IJAE
Vol. 118, n. 2 (Supplement): 74, 2013
ITALIAN JOURNAL OF ANATOMY AND EMBRYOLOGY

Activation and nuclear translocation of PKCε promotes skeletal muscle cell differentiation via HMGA1 down-regulation

Daniela Di Marcantonio[1], Daniela Galli[1,2], Cecilia Carubbi[1], Giuliana Gobbi[1,2,3], Valeria Queirolo[1], Prisco Mirandola[1,2,3] and Marco Vitale[1,2,3]

[1] Department of Biomedical, Biotechnological and Translational Sciences (S.Bi.BI.T.) Unit of Anatomy, Istology and Embriology, University of Parma, 43126 Parma, Italy
[2] Interdepartmental Center of Molecular and Translational Oncology (COMT), University of Parma, 43126 Parma, Italy
[3] Center for Sport & Exercise Medicine – SEM, University of Parma, 43126 Parma, Italy

The role of novel PKCs in skeletal muscle differentiation has recently emerged. PKCθ is the most expressed isoform of PKCs in muscle and it promotes the fusion of myoblasts [1]. Recently, we have demonstrated that PKCε is implicated in myocardiocyte differentiation of bone marrow mesenchymal stem cells [2] but the role of PKCε in skeletal muscle cell regeneration has only recently emerged [3].

We here demonstrate that both nuclear and cytoplasmic fractions of PKCε are up-regulated during in vitro C2C12 cell line and satellite cell differentiation. We also show that PKCε is able to modulate myogenic differentiation genes via a down-modulation of HMGA1 proteins that promotes myogenin accumulation and mature myoblast formation. To study the effects of PKCε on muscle regeneration, we have used the in vivo model of CTX-induced skeletal muscle injury. We show that the up-regulation of PKCε also occurs in vivo, particularly in the centro-nucleated regenerating fibers that are derived from the fusion process of the resident satellite cells, suggesting a role for PKCε in human satellite cell-driven muscle repair and substitution, with clinically relevant implications in human muscle pathology.

References

[1] Madaro et al. (2011) PKCθ signaling is required for myoblast fusion by regulating the expression of caveolin-3 and β1D integrin upstream focal adhesion kinase. Mol Biol Cell 22: 1409-1419.
[2] Galli et al. (2013) The role of PKCε-dependent signaling for cardiac differentiation. Histochem Cell Biol 139: 35-46.
[3] Gaboardi et al. (2010) A role for PKCepsilon during C2C12 myogenic differentiation. Cell Signal 22: 629-635.

Key words
Muscle stem cells, PKCε, skeletal muscle differentiation.