# *EFFECT OF RADIOFREQUENCY FIELDS ON ANTIOXIDATIVE ENZYMES IN LEMNA MINOR*

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Various kinds of radiofrequency fields (10 MHz - 300 GHz) are used to transmit information (TV, radio, mobile phones, base stations and satellite communications). Although radiofrequency electromagnetic fields (RF EMF) are lacking energy to break chemical bonds they can increase the temperature of biological material and cause damage of exposed tissue. These EMFs may also produce non-thermal biological effects but the exact mechanisms are still unknown and some of them include the possible involvement of reactive oxygen species (ROS). ROS include superoxide radical, hydroxyl radical and hydrogen peroxide that are chemically aggressive molecules and can damage the biomolecules such as lipids, proteins, nucleic acids etc.

Plants are essential components of a healthy ecosystem. They could also be useful test organisms because they are eucaryotic multicellular organisms and many of them are easy to grow in aseptic and controlled laboratory conditions. Due to their immobility plants are sensitive to different kind of environmental stresses. Salinity, drought, extreme temperatures, heavy metals and UV-B radiation could cause oxidative damage in plants by triggering an increased level of ROS production. Antioxidative enzymes like peroxidases and catalases protect them against oxidative damage from free radicals. Catalases are involved in scavenging H2O2 while peroxidases utilize H2O2 in the oxidation of various substrates. In this work the effect of RF EMF on catalase and pyrogallol peroxidase activity as well as pyrogallol isoenzymes of model plant, Lemna minor, has been investigated.

Duckweed Lemna minor was exposed in specially constructed chamber, a Gigahertz Transversal Electromagnetic (GTEM) cell to EMF of 400, 900 and 1800 MHz at field strengths of 10, 23, 41 and 120 V/m for 2 hours. At 23 V/m the effect of longer exposure (4 hours) as well as modulation was investigated. At 10 V/m the 14 hours exposure was also studied.
Exposure to the EM field of 400 MHz at 10 V/m for 14 hours and at 41 and 120 V/m for 2 hours as well as exposure to 900 MHz field at 120 V/m and at modulated field of 23 V/m for two hours increased both, the catalase and the pyrogallol peroxidase activity. Additionally, catalase activity was increased after the exposure to 400 MHz at 23 V/m for 2 hours while exposure to 400 MHz at 10 V/m 2 hours as well as to 900 MHz at 10 V/m for 14 hours and at 23 V/m for 4 hours increased pyrogallol peroxidase activity. The exposure to the 1800 MHz did not change the enzyme activities significantly. Comparing to the control there was no new pyrogallol isoenzyme band in exposed plants.
Our results showed that the activities of catalase and pyrogallol peroxidase of Lemna minor exposed to the RF fields increased in the most cases suggesting that investigated RF fields could induce antioxidative defence in plants.