

# LASER-INDUCED MEMBRANE POTENTIAL DEPOLARIZATION AND HYPERPOLARIZATION IN CULTURED HELA CELLS

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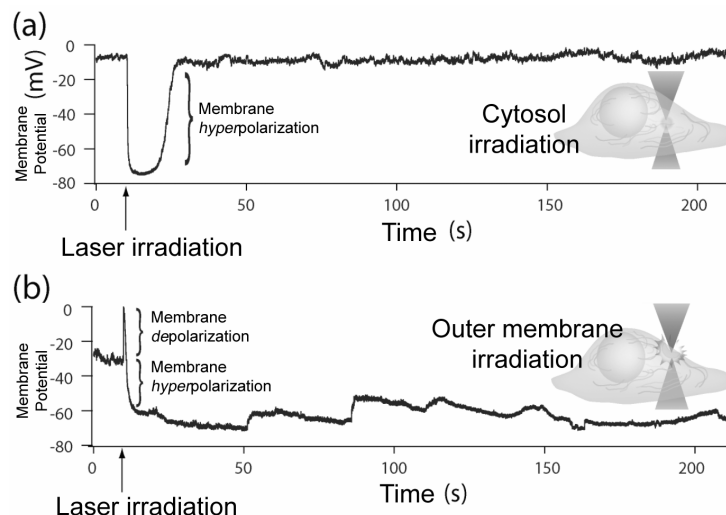
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**ABSTRACT:** Femtosecond lasers have become a common tool in microscopy and biophysics. Recent applications of note include optical poration of the outer membrane of the target cell, and the laser has also been widely employed in two-photon microscopy. In this talk, we will demonstrate the first observation of the biological effects of such irradiation on the membrane potential of the cell. We observed some surprising results. In HeLa cells, rapid and long-lasting laser induced membrane potential changes were observed using patch-clamp analysis, following exposure to 780nm, 80fs laser pulses focused in the cellular cytoplasm or on the outer membrane at average powers of 30 to 60mW. Simultaneous detection of intracellular  $Ca^{2+}$  concentration revealed coincident photogeneration of  $Ca^{2+}$  waves and membrane potential hyperpolarization. Other side-effects of irradiation were not observed. The implications for the cell stability and artifacts during optoporation experiments, photostimulation experiments and two-photon microscopy will be discussed.



[1] J. Ando, N. I. Smith, K. Fujita, and S. Kawata, " Photogeneration of membrane potential hyperpolarization and depolarization in non-excitable cells," Eur Biophys J 38:255–262 (2009).