Assessment of radiation quality by means of nanodosimetric quantities

E. Gargioni, G. Hilgers and B. Grosswendt
Physikalisch-Technische Bundesanstalt (PTB), Bundesallee 100 – D-38116 Braunschweig (Germany)

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Radiation-induced damage to cells is dominated by the pattern of inelastic interactions in sub-cellular targets. Thus the effectiveness and the quality of ionizing radiation should be defined in terms of quantities directly related to the particle track structure. We present in this work a new concept for characterizing radiation quality which is based on the assumption that the initial damage to the DNA is mainly due to the number of ionizations (the ionization cluster size) directly produced by single ionizing particles within short segments of the DNA or in the near neighbourhood. The frequency distribution of the ionization cluster size due to the interaction of single ionizing particles in target volumes of nanometric dimensions can be measured with an ion-counter nanodosimeter, which provides, together with *ad-hoc* Monte Carlo simulations, the basis for defining new dosimetric quantities. We show here preliminary results about the connection between directly measurable nanodosimetric quantities and DNA damage produced by low-energy electrons.