

## **Third Malmo Conference on Medical Imaging**

**B.Michael Moores**  
**IRS Ltd**  
**Liverpool**

The Third Malmo Conference on Medical Imaging took place at Malmo University Hospital on 25-27 June 2009. The Conference theme was optimisation in x-ray and molecular imaging and was jointly organised by members of current and former research projects supported by the European Commission (EC) Euratom Radiation Protection Research Programme.

As with previous conferences, the aim was to provide an up to date overview of current worldwide research and development in medical imaging. This was provided by 16 keynote invited lectures by leading experts supported by 86 oral and poster presentations on a very wide range of research topics. The tremendous growth and interest in the field of medical imaging research over the past five years was noticeable to those of us who had attended the second conference in April 2004. This was clearly demonstrated by the more than 120 participants from more than 20 different countries who attended in spite of the constrained financial climate.

The first three presentations established the forward-looking tone of the meeting. First presentation by Andrew Maidment from Philadelphia (US) gave a thought provoking review of trends in medical imaging. Of particular interest was the changing role of the medical physicist in the US in this evolving frontier and its growing dependence on a scientific input. Indeed medical physics training in Philadelphia is now developing a very strong medical/clinical component in order to be able to respond adequately to new support requirements. The next presentation was apposite given the extremely large amounts of data generated by modern imaging methods. Anders Persson from Sweden discussed medical visualization tools as an aid to assessment of such data sets. Methods for analyzing, assessing and presenting the most relevant information are vital if we are to gain full benefit (clinical and financial) from such imaging methods. Key areas for future research were also discussed.

The third presentation, by Katrine Ahlstrom Riklund from Umea (Sweden) was concerned with the future of nuclear medicine imaging. Ongoing developments in hybrid imaging (PET/CT, SPECT/CT and PET/MR) were discussed in terms of their ability to combine form and function. This talk also highlighted the demands that are increasingly being placed on medical practitioners by the need to interpret new forms of clinical data. The associated needs for ongoing education and training programmes, in order to ensure that the human component can keep abreast of technological developments in medical imaging was clearly stated. This is especially true if such new methods are to find rapid clinical application once they have been shown to be of benefit to the patient.

The second session was dedicated to the memory of Robert "Bob" Wagner, an internationally recognized US leader in the field of medical image sciences who died last year. This session was concerned with the assessment of clinical images a topic near to Bob Wagner's heart. Overview lectures were provided by Dev Chakraborty from Pittsburgh (US) dealing with the basis of statistical methods that underpin Receiver Operating Characteristic (ROC) techniques for measuring the effectiveness of imaging systems in terms of true positive and true negative outcomes. These talks were supported by a presentation from Magnus Bath, Goteborg (Sweden) on practical applications for evaluating imaging systems. A number of papers dealing with current work in this area then followed.

The next session was devoted to CT, SPECT/CT and PET/CT methods and reinforced the ongoing progress being made in medical imaging techniques. As well as a number of papers dealing with recent research in these areas an overview lecture on patient and personnel exposures from PET/CT was presented by Sigrid Leide-Svegborn, Malmo (Sweden). The total effective dose to the patient was estimated to be approximately 10 mSv with the largest portion (6-7mSv) arising from the PET study.

The Conference included a significant number of poster presentations and adequate time was apportioned to give delegates the opportunity to view them. The posters created tremendous interest given the breadth and depth of the topics covered. One of the great advantages of poster presentations lies in the ability to absorb information at one's own rate as well as discuss the work personally with the lead author. Topics included every conceivable imaging modality with recent developments in nuclear medicine, CT and tomosynthesis well represented.

The fourth session dealt with technical developments and their clinical impact. Future detectors for medical imaging, phase-contrast and dark field imaging, molecular phase-contrast X-ray stereoscopic imaging as well as dual energy imaging with photon counting detectors were some of the topics covered. Such methods offer the potential for early detection of disease with corresponding potential for improved treatments. This aspect was clearly highlighted in the next session, which was concerned with imaging in radiotherapy. Harold Johns's edict that "if you can't see it you can't hit it," set the tone for the presentation by Wolfgang Schlegel, Heidelberg (Germany). Both Harold Johns and his friend and collaborator Jack Boag successfully transferred their research interests towards trying to improve medical imaging during the latter stages of their careers. Image guided radiotherapy is only of benefit whilst a tumour is clearly visible during treatment.

Tomosynthesis is one of the recent developments arising from the development of direct digital X-ray detectors combined with the "old fashioned" conventional tomographic tube movement. This technique offers the potential for low dose, low cost three-dimensional imaging. The Swedish hosts of the Malmo Conference, Malmo and Goteborg University departments of medical physics, are European leaders in the clinical and scientific/technical evaluation of this new modality in both mammography and chest radiology. The sixth session provided the results of their investigations including clinical findings and quantitative evaluation of performance.

One interesting outcome from this work concerns the possible implementation of tomosynthesis as a front-line breast screening technique in parts of Sweden. With its ability to reduce structural (anatomical) noise as a means of improving cancer detection it may also lead to a more effective application of Computer Aided Diagnosis (CAD) methods.

Session 7 covered radiation safety in medicine and opened with an invited presentation by Madan Rehani, IAEA and ICRP (Vienna). He gave an extremely thought provoking presentation that highlighted the population dose explosion that has occurred in the past 20 years through the ongoing growth in CT applications including volume imaging. The fact that dose control has lagged behind technology developments was emphasised and the apparent failure of the medical physics radiation protection community to be able to influence events was highlighted. Madan mentioned the recent initiative from the IAEA to promote the introduction of "patient dose smart cards" as a means of drawing attention to and monitoring this phenomenon. Scientific presentations covering patient dose surveys, many from the Eastern block countries, demonstrated that dose assessment is still the primary scientific radiation protection initiative available to medical physicists working in the field of diagnostic radiology. However, knowing the dose does not necessarily lead to a reduction.

Following the Conference dinner held in the historical Town Hall of Malmo, session 8 on Saturday morning dealt with QA and QC and associated reference dose measurement in a variety of different modalities. An invited presentation by Michael Sandborg, from Linkoping (Sweden) was given on efficient quality assurance programmes in radiology and nuclear medicine. This was followed by a presentation on the IAEA approach to a clinical audit programme for diagnostic radiology given by Keith Faulkner, Newcastle (UK). Presentations were also made on web-based applications in QA as well as methods for image quality assessments in CT and dental radiology.

The final session was concerned with optimisation in digital radiology and nuclear medicine. A novel approach to prioritisation of optimisation of radiological examinations as well applications in cardiology, chest radiology and nuclear medicine were included. The final presentation was by Christoph Hoeschen from Neuherberg (Germany) and was concerned with the minimisation of activity and dose with enhanced image quality in nuclear medicine.

Conference proceedings will be presented in Radiation Protection Dosimetry and should form a useful addition to the literature on the evolving front of medical imaging. The organisation and hospitality offered by the Swedish hosts was second to none and the meeting demonstrated the need in Europe for a high level scientific Forum dedicated to presentations and discussions in the field of medical imaging. We, hopefully, can look forward to the fourth Malmo conference as a forum for discussing the many exciting developments ongoing within the field of medical imaging.