



BRACHYTHERAPY

Annual Report of BRAPHYQS (2019), working group of GEC-ESTRO

The BRACHYtherapy PHysics Quality Assurance System (BRAPHYQS) working group is involved with a variety of projects related to brachytherapy physics. It is a working group of the merged Groupe Européen de Curiothérapie (GEC) and the European Society for Radiotherapy & Oncology (ESTRO).

One working package (WP) finalised in 2019 was the “GEC-ESTRO / Advisory Committee in Radiation Oncology Practice (ACROP) recommendations for Quality Assurance of Ultrasound Imaging” (WP 12, chair: Professor Frank-André Siebert, Christian-Albrecht University, Kiel, Germany). A manuscript was accepted for publication in *Radiotherapy and Oncology*. These guidelines were developed to achieve consistent, high-quality, image-guided implants. Many important checks are described along with appropriate phantoms. In addition, an example table with quality assurance (QA) tests that include test frequencies and tolerances is presented. The data enable users to install a high-level QA programme for ultrasound in brachytherapy with minimum time expended.

Following the first ESTRO Physics Workshop in Glasgow in 2017, Kari Tanderup and Frank Verhaegen prepared a draft on “In vivo dosimetry in brachytherapy: requirements and future directions for research, development, and clinical practice”. The draft has been circulated to the advisory group, with a plan to submit it for publication to the ESTRO journal *phiRO: Physics and Imaging in Radiation Oncology* within the year. In this manuscript the current status of in-vivo dosimetry in brachytherapy is described and the clinical necessities for new approaches to in-vivo dosimetry are highlighted. A second manuscript that is complementary to this first is under production covering in-vivo dosimetry for external photon beam techniques.

Another important GEC-ESTRO recommendation was published last year based on work performed within BRAPHYQS WP18, chaired by Jose Perez-Calatayud (Hospital La Fe, Valencia, Spain). In the “GEC-ESTRO ACROP recommendations on calibration and traceability of LE-LDR photon-emitting brachytherapy sources at the hospital level” (*Radiother Oncol* 135 (2019) 120–129, <https://doi.org/10.1016/j.radonc.2019.02.008>), clear guidance is given to clinical physicists. The particular interest and challenge is that the sources (typically between 40 and 100) have to be sterile for the subsequent implantation process. Thus, the physicist has to find a strategy for how to deal with the sources, how many sources have to be checked, and what tolerances are acceptable. Moreover, the necessary course of action when tolerances are exceeded is explained. This information is condensed into 13 points that can be easily adapted in clinics using well-type chambers. Similar to this project, a work package (WP21) on the calibration of high energy/high dose-rate sources was launched under Professor Perez-Calatayud. It is expected that this project will also result in European recommendations.

Considerable progress has been made this past year in WP19, a comprehensive project on commissioning and QA of brachytherapy treatment-planning systems chaired by Marisol de Brabandere (University of Leuven, Belgium) and Alex Rijnders (Europe Hospitals, Belgium). A draft manuscript is planned by the end of 2020.

Image registration in brachytherapy has received much attention in conferences during the last few years. Seeking to provide an overview of the field, BRAPHYQS initiated WP20, chaired by Jamema Swamidas (Tata Memorial Centre, India). Last year we were able to publish our results in the review article: “Image registration, contour propagation and dose accumulation of external beam and brachytherapy in gynaecological radiotherapy” (<https://doi.org/10.1016/j.radonc.2019.08.023>). This paper was recently highlighted as an “editors’ pick” here in the ESTRO Newsletter/Brachytherapy.

BRAPHYQS is also involved in the international project to develop primary standards and traceable measurements for electronic x-ray brachytherapy sources (PRISM-eBT). In this joint project within the European Metrology Programme for Innovation and Research (EMPIR), BRAPHYQS is represented by Åsa Carlsson Tedgren (Karolinska University Hospital and Linköping University, Sweden).



Frank-André Siebert
(Chair of BRAPHYQS)
Clinic of Radiotherapy
UKSH
Kiel
Germany