

JOINT EVENT

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Reactions of macrophages of patients with atherosclerosis to nano-structured biodegradable materials for applications in cardiovascular surgeryEkaterina I Shishatskaya¹ and N G Menzianova¹¹Siberian Federal University, Russia

Restoration of injured vessel wall due to formation of atherosclerotic plug is the target of percutaneous transluminal coronary angioplasty (PTCA) in ischemic heart disease treatment. Development of smart materials for vascular stents is a key point in the solution of the problem of neoatherosclerosis and restenosis. Nanostructure of such smart stents may have the specific influence to cell elements of vessel wall through the mechanisms of mechanotransduction; realize the phenomenon of guided tissue formation. Macrophages have the leading role in the development of atherosclerotic changes, as foam cells of plugs. The creation of smart nano-structured stents requires their estimation in adequate *in vitro* model systems. Development of ischemic heart disease is accompanied by the appearance in circulating blood of monocytes of pro-inflammatory, pro-atherogenic phenotype, co-expressing CD14 and CD16. PTCA can be contemplated as a provoking factor, triggering the cascades of negative chemokine reactions and causing neoatherosclerosis development. Good candidates for applications in reconstructive tissue remodeling is the group of natural polyesters of alkanolic acids, - polyhydroxyalkanoates (PHAs). This class has high biocompatibility, controllable periods of biodegradation and good construction properties thanks to their structure variations. PHAs are synthesized in microbial cultures depending on strain specificity monomer composition can vary. We tested five monomer compositions, obtained in *Ralstonia eutropha* B5786 in short-term cultures of monocytes of patients, before and after PTCA. Surface nano-reliefs of samples differ in significant, as seen in atomic force microscopy (AFM). Phenotypic differences in monocytes cultured were observed also, in SEM and molecular analyses.

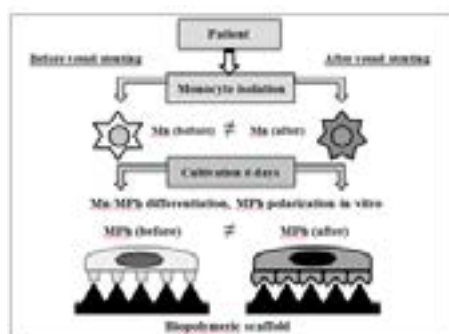


Figure 1 : Reaction of monocytes to the nano-structured culture substrates, made from PHAs, before and after the PTCA.

Biography

Ekaterina I Shishatskaya, MD, PhD, has her expertise in biotechnology of degradable natural materials for biomedical purposes. More than fifteen years she devoted to research of applications of natural polymers, PHAs, working towards development of scaffolds for tissue engineering and systems of controlled drug delivering.