Multimodal optical imaging for Regenerative medicine

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The study of the epigenetic mechanisms of stem cell (mesenchymal stromal cells (MSC), induced pluripotent stem cells (iPS)) differentiation is an actual problem. So using fluorescence lifetime imaging microscopy (FLIM) the metabolic switch from glycolysis to oxidative phosphorylation was shown during MSC differentiations by the lifetimes changing of NAD(P)H. Also we study the involvement of seeded allogeneic MSCs in bone formation using the model of transgenic mice expressing fluorescent protein GFP and genetically labeled cells. Despite the significant progress in developing of skin equivalents (SEs) a problem of non-invasively assessing the quality of the cell components and the collagen structure of living SEs both before and after transplantation remains. Using the methods of optical coherence tomography (OCT), multiphoton tomography (MPT) and FLIM, the structure and quality of dermal SEs before transplantation, and remodeling of collagen matrix and microcirculation in the wound healing after dermal SEs transplantation were studied.

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