THE PROTECTIVE EFFECT OF MELANIN IN PEROXIDE-INDUCED DAMAGE OF THYMOCYTES UPON INFLUENCE OF EXTREMELY LOW FREQUENCY ELECTROMAGNETIC FIELD

Martynyuk V.S., Beregova T.V., Ostapchenko L.I., Sobko V.M., Tseyslyer Yu.V.
ESC «Institute of Biology», Taras Shevchenko National University of Kyiv, Kyiv, Ukraine
e-mail: mavis@science-center.net

Melanin is synthesized by many cells, it performs a variety of physiological functions. It is an important radio- and photoprotective factor. This substance demonstrates antioxidant, immunomodulatory, anticarcinogenic and stress-protective properties allowing its use in medicine. Melanin has been increasingly used in food industry.

It has long been known that the electromagnetic background of natural and anthropogenic origin at low frequencies is an important factor in the environment. Electromagnetic waves can cause a variety of biological effects, among which special interest is their possible impact on programmed cell death. Studies of combined effects of low-frequency electromagnetic fields (EMF) with melanin and hydrogen peroxide is very interesting. The aim of this study was to investigate the level of viability, early morphological changes in chromatin structure of thymocytes and to assess the level of DNA fragmentation under the action of melanin (5 mg/l), hydrogen peroxide (100μM) and an alternating electromagnetic field with frequency of 8 Hz 25 μT at different combined impacts, and at various exhibitions. The melanin (commercial name: polyphenol carboxyl complex Antarctic black yeast «Nadsoniella nigra») was produced by "Chaga" (Ukraine) from yeast Nadsoniella nigra strain X-1.

It was found that the action of peroxide caused an increase in the number of apoptotic cells , as expected. Moreover, the combined effects of EMF with frequency of 8 Hz amplified this effect. Augmentation of the cell number with apoptosis signs under the action of hydrogen peroxide and simultaneous exposure to EMF was mainly due to cells with condensed chromatin, which probably indicated an increase in the activating mechanisms of apoptosis initiation when samples were exposed to EMF.

Melanin showed significant protective effect against the damaging effect of hydrogen peroxide, but these effects were not fully appeared under the influence of EMF frequency of 8 Hz.