

DOSEmapper Digest: September 2019



A new technique for in-body Radiation Measurement

TRUEinvivo make DOSEmapper micro silica bead arrays to measure the accuracy of dose delivery in the first fraction, enabling clinicians to adjust the dose if required in subsequent fractions. The radiation absorbed by each bead can be measured by our fully automated reader within minutes of the completion of treatment, showing the exact position of the beam in relation to the tumour and providing clinicians and patients with welcome feedback.

Our Technology

DOSEmappers are arrays of high performance, low maintenance thermoluminescent dosimeters (TLDs) for in vivo dosimetry that would comply with the requirements of modern radiotherapy technology.

Characterization measurements have been performed utilizing a range of modalities and energies of clinical beams; photons, electrons, proton and carbon ions, and HDR brachytherapy sources of ^{60}Co and ^{192}Ir . The initial results were promising, offering in many cases a better performance in comparison with other commonly available TL dosimeters, including;

- a better batch homogeneity,
- a linear response over a large dynamic range from mGy to more than 100 Gy that covers the whole radiotherapy dose range,
- a response independent from dose rate and angle of incident beam, lower fading
- an almost flat energy response over the megavoltage energy beams.

These results encouraged investigation into their different clinical dosimetric applications, including small field dosimetry, patient specific treatment plan dosimetry verification (by performing point dosimetry), a postal dosimetry audit programme of



lung SABR techniques within 20 radiotherapy departments in UK, and invivo dosimetry for patients treated with kV X-ray beams.

The dosimetric characteristics and the small size of dosimeters makes them suitable for accurate dose determination, from simple to complex beam arrangements and dose distributions covering different radiation therapy techniques and modalities. This is particularly useful when high spatial resolution at a high dose gradient and complex treatment delivery is required, as is their robustness, inert nature and minimal fading characteristics when it is difficult to control the environmental factors such as light exposure, humidity and temperature.

Closer to Market

We are now close to completing the development stage of the reader. Trials are currently being performed on an anthropomorphic pelvic phantom, which includes both external radiotherapy and brachytherapy for cervical cancer treatment. We will also be working with a number of hospitals, including Queen Alexandra Hospital in Portsmouth and Royal Surrey Country Hospital in Guildford, where trials, initially covering prostate and cervical cancer, are expected to begin early in the New Year. We will also be undertaking a number of research collaborations involving hospitals both in the UK and overseas, including an ongoing pilot patient trial in the Yas cancer centre of Tehran, to assess the use of our DOSEmapper technology across a range of applications.

At the same time we will be completing the regulatory approval processes required. Our DOSEmapper bead array is a class I medical device and will achieve regulatory approval in the next few weeks. This means clinicians can trial it not just in phantoms but also on and in patients.

We have made good progress on compliance with ISO13485, which covers quality management for medical device manufacturers and expect to receive full certification next month.

At the same time we will be working on achieving regulatory approval and medical CE marking. We expect to have our TLD reader and DOSEmapper bead arrays available for clinical use by the end of the year.

Events

Surrey University in the UK is a world leader in dosimetry research and in June this year, TRUEinvivo sponsored a two day workshop on in-vivo 3D dosimetry measurement. This attracted a wide range of attendees, and speakers from the UK, France, Ireland and Italy, many of whom are trialling our bead technology. Of particular interest was a paper by Jerome Benoit, a veterinary oncologist based in Lille with



whom we are collaborating to determine the efficacy of our technology in animal cancers.

Scope for collaboration

As mentioned above, we are working with a number of clinicians around the world to find out more about how our technology can be employed in a wide range of applications. Collaborations involve the provision of DOSEmapper bead arrays and a reading service – all free of charge. In return we ask for feedback on the application and whether our technology has met user requirements.

If you are interested in collaborating or just want to find out more please contact Chris Budleigh at chris.budleigh@trueinvivo.co.uk