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BMP-2 induced expression of PLC beta1 that is a positive regulator of osteoblast differentiation

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C2C12 is an immortalized mouse myoblast cell line. The cells readily proliferate in high-serum conditions, and differentiate and fuse in low-serum conditions. While this cell line is a very useful tool to study aspects of myogenesis, metabolism and muscle biology, however, treatment of C2C12 cells with bone morphogenic protein (BMPs) induces cells to differentiate into osteoblasts. Osteoblast differentiation is controlled by diversified signaling proteins and transcription factors, essentially BMP-2, Osterix (Osx/Sp7) and Runx2, finally associating with the expression of late osteoblast marker genes, like ALPL and Bglap. These peculiarities make C2C12 progenitor cells a skillful prototype to investigate the molecular mechanism that control cell destiny specification and terminal differentiation. In the current investigation, we took improvement of the differentiation peculiarities of the mouse C2C12 cell line to analyze whether changes in PLCbeta1 expression and its nuclear localization might regulate or affect their terminal osteogenic differentiation. We demonstrated that overexpression of PLCβ1 enhances the osteogenic differentiation of C2C12 elicited by BMP-2 as demonstrated by the presence of osteoblast marker genes expression. In the present study we also showed that miR-214 suppressed osteogenic differentiation through the regulation of nuclear PLCβ1 by targeting Osterix.

References

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Keywords

PLCβ1; nucleus; osteogenic differentiation.