

# **EPI2k8 – 10<sup>th</sup> International Workshop Electronic Portal imaging and Positioning Devices**

**May 20 - 22 2008, St Regis Hotel San Francisco, hosted by University of California San Francisco (UCSF)**

200 delegates from across the globe attended this workshop. Activities began with an ice-breaker reception at 6pm on Tuesday May 20th, followed by two days packed to the brim with presentations from leading exponents in the field. Educational refresher courses started early, at 7 am, although the quality the speakers meant that there was still a full house at his early hour.



## **Wednesday 21<sup>st</sup> May**

Marcel van Herk (Netherlands Cancer Institute) and Frank van den Heuvel (University of Leuven, Belgium) started the day with their refresher courses on 'Sources of uncertainties and margins, in the 3D world, the IMRT world and IGRT world' and 'A review of the "GOLD" standard; implanted markers'. Four sessions then followed, each starting with a half hour presentation by an invited speaker, followed by five shorter proffered presentations.

The first session was opened by invited speaker Jan Verstraete (University of Leuven) who presented his centre's experience on the 'Clinical integration of kV, MV and CBCT technologies for patient positioning'. His talk formed part of the session 'Positioning with EPID'. The guest speaker in the second session was Larry Antonuk (University of Michigan Medical Centre), who spoke on 'Flat panel technology: prospects for substantial improvement over conventional active matrix imager performance'. The proffered presentations that followed were all on 'Image quality, performance evaluation and system QA' and included a talk from David Roberts (The Institute of Cancer Research and Royal Marsden) who discussed an alternative to the current in room kV systems by modifying the bremsstrahlung target in a standard linac.

After lunch, the talks focussed on EPID dosimetric properties and applications, with invited speaker Bas Nijsten (Department of Radiation Oncology, University Hospital Maastricht, The Netherlands (MAASTRO)) describing their experience of in-vivo verification using EPID dosimetry. MAASTRO have implemented 2D EPID dosimetry clinically based on in-house methods, and apply these procedures to all patients with clinical intent, using a local gamma criterion of 5%, 5mm. They have verified 200 patients since December 2006. This is the session that included my talk on my Monte Carlo based investigation of dose rate dependency in IMRT portal dosimetry. My technique has proved accurate enough to detect real errors in IMRT delivery. Peter Greer (Calvary Mater Newcastle Hospital, Australia) presented the effect of non-uniform backscatter on EPID dosimetry.

The invited speaker for the final session on the Wednesday was Paul Keall (Stanford University), who spoke on 4D in room imaging. He expressed that although imaging prior to treatment is of value as it gives an estimate of the patient's position during treatment, radiotherapy centres should be progressing towards imaging during treatment to enable the building of 4D models of the patient anatomy with movements during treatment. The session that followed was on 'Clinical applications with CT on board' and included talks by Dong-Wook Park (Asan Medical Centre, Korea) on a Monte Carlo investigation of dose from cone beam CT and Peter Remeijer (Netherlands Cancer Institute) on using lipiodol, a fatty radio-opaque substance, for image guidance in bladder treatments.



**Jean Pouliot (second from left), the convenor of the EPI2k8 workshop, with colleagues on the local organising committee**

### **Time to Relax**

The day ended with 'cocktails with a view' and the course meal at the nearby Francis Drake Hotel, Union Square. A drinks reception was held on the 21<sup>st</sup> floor, with magnificent views across San Francisco.

### **Thursday 22<sup>nd</sup> May**

The day followed the same structure as the previous one, educational refresher courses being on 'Quality assurance of EPID and IGRT technology' (Luis Fong, Mayo Clinic Rochester and Scott Hadly, University of Michigan) and 'Practical experience / guidance with implementation of IGRT technologies' (Lei Xing, Stanford University School of Medicine and Olivier Morin, University College San Francisco).

The first session started with invited speaker Katja Langen (MD Anderson Centre, Orlando) who presented on 'Image guided radiotherapy: new tools and directions'. The talk looked at taking images for patient alignment on the TomoTherapy Hi\*ART II unit. These images are used in an off-line process to modify subsequent treatments (adaptive radiation therapy (ART)). The daily acquisition of volumetric CT data offers the opportunity to quantify the effect of patient deformation on dosimetry, enabling the delivered dose to be compared with the original plan and the modification of subsequent treatment fractions. The proffered talks in this session were about new technologies for patient positioning and included a talk by Danielle Fraser (McGill University) describing a 3D ultrasound patient positioning system capable of both multi-modality fusion and intra-modality fusion, eliminating cross-modality discrepancies and providing enhanced soft tissue contrast.

Marcel van Herk (the Netherlands Cancer Institute) began the second session with his invited talk on 'Planning without a PTV'. The objective of his work is to incorporate geometric uncertainties in treatment planning using a new 'probabilistic' planning system. A set of new cost functions is defined that read data files listing the geometrical uncertainties associated with the different organs, optimising IMRT plans with a probabilistic approach. The session that followed was on new developments with CT on board, many of the talks focussing on improving the images for the purpose of dose calculation accuracy, to enable adaptive radiotherapy. M. Sun (Varian Medical Systems) and Tom Depuydt (University Hospital Leuven, Belgium) both presented their techniques for achieving more accurate Hounsfield

Units from cone-beam CT scans, J.C. Barnhoorn (Erasmus MC, Rotterdam) spoke on the removal of artefacts due to metal fiducial markers and Lei Zhu (Stanford University) spoke on metal artefact correction using hybrid kV and MV imaging.

After lunch Jean Pouliot (University of California San Francisco), the convenor of the EPI2k8 workshop, presented on 'Dose recalculation and the DGRT process'. He discussed the evolution of image guided radiotherapy to dose guided radiotherapy and the ability to evaluate the daily dose distribution. The proffered talks in this session were about dosimetric properties and applications. Anton Mans (Netherlands Cancer Institute) presented the errors they have detected at their centre using their portal dosimetry methods which convert the images to dose distributions in a plane parallel to the EPID using a back-projection algorithm and Wouter van Elmpt (MAASTRO) described their 3D in vivo dose reconstruction method using EPID measurements and MV cone-beam CT scans.

At the final session of the meeting, invited speaker James Balter (University of Michigan) discussed how much data is needed to effectively use imaging and monitoring technology for radiotherapy, and the possibility of data reduction.

### **Time to Reflect**

As many of the talks in this workshop were from international experts from state-of-the-art centres, valuable experience was passed on regarding current imaging and dosimetric procedures, whilst research into future applications was also presented. It was my first opportunity to present my work orally at an international meeting, and although quite daunting, it was an invaluable experience to be able to generate discussion with leading exponents in the field and I returned home with many avenues to pursue. I feel that the dosimetric techniques presented are particularly relevant at this time in the UK with current interest in in-vivo dosimetry. The full list of speakers at the meeting is available at [www.epi2k8.org](http://www.epi2k8.org). For those interested, the next meeting is to be held in Belgium in 2010.

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