

GONZALEZ-1: State of the art and applications of radiobiological figures of merit in BNCT.

Gonzalez, Sara J.

Comisión Nacional de Energía Atómica (CNEA), Argentina.

Consejo Nacional de Promoción Científica y Técnica (CONICET), Argentina.

In the last decade, novel research in BNCT has emerged offering not only more accurate models of photon iso-effective dose calculation, but also suitable probability models that describe the dose-effect relationship observed in the treatment of humans for both tumor and normal tissue.

The availability of these radiobiological figures of merit (rFOM) has triggered a multiplicity of studies that seek to improve the delivery and the clinical outcome of this therapy. Among the applications of the rFOMs that are relevant for both prospective and retrospective analysis, the assessment and comparison of the therapeutic potential and versatility of beams presenting different neutron energy spectra became recently pivotal. In addition, a biologically equivalent dose that explains the effects observed in the clinic of BNCT in terms of outcome with photon radiation, together with useful tumor control and normal tissue complication probability models to guide treatment decisions, open new horizons in the field of dose reporting, prescription and treatment planning.

The Computational Dosimetry and Treatment Planning group of the National Atomic Energy Commission of Argentina has a long tradition in contributing to this subject. The local clinical protocol for the treatment of cutaneous melanomas and the invaluable in-vivo and in-vitro data provided by groups from the CNEA Radiobiology Department have strongly favored the developments carried out by our group. Additionally, our long-standing collaborations with basic and clinical research groups from Italy, Finland, Japan and China report on the importance of this topic and the relevance of the mentioned contributions to BNCT optimization.

This expository lecture presents the state of the art and applications of the radiobiological figures of merit in BNCT.