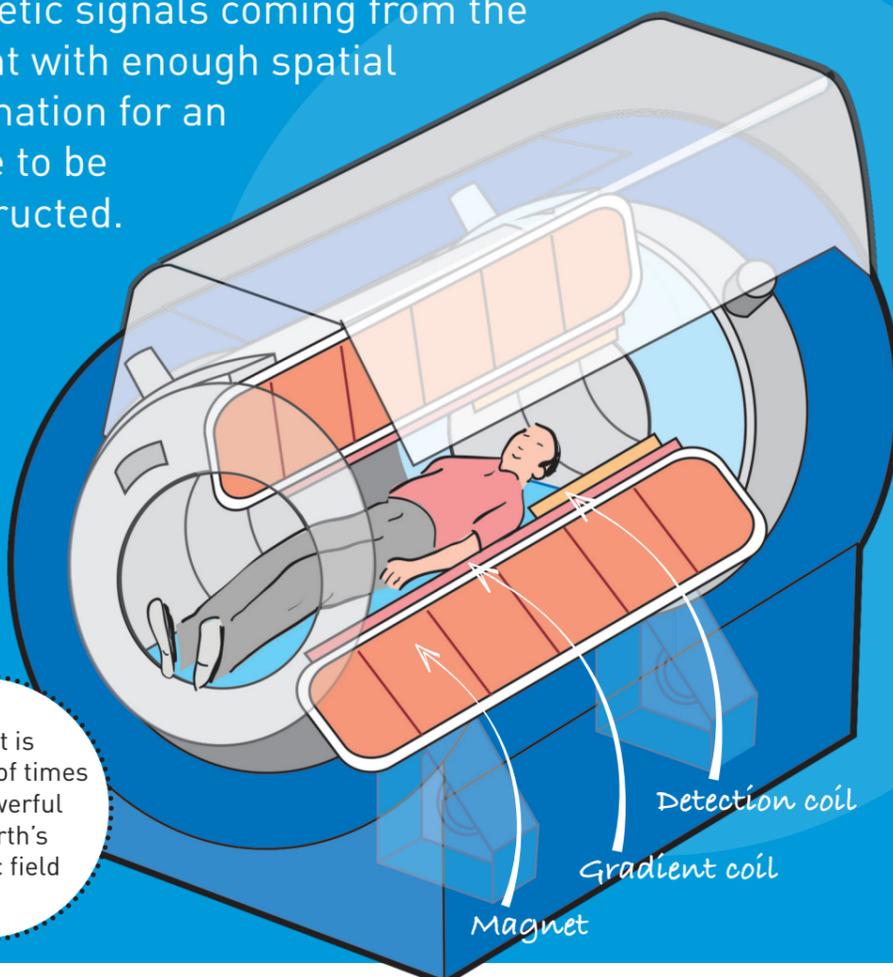
MRI works by detecting how hydrogen atoms in the patient's body respond to this electromagnetic energy. Once the patient is in the scanner, there is a small preferential magnetic alignment of their hydrogen atoms (protons) with the MRI scanner's strong magnetic field. The patient is slightly magnetised.



This magnetisation is tilted away from its equilibrium position using pulses of radio waves. Different types of tissue (such as fat, bone, muscle or disease) return to equilibrium at different rates. Adapting the timing parameters of MRI acquisition affect how different tissues appear on MR images.

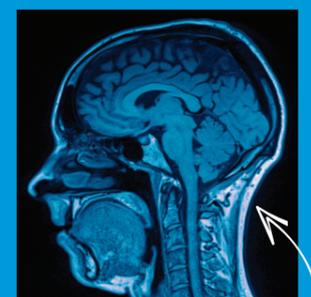


The scanner uses gradient coils to create variations in the magnetic field across the patient. This provides the magnetic signals coming from the patient with enough spatial information for an image to be constructed.



Magnet is thousands of times more powerful than Earth's magnetic field

Detector coils surrounding the patient measure the magnetic signals as tiny induced currents, similar to a bicycle light being lit by the rotating bar magnet in a dynamo.



MRI image of the head and neck

These complex signals are then processed by a computer to extract all the information and produce 2D or 3D images of the human body.

MRI images are extraordinarily detailed and are used to help diagnose illness or plan and monitor medical treatments. MRI is also an important tool for research. For example, researchers use functional MRI (fMRI) and diffusion MRI (dMRI) to investigate how the brain works or to understand more about conditions such as Alzheimer's and schizophrenia.