Femtosecond Laser Microscopy of Stem Cells

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ABSTRACT:

Femtosecond laser multiphoton microscopy is an already well-established method for *in vivo* imaging of biological cells. The use of innovative femtosecond laser techniques for imaging and nanoproceesing in stem cell research is the subject of this talk. The multiphoton-FLIM tomograph MPT*flex* was used to investigate stem cells´ autofluorescence originated from the metabolic coenzymes NAD(P)H and FAD/flavoproteins. Significant differences on autofluorescence lifetime signatures have been identified in variety of stem cells as well as their differentiating counterparts[1]. Moreover, metabolic activity of individual cells can also be detected within the complex culture of artificially generated induced pluripotent stem cell (iPS) colonies[2]. Furthermore, femtosecond-laser based transfection found to be a superior method to realize contamination-free delivery of foreign molecules into single cells of interest[3]. In order to achieve transfection of a large cell population, a software-aided automatic and a continuous flow femtosecond laser-assisted cell transfection systems were realized[4,5]. Such fs laser transfection systems are shown to be beneficial in optical cell reprogramming to generate iPS cells[6,7].

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