

Structure of Mitochondria and Activity of Their Respiratory Chain in Successive Generations of Yeast Cells Exposed to He–Ne Laser Light

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Abstract

—The data on the aftereffect of He–Ne laser light ($= 632.8 \text{ nm}$) on mitochondria of yeasts in late log phase were reviewed. The quantitative analysis of the ultrathin cell sections demonstrated a nonuniform thickness of the giant branched mitochondria typical for budding yeasts. Exposure to a dose of 460 J/m^2 (accelerating cell proliferation and activating respiratory chain enzymes, cytochrome c oxidase and NADH dehydrogenase), changed the macrostructure of the giant mitochondria—much of the narrow regions of the mitochondrial tube with profiles $\delta 0.06 \text{ } \mu\text{m}^2$ were expanded (while no signs of organelle damage were observed). Such mitochondria are characterized by increased relative surface area of the cristae, which can be due to the activation of their respiration and ATP synthesis. The number of associations between mitochondria and endoplasmic reticulum increased in irradiated cells in early log phase, which reflects the increased capacity of mitochondria to uptake Ca^{2+} . Altered giant mitochondria configuration can increase the efficiency of both energy transfer and Ca^{2+} propagation through the cytoplasm.