Live cells including HIV-1 infected and embryonic stem cells noninvasively micro-manipulation via laser light

Live mammalian cells from various tissue of origin can be aseptically and non-invasively micro-manipulated via lasers of different regimes. Laser-driven techniques are therefore paving the path towards the advancement of embryonic stem cell research, neurodegenerative disorder studies, human immunodeficiency virus (HIV-1) investigations and cancer research sciences. Studies aimed at the interaction of laser light, nano-materials and biological materials can also lead to an understanding of a wealth of disease conditions and result in photonics-based therapies and diagnostic tools. Thus in our research, both continuous wave and pulsed lasers operated at varying wavelengths are employed as they possess special properties that allow classical biomedical applications. In this talk; firstly, optical transfection and differentiation of embryonic stem cells using different femtosecond laser wavelengths will be presented. Secondly, somatic and dendritic photo-transfection of neuroblastoma cells on graphene substrates will be shown. Thirdly, using novel beam lattices photo-translocation of antiretroviral drugs into HIV-1 permissive cells is given. Then, preliminary results of low level laser therapy in HIV-1 infected cells are shared. Finally, optical trapping and sorting of cancerous cells from healthy ones is demonstrated.

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