Contribution ID: **61** Type: **not specified**

On the Influence of Ionizing Radiation on Erythrocyte Membrane Permeability and the Diffusion Mechanisms of Cell Hydration

Tuesday 17 June 2025 16:39 (1 minute)

Numerous studies on the changes in physicochemical and structural properties of erythrocyte membranes following radiation exposure indicate that erythrocytes which do not undergo death or destruction in the early post-radiation period may still undergo alterations in both shape and size. In recent years, alongside experimental research, studies on numerical modeling of diffusion transport processes of microparticles through lipid membranes have also emerged.

In early studies, we experimentally established that the kinetics of changes in the morphological parameters of erythrocytes through one, two and three days after total irradiation of animals exhibits features depending on the dose of ionizing energy received. Analysis of experimental data from other authors indicates that the processes of erythrocyte swelling and shrinkage in the post-radiation period are a consequence of altered membrane permeability. X-ray diffraction data have shown that this is caused by structural changes at the supramolecular and molecular levels, which likely lead to a shift in the dominant mechanisms of diffusion of various substances (including water molecules and their radicals) across the membranes and to a change in the kinetics of diffusion mass transfer between the internal (cellular) and external (plasma) environments, the composition of which deviates significantly from the norm under radiation exposure.

In the present study, within the framework of a general quasi-chemical approach to multicomponent nonlinear diffusion, we developed a mathematical model of a diffusion diode to describe the hydration and dehydration processes of erythrocytes in the early post-radiation period.

Author: SARGSYAN, Hrachya

Presenter: SARGSYAN, Hrachya

Session Classification: Poster Session P17