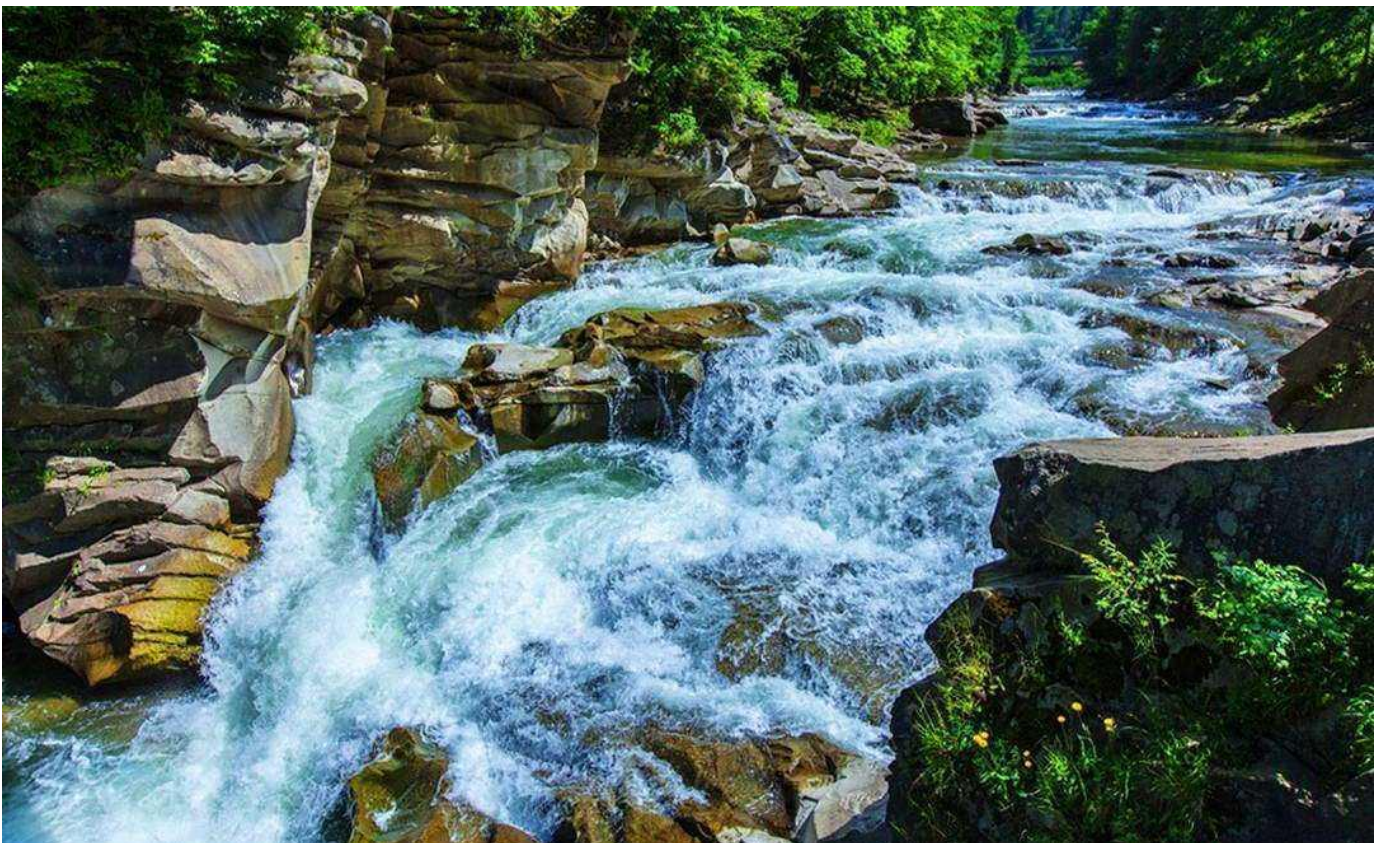


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Ivano-Frankivsk National Medical University**

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Dr. Sci. Panchuk R.R.
Dr. M. Semkiv

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**APPLICATION OF THE NOVEL INTEGRATIVE INDEX OF OXIDATIVE STRESS
BASING ON THE EXPERIENCE OF AQUATIC MOLLUSKS STUDY**

Oksana Stoliar

Lecture 4

Oksana Stoliar¹, Lesya Gnatyshyna^{1,2}, Vira Khoma¹, Gunta Sprinģe³

1 – Volodymyr Hnatyuk Ternopil National Pedagogical University, M. Kryvonosa Str., 2, 46027 Ternopil, Ukraine;

2 – I.Ya. Horbachevsky Ternopil State Medical University, m.Voli, 1, 46001, Ternopil, Ukraine;

3 – University of Latvia, Miera Str. 3, Salaspils, LV, 2169, Riga, Latvia.

E-mail: Oksana.Stolyar@tnpu.edu.ua

The oxidative stress response is the common manifestation of the adverse environmental impact on the organism. However, depending on the severity and duration of impact, this response can be highly different. Consequently, the successfulness of the oxidative stress response is frequently unclear due to the variability of the applied set of the indices for its assessment and difficulties in the evaluation of the state of the equilibrium between the antioxidant activities and oxidative injury manifestations. Bivalve mollusks, due to their suspension-feeding and sedentary lifestyle, are on the first line of impact of the pollution. The aim of this study was the application of the elaborated novel Integrative index 'Preparation to the oxidative stress' (POS) (Moreira et al., 2016) to the available results of the antioxidant activities in the sentinel aquatic organism, bivalve mollusk.

The results of the assessment of the field exposures of three populations of bivalve mollusks during three seasons, and in their ability to withstand heating (25° C and 30° C during 14 days) and ionizing radiation (14 days after the acute exposure to 2 mGy) were analyzed. The parameters for the calculation of POS included the activities of superoxide dismutase, catalase and glutathione *S*-transferase, and the concentrations of the glutathione and metallothionein (from its thiol groups) in the digestive gland and gills. The values were calculated as the magnitude of change (as % change) in comparison to the corresponding control (less disturbed field group or non-exposed group). Only statistically significant differences, as stated by the authors, were considered. Based on the magnitude of change compare to the corresponded control, we classified each group as POS-positive, POS-negative or POS-neutral, considering the three different criteria. The first criterion was the occurrence of at least one statistically significant up-regulation event of antioxidant defense. The second criterion based on the definition of thresholds for up- and down-regulation events: the occurrence of at least one up-regulation above a 50% threshold or the down-regulation by 25% or more. The third criterion was the occurrence of more cases of up-regulation in comparison to down-regulation within a tissue. The analysis had shown that the POS responses were in the limits of adaptive ability in all studied cases. However, the depressive common direction in the POS response was estimated in the cases of the impact of extreme temperatures, irradiation and, mainly for the mollusks from the highly polluted sites. Summarizing, the key importance of POS as a survival strategy of the mussels exposed to adverse impact depending on the life history is evident. As far as we know, there is no analysis available of the prevalence of POS among mollusks depending on their history of population.

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Moreira D. C. et al. *Comp. Biochem. Phys.* 2016. 200A: 64–78..

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Друк ФОП Стадник С.О.
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тел. (38-032) 247-99-82,
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