

Web toolbox for BNCT treatment assessments

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“The Photon-Isoeffective Dose in Boron Neutron Capture Therapy” [1] was published in 2012 presenting strong evidences about the limitations of the traditional relative biological effectiveness (RBE) weighted model used to compute photon-equivalent doses in BNCT. Further, an alternative formalism that considers first-order repair of sublethal damage and synergistic interactions was introduced.

More adequate photon-equivalent dose estimates prompted the development of new models of Tumor Control and Normal Tissue Complication Probabilities (TCP and NTCP) to assist in treatment planning and neutron beam assessments [2]. The broad definition of proposed models allows to extend them to different kind of tissues and pathologies using diverse sets of cell survival curves and in-vivo experiment results.

Before considering a formal implementation of proposed models in clinical application of BNCT, users may want to explore capabilities and scopes in a simple and accessible way. To this end, a set of online tools were developed. A web page is now available to calculate and compare both, traditional and novel dosimetry figures of merits for BNCT treatments [3].

The web service makes available online calculation of RBE weighted photon-equivalent doses, Photon Iso-Effective doses, TCP for inhomogeneous dose distribution, NTCP and Uncomplicated Tumor Control Probability (UTCP). While all online models are strictly developed for Head and Neck cancer tumors and mucosa membrane, new updates are foreseen for different kind of cancer and healthy tissues.

The online toolbox was developed in JavaScript and is completely static which means that input data and operation occurs on client-side protecting the privacy of user's information. All codes are gathered in a public repository for free access [4].

References

1. S. J. González and G. A. Santa Cruz. The Photon-Isoeffective Dose in Boron Neutron Capture Therapy. *Radiat. Res.* 178 609–21(2012).
2. S. J. González, E. C. C. Pozzi, A. M. Hughes, L. Provenzano, H. Koivunoro, D. G. Carando, S. I. Thorp, M. R. Casal, S. Bortolussi, V. A. Trivillin, M. A. Garabalino, P. Curotto, E. M. Heber, G. A. S. Cruz, L. Kankaanranta, H. Joensuu and A. E. Schwint. Photon iso-effective dose for cancer treatment with mixed field radiation based on dose–response assessment from human and an animal model: clinical application to boron neutron capture therapy for head and neck cancer *Phys. Med. Biol.* 62 7938–7958 (2017).
3. <https://bnct.com.ar>
4. <https://github.com/lucasprovenzano/BnctAR>