

# Cell Contraction, Signalling and Action Potentials Evoked by Femtosecond Laser Irradiation

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The femtosecond laser has had a large impact in biomedical research fields and in microscopy, where it has enabled new imaging methodologies. At high intensities, focused femtosecond laser irradiation has been used for photobleaching, photouncaging, laser surgery and other techniques where the light is used not merely as a tool of observation but is instead an integral part of the dynamics of cells and can be used to probe and perturb the cell condition. In this talk I will discuss some of the biological and mechanical effects that can be generated by short exposures to femtosecond laser irradiation. With careful selection of laser power, calcium waves, membrane hyperpolarization, and cell contraction can be repeatably induced with little or no long-term effects on cell viability, demonstrating the versatility of the laser as a tool for exploring cellular dynamics.

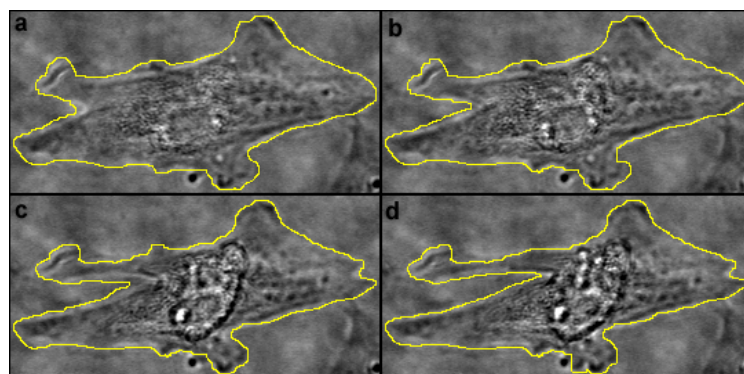


Figure: Ti:Sapphire femtosecond laser irradiation causing cardiomyocyte contraction. The image sequence was taken by phase contrast microscopy and the outline of the cell is highlighted. The laser was focused inside the cell using 30mW of average power, and 8ms exposures occurred every at 1Hz intervals. The time sequence is a) 1sec, b) 8sec, c) 14.7sec, and d) 16.7sec.