Quercetin effects on survival and delayed luminescence of hydrogen peroxide-treated yeast cells

Irina Baran[1], Constanta Ganea[1], Francesco Musumeci[2], Salvo Tudisco[2], Agata Scordino[2], Simona Privitera[2], Luca Lanzano[2], Virgil Baran[3]

[1] "Carol Davila" University of Medicine and Pharmaceutics, Faculty of Medicine, Biophysics Department, Bucharest, Romania
[2] Istituto Nazionale di Fisica Nucleare – Laboratori Nazionali del Sud, Catania, Italy
[3] University of Bucharest, Faculty of Physics, Department of Theoretical Physics and Mathematics, Bucharest, Romania

Quercetin is a natural antioxidant that in *Saccharomyces cerevisiae* yeast cells is able to permeate the cell wall and membrane. It is known that quercetin consistently increase cell survival after induction of DNA double-strand breaks by free radicals such as hydrogen peroxide. Due to its quenching effect on free radicals, we expect that quercetin has consistent effects on delayed luminescence (DL) of cells. This issue has not been investigated so far. Quantification of these effects can help answer the question on the origin of DL, which at the moment is still a matter of debate. Suspension yeast cell cultures are challenged to various doses of hydrogen peroxide in the presence or absence of quercetin. Cell survival is measured by assessing the colony-forming ability after a specific treatment. For DL determinations, biological samples are excited with a pulse of laser light and photons emitted by the system are detected with a photomultiplicator tube, set to count single photons. Spectral analysis of the emitted light is done with the use of seven filters that correspond to seven wavelengths which span the visible region (from 395 to 763 nm). Both the maximal intensity of emitted light and the kinetics of photon emission are measured. Survival and DL characteristics of treated cells are directly compared to those observed in control cultures. A consistent decrease in DL intensity is observed in quercetin-treated cells, suggesting that free radicals substantially contribute to DL emission.