Proc. R. Coll. Physicians Edinb. 1995; **25:** 706–708

A REPORT ON THE 80TH ANNUAL MEETING OF THE RADIOLOGICAL SOCIETY OF NORTH AMERICA, DECEMBER, 1994

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The meeting of the RSNA is traditionally held in Chicago, this being the only American city with a single venue capable of housing the largest medical conference in the world.

Over a 6 days period more than 1,000 papers and a vast array of refresher courses were presented to 47,000 delegates and technical exhibitors, in a total of 31 lecture theatres (seating capacity ranging from 200 up to a mere 4,000). There were 833 posters on exhibition, each of which could have filled a chapter, if not a complete book, and all were of exceptional quality. In addition, there were numerous displays, with computer terminals demonstrating images using two and three dimensions, maximum intensity projection, surface rendering, subtraction and virtual reality. By day 6 I was no longer sure if one should examine the neck with RAGE (Rapid Acquisition Gradient Echo) or simply cover it with TURNIPS (T1 weighted Ultrafast Recalled Non-contrast In Phase Sequence)! There was never a risk of boredom.

One of the most awe-inspiring features was the technical exhibition, which was housed in two enormous hangars in the McCormick Conference Centre. Many of the companies had taken floor space equivalent to a football pitch. Rumour had it that a total of $500 million changed hands over the 6 days, and having seen the gloss and the glitter, I should think that this was a conservative estimate.

From a personal point of view, with a newfound interest in neuroradiology and oncological imaging, the meeting offered a unique insight into the recent developments in these areas, particularly the growing impact of magnetic resonance imaging (MRI) and spiral computered tomography (CT). The following are but a few of these developments:

Advances in CT

The introduction of slip ring technology, and the development of high heat capacity X-ray rubes, now enables spiral CT scanning of large volumes of the body, with a rapid throughput of patients. Typically, one slice can be scanned each second. Using single breath-hold techniques, the problem of missing lesions due to respiratory misregistration has been overcome. In addition, it is now possible to ensure that scanning is performed during the optimal phase of contrast enhancement throughout the volume scanned, with increased detectability of lesions and better delineation of vessels. The great advances in computer processing of volume data have lead to the development of new techniques, such as angiography without the need for arterial puncture. Already the images generated by CT angiography are of diagnostic quality, and, though the resolution is not yet quite that of conventional transfemoral angiography, there are several advantages of the technique. Amongst these, the absence of the morbidity associated

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with arterial puncture and catheterisation, the potential cost saving of performing CT angiography as an out-patient procedure, and the ability to calculate cross-sectional areas of vessels (information not obtainable from conventional angiography) are perhaps the most important. Originally used in the assessment of aortic aneurysms, CT angiography is now gaining much wider application to the peripheral circulation, particularly in the carotid arteries where the morbidity associated with conventional angiography can be so devastating.

Advances in MRI

Though CT seems likely to retain its primary role in cross-sectional imaging of some patients (i.e. the acutely ill patient, those with claustrophobia, pacemakers or intracranial vascular clips, and in acute trauma), the list of clinical applications of MRI is increasing rapidly. Its role in imaging of the central nervous system and musculoskeletal system is already established. However, the exquisite anatomical detail now routinely obtained with MRI, means that a wide range of pathological processes can be visualised in sites previously difficult to image; from perianal fistulae, to metastatic disease in the spine, or branchial cysts in the neck.

Advantages of MRI include improved tissue characterisation, and the ability to image in any plane, allowing optimal visualisation of the size of a lesion and its relationship to surrounding structures. In addition, there is an absence of bony artifact and ionizing radiation (ask any radiologist which investigation he/she would rather have!) and a reduced need for contrast. In the vast majority of cases these advantages far outweigh the few disadvantages. Though MRI is still relatively expensive and poorly available in Britain, this will inevitably change as costs fall.

The versatility of MRI was reflected in the impressive variety of new MR sequences and new applications on display at the conference. Promising areas of development included: the use of MR spectroscopy in the analysis of biochemical reactions, the potential of functional imaging, the use of high field magnets (up to 8 Tesla) to obtain almost histological detail with resolution of 200 μm or less, the further development of MR angiography, and the evolution of echo-planar imaging, allowing real time MRI-guided diagnostic and interventional procedures. The list seems endless.

Imaging in oncology

The ability to obtain cross-sectional images in the body has established a pivotal role for radiology in diagnosis, staging, follow-up, intervention and research in oncology. Remarkable anatomical detail is now obtainable with ultrasound, CT and particularly MRI. The latter is now the preferred modality for assessing malignancies in many sites, particularly the head, neck, spine, pelvis and musculoskeletal system. Staging malignancy for the primary tumour, lymph node and extranodal metastases using a single modality, rather than a series of imaging techniques, is now a real possibility in the near future.

However, there remain a number of problem areas: no imaging technique yet developed can confidently detect micrometastases, and the difficulty in distinguishing recurrent disease from post-operative or post-radiotherapy inflammatory changes.

Advances in neuroradiology

Using certain sequences, it is now possible to identify infarcted and ischaemic

cerebral tissue, using MRI, as little as 4 hours after the onset of symptoms. (In comparison, approximately 50% of infarcts are not visible on CT for the first 24 hours). This has important implications if current trials demonstrate benefit from early thrombolytic intervention in patients with acute cerebral infarction.

The development of hydrophilic guidewires, smaller vascular catheters, and embolisation coils and balloons, has lead to a rapid expansion of interventional procedures performed in the CNS. Now the radiologist can freely explore where even the bravest of surgeons fears to tread, with coiling being the preferred treatment for basilar artery aneurysms, and embolisation an important therapeutic option in the management of intracranial arteriovenous malformations. Surgeons may have developed keyhole operations, but radiologists have been performing pinhole therapeutic procedures for several decades, and the advances continue apace. Trials are presently underway to assess the value of radiological intervention in many intracranial lesions, including coiling of non-basilar aneurysms, and carotid angioplasty versus surgery for the treatment of carotid stenosis. The results are eagerly awaited.

With the major methods of imaging now established, advances in the field of image integration are now emerging. Several exhibits were on show demonstrating combined images using several techniques, such as CT and MRI, or PET (position emission topography) and MRI scans in imaging the base of the skull. However, though aesthetically pleasing to look at, the production of the final images were evidently still incredibly labour intensive, and considerable development will be required before these methods are available in clinical practice.

There were a few disappointing aspects of the meeting. Though hailed as the world's forum for the presentation of new work, the content of some of the papers was poor. In several of the studies the number of subjects was small, and the scientific method rather dubious.

There was a noticable lack of awareness (or denial) of the importance of radiation protection amongst the American radiologists. The Royal College of Radiologists of Britain has recently highlighted the significant contribution of CT to patient exposure to ionizing radiation, and the importance of trying to limit this. The philosophy in the US seemed to be that of 'Why do an MRI when CT is cheaper?'—presumably the effect of the tightening financial belt on the American health service. 'Cost effectiveness' was the phrase of the week.

Memorable moments of the visit included a video trip into 'virtual CT', the audience propelled into a 3-dimensional image of a patients body which could be examined from any position. There were examples of virtual bronchoscopy, guiding the physician to the optimal site for biopsy of an occult submucosal lesion, and aortography, viewed as if one were sitting in the lumen of the vessel.

There was one exceptional exhibit, and that was a computer reconstruction of 'virtual man', created from a cadaver sliced into 1 mm sections and digitally imaged. Exquisite high resolution images of the entire body could be viewed in any plane (with CT correlation, of course). To use the word 'beauty' of someone cut into 1 mm thick slices may seem rather macabre, but the exhibit was a radiologists' dream—the ultimate aid to anatomy teaching.

I am grateful to the Royal College of Physicians for their generous support from the Myre Sim Fund.

Letters to the Editor

TROPICAL MEDICINE IN THE TWENTIETH CENTURY

Sir, This article, Power H. (*Proceedings*, 1995; **25:** 427–35) gives a full account of the development of tropical medicine, with 47 references. The author refers to the founding in Britain of two schools of tropical medicine, in Liverpool in 1898 and in London in 1899. Although it is literally true that only two 'Schools' of tropical medicine have existed in Britain, it is strange that there is no reference to Edinburgh.

In 1857 a course of lectures on 'Effects of Climate on Health and Disease and Hygiene' was given by A. W. Pinkerton (1829–1861) in the Edinburgh extra-mural School of Medicine. Pinkerton was elected FRCP (Edin.) in 1857 and died, aged 32 years, of a 'fever' in Aden. The University of Edinburgh founded a Lectureship in Diseases of Tropical Climates in 1898, the first lecturer being Andrew Davidson (1836–1918), and in 1899 he also lectured on tropical diseases in the extra-mural school. Edinburgh instituted a Certificate in Tropical Medicine in 1899 and in 1905–1906 the course for the diploma in Tropical Medicine and Hygiene (DTM & H.), shortly after a similar diploma (but after a shorter course) had been started in Liverpool and Cambridge, while specialised teaching in tropical medicine was also being given in London.

As Professor Alan Woodruff of London (FRCP London and Edinburgh) pointed out, when the unification of the membership examinations of the Royal Colleges was under discussion, with the consequent abolition in Edinburgh of 'selected subjects', the Edinburgh College was the only academic body which had been conducting, as a selected subject, an examination in tropical medicine more advanced than for a DTM & H. Since the abolition of the 'selected subjects' a number of courses and examinations of limited aspects of tropical medicine have been instituted by various bodies. There is a professor of tropical medicine in Birmingham, and research in specialised fields is carried out elsewhere in Britain, notably in Oxford and Glasgow, sponsored by the Medical Research Council through its Tropical Medicine Research Board.

With my retiral, in 1972, the Senior Lectureship in Diseases of Tropical Climates in Edinburgh and the DTM & H. (Edin.) fell into abeyance. The University departments which formerly contributed to the DTM & H. Course, viz. those of protozoology, entomology, helminthology, bacteriology, paediatrics, public health, etc., continued as formerly, but clinical practice in tropical medicine was taken over by the Department of Infectious Diseases, and *ad hoc* arrangements were made for lectures in tropical medicine. Probably correctly, the concept of tropical medicine is tending to be absorbed into that of global medicine. However, the Royal Society of Tropical Medicine and Hygiene (RSTM & H.) continues through its Scottish (formerly Edinburgh) Branch to foster tropical research in Scotland, the results being reported at Laboratory Meetings of the Society. In Britain, in addition to the organisations mentioned by Power, it should be noted that the RSTM & H. has its headquarters in Manson House in London and publishes a scientific journal. Also the Government sponsored Bureau of Tropical Diseases and Hygiene publishes the *Bulletin of Tropical Diseases* and *Abstracts of Hygiene*, surveying the world literature of these subjects.