



SCHOOL

XVIIth Annual Tata Memorial Hospital Radiotherapy Practicum Implementation of Code of Practice (CoP) for Dosimetry of Small Fields

20-21 September 2019, Tata Memorial Centre, Mumbai, India

Course endorsed by European Society for Radiotherapy and Oncology

Small fields are part of current advanced radiotherapy techniques such as *Stereotactic Radio Surgery (SRS)*, *Stereotactic Radiotherapy (SRT)*, *Stereotactic Body Radiotherapy (SBRT)*, and *Intensity-Modulated Radiation Therapy (IMRT)*. These treatments are performed not only with specialised, dedicated machines such as the TomoTherapy®, CyberKnife® or Gamma Knife®, but also with conventional, non-dedicated linear accelerators equipped with high resolution multileaf collimators. These developments have increased the uncertainty of clinical dosimetry and weakened its traceability to reference dosimetry based on codes of practice for conventional radiotherapy such as the International Atomic Energy Agency Technical Report Series (IAEA TRS) 398 or the American Association of Physicists in Medicine Task Group (AAPM TG) 51. Therefore the IAEA and AAPM produced a new code of practice (CoP) on small field dosimetry, TRS 483, in 2017.

The purpose of this practicum was to acquire practical knowledge on how to implement the new code in clinical settings. Consistent reference dosimetry traceable to metrological primary standards is a key to the radiotherapy process, so this was an opportunity for clinical medical physicists across India to obtain first-hand information on the dosimetry of small fields in radiotherapy from experts in the subject.

This two-day practicum consisted of lecture presentations; discussions followed by demonstrations. There were 42 delegates from 40 institutes based in 25 cities across India. All the participants were from radiotherapy centres that had, as a minimum, a linear accelerator with multileaf collimators and dosimetry systems capable of measurements for small fields. About one third of the participants also had SRS/SRT or SBRT established at their centres.

The faculty included six national lecturers, two international lecturers who had contributed to the development of the CoP, and local faculty members. The programme was delivered with lectures in the morning and practical demonstrations in the afternoon.

The first session of the first day began with a lecture that offered an overview of IAEA-AAPM CoP on testing of small fields. The physics and challenges of small fields and conventional small-field approaches such as those employed in the X-knife and Gamma Knife® were discussed. The second session started with non-conventional approaches to produce small fields such as those used in TomoTherapy® and CyberKnife®, followed by detailed lectures on dosimetry requirements, and absolute and relative measurements for small fields. During the afternoon's practical session, water tank measurements of profiles and output factors on the linear accelerator and Tomotherapy® were demonstrated. The active participation of key experts produced an interactive session.

The physics aspects of small fields for Tomotherapy® and proton beam therapy were presented in the early session of the second day, followed by a highlight on small fields from radiation oncologists and consideration of regulatory perspectives. The second session explored the requirements and limitations in commissioning small fields in treatment planning systems, and the dosimetric errors associated with various techniques involving small fields. The presentation was dedicated to programmes for dosimetric audit of small fields. The practical session included the measurements with solid water slabs on linear accelerators and in Tomotherapy®. The day closed with feedback and a vote of thanks.

The practicum generated much enthusiasm and high-level thinking among its participants. Many participants felt there was a need for more time for hands-on demonstration and a focus on clinical illustrations to obtain practical understanding of small-field dosimetry.

We hope that in the future there will be more interactive education programmes in India on this topic. This practicum will help to improve the quality of radiotherapy treatment through use of a common protocol for small-field dosimetry within the country.



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Hands-on demonstration





Experts with the team from the Department of Physics of the Tata Memorial Centre Mumbai

