

Na,K-ATPASE BIOSTIMULATION BY LOW-ENERGY LASER IRRADIATION:  
COMPARATIVE EFFECTS IN MEMBRANE, SOLUBILIZED AND  
PROTEOLIPOSOME ENZYME

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The mechanism of laser irradiation action on living cells is not yet understood. The role of membrane ATPases as possible targets has been analyzed. In our group we have been working with Na,K-ATPase. This enzyme is a member of the P-type family of active cation transport proteins. Thus, the aim of the present work was to investigate the effect of low-energy laser irradiation (685nm, 35mW) on the ATPase activity of different forms of the Na,K-ATPase. Membrane-bound and solubilized ( $\alpha\beta$ )<sub>2</sub> form of Na,K-ATPase was obtained from the rabbit kidney and DPPC:DPPE-proteoliposomes were prepared by the co-solubilization method. Irradiations were carried out at 685 nm. The ATPase activity of the membrane fraction was not altered with exposition to irradiation doses between 4 and 24 J/cm<sup>2</sup>. With irradiation doses ranging from 32 to 40 J/cm<sup>2</sup>, a 28% increase on the ATPase activity was observed while when using up to 50 J/cm<sup>2</sup> no additional enhancement was observed. When biostimulation was done using the purified or the reconstituted enzyme, an increase of about 36-40% on the ATPase activity was observed using only 4-8 J/cm<sup>2</sup>. With irradiation above these values (24 J/cm<sup>2</sup>) no additional increase in the activity appeared. These studies revealed that the biostimulation of ATPase activity from different forms of the Na,K-ATPase is dose dependent in different ranges of irradiation exposure. The stimulation promoted by visible laser doses was modulated and the process was reverted after 2h for the enzyme present in the membrane and after about 5h for the solubilized or the reconstituted in DPPC:DPPE-liposomes.

Financial Support: CNPq, CAPES and FAPESP.

Key words: Na,K-ATPase, DPPC:DPPE-Liposome, biostimulation.