

# MAGNETIC RESONANCE IMAGING (MRI)

Although short, the history of MRI mixes brilliant science, Nobel prizes (at least 4), scientific genius, commercial greed, and a fair degree of personal and professional enmity. The early discoveries were in the field of chemistry – the fact that protons move with angular momentum (i.e. 'spin') and can become magnetic was discovered by Wolfgang Pauli in 1924, and methods for measuring the spin in 1937 by II Rabi. Felix Bloch and Edward Purcell in 1946 showed that

the nuclei resonate when exposed to an alternating magnetic field at a certain (resonating) frequency and this led the development of NMR spectrometers. The first attempt to use NMR in medicine was by the research physician Raymond Damadian in New York. In 1974, he won the first patent in the field of MRI in which he suggested that NMR could 'scan' the human body to locate cancerous tissue. His first human scan was in 1977. The idea of varying the magnetic field and thus introducing spatial resolution came to two persons independently: Paul Lauterbur and Peter Mansfield – both of whom shared a Nobel prize for this discovery (much to Damadian's despair, as he believed he deserved the Nobel prize). Mansfield's contributions, the most fundamental of any at the time, were to use Fourier trans-

forms to allow spatial information to be collected along a line not a point; echo-planar imaging, which rendered the imaging time feasible for human scanning; the development of active shielding of the magnets to facilitate accuracy; and a method of obtaining 3-D pictures that were not reconstructions of 2-D slices but direct 3-D measurements. The first two scanners for clinical use were in place in the United Kingdom in 1978, and in Nottingham the first brain scan was performed by Mansfield's group in 1978. The first series of neurological patients studied by MRI was reported from the Hammersmith Hospital in 1982. In those early years, the true value of MRI in epilepsy was only just beginning to be appreciated, but since then the central importance of the technology to epilepsy as to most other areas of neurology has become clear – and the practice of medicine without structural imaging with MRI is now quite unthinkable.



British stamp celebrating MRI



An early experimental MR scanner from the University of Aberdeen