

Project for ICRP Task Group 116 Mentees 2023/2024

Optimisation of radiological protection aspects of imaging in radiotherapy

Background and progress with current project

A project was started in 2022 to investigate methods for measuring doses for cone beam CT (CBCT) systems incorporated with linear accelerator treatment machines. This was to look into the feasibility of radiotherapy centres across the world measuring suitable dose quantities to allow patient doses to be quantified. We have now carried out preliminary measurements in a few countries and are arranging Zoom meetings to discuss progress at 2-3 month intervals. We now plan to extend the survey to more countries. We will require the participation of new Mentees to carry out measurements and collect data, from countries other than those listed below, for which we already have contacts.

Countries that are currently represented, from which new Mentees are **NOT** required.

- 1) **Africa:** Algeria
- 2) **America:** Colombia
- 3) **Asia and Australasia:** Australia
- 4) **Europe:** Cyprus, Portugal, Serbia,
- 5) **Middle East:** Iraq, UAE

TG116 dosimetry project: Duties of mentees

Applications for a position of ICRP mentee with TG116 are invited from early career medical physicists working in radiotherapy or imaging related to radiotherapy. Mentees are sought from countries that are not included in the current survey (see above).

The purpose will be to carry out measurements and collect exposure factor data from patient CBCT imaging protocols in radiotherapy. The project will be carried out in phases (1-4) listed below. We have so far been focussing on phase 1 in order to develop consistent approaches to CBCT dose measurement, identify problems, and iron out anomalies. Such measurements will only be possible if each mentee:

- 1) works in or has close association with a radiotherapy treatment centre
- 2) is able to make measurements on CBCT equipment and has access to suitable measuring instruments and phantoms
- 3) is able to readily gain access to imaging protocols used in radiotherapy treatment.

1) Dosimetry measurements on linacs in your department.

Take measurements at your own centre with standard 32 cm and 16 cm CT cylindrical acrylic dosimetry phantoms. Make measurements with 100 mm CT pencil chamber and/or 0.6 cc Farmer chamber, if they are both available. This will be according to a set protocol provided in a spreadsheet. The ability to carry out this phase would require the necessary measuring instruments calibrated for diagnostic x-ray energies and phantoms of the type used for CT

dosimetry in radiology. If these are unavailable, then participation in this part of the project will not be possible.

2) Collect data on clinical protocols

Collect exposure data on standard imaging protocols for several specified treatments at your centre, and analyse data. This will again be recording data in prepared spreadsheets. The exposure factor data can be combined with results from the measurements to provide an indication of patient dose levels. N.B. If you do not have suitable instruments and phantoms for the measurements in part 1, you may still be able to obtain an indication of patient doses using dosimetry data from other groups in the project, as dose levels per mAs usually lie within a relatively narrow range. You will be expected to calculate results that give an indication of patient imaging doses.

3) Dosimetry measurements at other centres.

Once the first two phases of the project are complete, mentees would be asked to make contact with colleagues in other centres within their country and arrange to carry out similar measurements and collect data on imaging protocols at their centres. This is to allow a picture to be built up of dose levels from imaging in a number of radiotherapy centres in the country. The mentee would then collate and report the results.

4) Data for individual patients

Although radiotherapy centres may use standard protocols for many of the patients treated, a proportion are likely to have modifications to the protocol because of differences in treatment site, size of the target to be treated, and individual patient differences. The final stage would involve collection of data for sets of individual patients for treatments for which protocols were modified for individuals, if this was considered necessary and appropriate.

ICRP Mentors for the TG116 project

The mentees will be divided between different groups primarily based on a geographical and time-zone basis.

Colin J Martin, UK

Tim J Wood, UK

Tomas Kron, Australia

Sebastien Gros, USA

Jenia Vassileva, IAEA, Austria

Ung Ngie Min, Malaysia