



#4

Course: Master of Mathematics (MMath)

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First Clinical Prototype Brain Scanner installed at Atkinson Morley's Hospital London.

This was the first Computerized Tomography Scanner and the first brain scanner. Computerised tomography was invented in 1972 by Godfrey N. Hounsfield of Electrical and Musical Industries (EMI) Laboratories and independently by Allan Cormack of Tufts University, Massachusetts. Hounsfield and Cormack later shared the Nobel Prize in Physiology or Medicine 1979 *for the development of computer assisted tomography*. Tomography is the study of creating three-dimensional images of solid objects (such as human tissue) by combining multiple X-ray images using a computer. Tomography comes from the Greek words tomos (slice), and graphein (describing).

"However, the technique's most important feature is its enormously greater sensitivity. It allows soft tissue such as the liver and kidneys to be clearly differentiated, which radiographs cannot do. ... It can also very accurately measure the values of X-ray absorption of tissues, thus enabling the nature of tissue to be studied. ... but CT additionally (sic) plays a role in the field of therapy by accurately locating, for example, a tumour so indicating the areas of the body to be irradiated and by monitoring (sic) the progress of the treatment afterwards." [1]

In this scanner an X-ray source and an X-ray detector cell collect the data for a single plane slice through the subject. A pencil beam is moved across the subject to obtain parallel projection measurements at a given angle. The source and detector are then rotated slightly in order to obtain a second set of measurements. These two sets of measurements can then be compared to generate the image of a thin slice. The entire process is repeated for each required angle of projection. The computer then combines the slices from each angle of projection to create a 3D image of all or part of the subject.

Early CT Scanners were limited to performing brain scans by 1976 however the technology advanced whole body scanner was created. A typical modern multi-detector CT system costs over \$US1 million and can complete a scan of the chest in less time than it takes for a single breath and generate a three-dimensional image in a matter of seconds.

[1] <http://nobelprize.org/medicine/laureates/1979/hounsfield-lecture.pdf> 1979
Nobel Lecture, 8 December, 1979
The Nobel Foundation

[2] <http://www.radiologymalaysia.org/Content/Public/GenRadiology/RadiologyThenAndNow.html>
College of Radiology Academy of Medicine of Malaysia 2004.

[3] <http://www.sciencemuseum.org.uk/on-line/treasure/objects/1980-811.asp>
Science Museum, London

*This brain scanner is currently on display at the Science Museum, London.
(Inventory Number: 1980-811)*