Abstract:

This paper outlines a phenomenological approach towards cell survival curve at low dose using tools of extensive Statistical Mechanics and nonextensive Statistical Mechanics. An Ising chain model is developed for the cell survival curve and the canonical ensemble formalism based on Boltzmann Gibbs statistic and Tsallis statistic is presented. The resulting cell survival curve shows excellent agreement with the experimental data and the physical parameters from our Tsallis model (N', q) can be shown to provide clear classification between healthy and cancerous cells. In this paper, we also provides possible biophysical interpretation to the (N’, q) parameters where N’ is representative of the amount of repairable DNA content in the nucleus and q represents the degree of correlation in DNA damage. Overall, this is the first time a Statistical Mechanics approach is used in Radiobiology, and could present a new perspective.