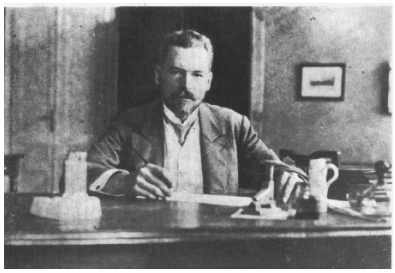

Contribution ID: **4** Type: **Regular talk**

Radiation adaptive response: the biophysical phenomenon and its theoretical description

Tuesday, 17 September 2024 11:00 (20 minutes)

The radiation adaptive response (or radioadaptiation) effect is a biophysical and radiobiological phenomenon responsible for e.g. the enhancement of repair processes, cell cycle and apoptosis regulation or enhancement of antioxidant production in cells / organisms irradiatied by low doses and low dose-rates of ionising radiation. Here we propose a comprehensive and complete theoretical model of radioadaptation grounded in mathematical concept of dose- and time-related probability function of the adaptive response appearance. This can be used in the context of two special cases of the adaptive response: the Raper-Yonezawa (priming dose) effect or constant low dose-rate irradiation (e.g. for high natural background). This complete theoretical approach is supported by Monte Carlo simulations and real experimental data used for model calibration and validation. Additionally, we show that the presented effect is just a special case of wider and generalized adaptation of physical systems, which can be delivered from basic laws of statistical physics, especially perturbative behaviours of far-from-equilibrium stationary states.

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