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Changes in ATPase and Antioxidant Enzymes Activities in Yeast *Candida guilliermondii* NP-4 Exposed to Millimeter Waves

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ABSTRACT

The role of microwave radiation is currently of great scientific significance, as modern telecommunication technologies utilize them. ATP, the primary energy supplier of cellular activity, is synthesized in eukaryotic cells by the ATPsynthase located in the inner mitochondrial membrane. The aim of our study was to investigate the effects of microwave radiation at a frequency of 51.8 GHz on ATPase activity, lipid peroxidation processes, and the activity of antioxidant enzymes in the homogenates and mitochondria of *C.guilliermondii* NP-4 yeast, and to assess the potential radioprotective effect of royal jelly (RJ). The exposure to millimeter waves and the subsequent repair leads to an increase of the total ATPase activity in yeast mitochondria. It is likely that the millimeter waves induce morphological changes and functional damages to cell macromolecules, which must be repaired for the cells to resume normal functioning. These repair processes are highly energy-dependent and are mainly sustained by ATP hydrolysis. The presence of RJ exhibited a more pronounced increase in ATPase activity. It is possible that the biologically active compounds in RJ reduce oxidative stress in the yeast. Under the influence of millimeter waves, the level of malondialdehyde (MDA) in yeast increased by 30%, indicating an intensification of lipid peroxidation processes. The catalase/SOD ratio increased, which helps to protect cells from the harmful effects of oxidative stress and facilitates the activation of adaptive cellular responses.

Keywords: ATPase, yeast, millimetre waves, antioxidant enzymes, Royal Jelly

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