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Stem cell differentiation for muscle regeneration

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Physical activity has a positive role on muscle remodelling and vascularization, involv-ing stem cells differentiation processes. Indeed, the skeletal muscle homeostasis and repair are maintained by a subset of muscle stem/progenitor cells called Satellite Cells (SCs), while for heart repair and remodelling the cardiac potential of progenitor cells is otherwise expressed by different stem cell types: bone marrow hematopoietic stem cells (BMHSC), bone marrow mesenchymal stem cells (BMMSC), cardiac stem cells and embryonic stem cells.

The ε isoform of the PKC family (PKC ε) is a serine-threonine kinase that is expressed in muscle and in a variety of other tissues, regulating their homeostasis acting on cell death and differentiation.

We focused on the role of PKC ε in skeletal, cardiac and smooth muscle differentiation of adult stem cells. We found that inhibition of PKC ε prevents myogenic differentiation of the myoblast cell line C2C12 and of primary SCs. In vivo PKC ε inhibition resulted in impaired muscle regeneration, as well [1]. On the contrary, in cardiac and smooth muscle differentia-tion of stem cells we observed a negative role of PKC ε both in vitro and in vivo [2,3]. In fact, it impaired cardiac markers expression like NKX2.5 and GATA4 but also vascular differ-entiation markers like SMA and PECAM. PKC ε should therefore be considered as a finely tuned modulator of muscle cell differentiation.

References

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Keywords

Stem cells, satellite cells, PKC ϵ , muscle cell differentiation.

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