DESCRIPTION FOR THE GENERAL PUBLIC

Pluripotent stem cells (PSCs), such as embryonic stem cells (ESCs), are considered as a promising source for cell therapies of damaged or disease-affected tissues and organs, including skeletal muscles. Among their advantages is the ability to preserve undifferentiated pluripotent character and - at the same time - to form any given cell type and tissue. However, before PSCs and their derivatives could be applied in therapies it is necessary to unveil mechanisms of their differentiation and also to propose accessible techniques of derivation of desired cell type. Noncoding RNAs, such as micro RNA (miRNA) or long non-coding RNA (lncRNA) are amidst the factors regulating cellular functions. The aim of the proposed project is to analyze the role of such RNAs in myogenic differentiation of mouse ESCs. Our previous studies allowed us to select several miRNAs that could be involved in the generation of skeletal muscle myoblasts. In the current proposal we plan to describe mechanisms of their action in differentiating ESCs and validate if their application could facilitate derivation of cells that could improve the skeletal muscle regeneration. To achieve our goals we will take advantage of transient overexpression of selected miRNAs in ESCs and analyze their impact at transcriptome and proteome in treated cells. We will also follow the changes in the levels of selected lncRNAs. Next, using molecular, cytological, and histological methods we will test how miRNAs chosen by us influence ESC differentiation in vitro and in vivo, i.e. in injured and regenerating skeletal muscle. We hope that this wide analysis will allow us to extend our knowledge on noncoding RNAs in differentiating ESCs and also to validate their usefulness as molecules improving derivation of myogenic cells able to improve muscle regeneration.