collections have been created for currently running in silico clinical trials (ROCCO and THUNDER), as well as public collections with datasets used for QA and PET calibration, pre-clinical HX4 PET imaging of rats and transcriptome profiling of cancer cell lines. Data upload facilities have been prepared to support supplying remote centres with de-identification of the datasets in a trusted environment. Download functionality has successfully been tested using the CTMM- TraIT (www.bmia.nl) and NCI NBIA (imaging.nci.nih.gov) instances. Full DICOM query and retrieve functionality is currently being added to the platform.

Conclusions: With CancerData.org we have successfully set up an open source data sharing service for the oncology community. We extended the platform for non-DICOM (non-imaging) datasets and are in the process of extending collections as well as connectivity options. The radiotherapy community should consider compulsory storage of published datasets as ‘open data’ as it has been done for years for genomics data. We believe the privacy issues can be solved with the concept of ‘anonymous de facto’ data.

POSTER: PHYSICS TRACK: RADIATION PROTECTION

PO-0893
Kerma evaluation at the maze entrance of Co-60 HDR brachytherapy facilities
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Purpose/Objective: Nowadays the use of Co-60 high dose rate (HDR) sources in brachytherapy is increasing quickly. The higher energy of Co-60 compared to Ir-192 increases direct radiation shielding for Co-60. In the absence of procedures for evaluating the design of a brachytherapy vault including a maze from the point of view of radiation protection, the methodology employed by the physics community is very diverse: (i) considering only the direct component through the maze taking into account the distance from the source to the front wall plus the distance from it to the maze entrance or (ii) with different approaches based on the linac door calculations on NCRP-151 Structural Shielding Design for Megavoltage X-and Gamma-Ray Radiotherapy Facilities. The purpose of this study is to evaluate the kerma at the maze entrance following a selected approach from NCRP-151. This is validated by using Monte Carlo (MC) techniques for two typical HDR Co-60 bunker designs.

Materials and Methods: We have performed transmission calculations for primary and scattered radiation based on an adaptation of the NCRP-151. Specific Albedo and attenuation coefficients on ordinary concrete for Co-60 were taken into account. To verify the results of our approach, the MC GEANT4 code has been used to obtain kerma in the two bunkers. The source was placed at 1 m from the floor inside the bunker. The direct transmission, simple-scatter and double-scatter components of the radiation emitted by the source have been obtained using our calculation method adapted from NCRP-151. We have considered the wall area that can be seen from the maze entrance for the calculation of the single-scatter component, the remaining wall area for the double-scatter component and direct calculation through the maze interior wall assuming perpendicular incidence of the radiation in the barrier for the primary component. In the MC calculations the radiation spectra have been obtained also in the door.

Results: For the bunkers studied, kerma values at the entrance of the maze are or the order of $2 \times 10^{-5}$Gy/(H/μ). Figure 1. The results of MC and NCRP-151 differ less than 10%. For a Co-60 source, due to the higher photon energy, the double-scatter component is negligible. The direct transmission through the wall of the maze plays an important role for mazes less than 1 m wide and decrease for wider mazes.

Figure 1. Kerma obtained with MC in a bunker of this study.

Conclusions: For the specific cases of this study, the proposed adaptation of the NCRP-151 formalism to estimate the absorbed dose at the maze entrance provides a result in reasonable agreement to that obtained by MC simulation.

PO-0894
Assessment of secondary doses in ion and photon therapy in conjunction with the doses from diagnostics modalities.
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Purpose/Objective: The work is focused on the assessment of secondary doses to healthy tissues that are delivered by the use of modern radiation therapy and diagnostics imaging modalities in the clinical environment. Ionising radiation is used increasingly for the treatment of cancer being the source of a considerable fraction of the artificial irradiation to the patient. Correlated with the advances in health care that have resulted in longer life expectancies, this has created the premises for an increase in the cancer incidence among the long-time survivors of radiotherapy. This is especially important for paediatric patients who, after a successful treatment, may live long and be more susceptible to secondary cancers. Also, diagnostics imaging modalities like CT and PET due to repeated imaging sessions are the source of significant radiation exposure associated with higher risk of occurrence of secondary cancers.

Materials and Methods: In these studies the MC code SHIELD-HIT was used to calculate absorbed dose and energy spectra of primary and secondary particles generated during the ion beam transport through phantoms representing female, male and child patients. The doses due to photonuclear reactions were evaluated by measurements around photon therapy units at the hospitals in Sweden using activation foil method and a developed technique with a 235U fission chamber. Assessment of the secondary doses due to the imaging modalities is based on the literature studies.

Results: Photonuclear production and secondary radiation doses around high energy medical electron accelerators of 16-50 MV located at the hospitals in Sweden have been evaluated. The level of secondary absorbed doses outside the treated volume due to the produced photonuclear was in general less than 0.4 mGy per photon Gy delivered to the target volume. For light ion therapy, the secondary organ absorbed doses were calculated by Monte Carlo simulations with the SHIELD-HIT code coupled with the mathematical anthropomorphic phantoms ADAM-HIT, EVA-HIT and CHILD-HIT for irradiation with H, He, Li, C and O ion beams in the energy range 100-400 MeV/u. The evaluated absorbed doses to the out-of-field organs were in the range $10^2$ to $10^5$ mGy per target Gy and with standard deviations 0.5-20 %. The secondary doses from light ion and X-rays therapy are compared with the doses from diagnostics imaging modalities like CT and PET.

Conclusions: Evaluation of absorbed and equivalent doses to organs or tissues due to secondary radiation in photon, light ion therapy and diagnostics imaging modalities is an important step in the risk evaluation for induction of secondary cancers. The introduction of new treatment and diagnostic approaches could increase the risk levels, especially due to repeated imaging sessions.

PO-0895
Radiation shielding calculations for modern radiotherapy treatment techniques and facilities
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