

Brain Scanning Techniques

In the 1970s, **CAT** scans were introduced. This contains an X-ray transmitter and detector on opposite sides of the head. X-rays are passed through the head from front to back, the ring on which the transmitter and detector is fixed upon, moves around so the head can be scanned from all angles, and then up and down so all sections of the head can be taken. The major limitations of the CAT scan are that they can only structural information. A further limitation is that sections can only be used to build up a three-dimensional picture and show where damage has occurred to structures.

MRI uses a similar principle to CAT, but passes a magnetic field through the head instead of X-rays. This picks up the activity of hydrogen molecules, which are present in different brain tissues to different degrees. Again, it only shows structures, but it can take sections in planes other than the horizontal, and these sections can be used to build up to a 3D image. It is more sensitive and gives much sharper images with more finer details, so its therefore capable of detecting smaller features.

Like CAT, MRI can only tell us about the structure of the brain. However, **fMRI** can give details of brain activity by assessing changes in the blood flow. It can locate the activity precisely with 1-2mm, and updates itself second by second. Apart from claustrophobia occasionally introduced by having the whole body placed inside an 11-ton magnet, the only disadvantage of fMRI is that there is a one-second delay in reporting activity in the cortex.

PET allows functioning to be monitored by assessing metabolic activity in different parts of the brain. Radioactive glucose is injected or radioactive oxygen is inhaled while the individual is in a scanner. Occasional exposure to these small amounts of radioactive chemicals is not considered to be harmful. They emit particles called positrons, which can be detected by the scanner, and the levels in different parts of the brain are shown on a computer image as differences in colour.