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Increased Adipogenesis in Cultured Embryonic Chondrocytes and in Adult Bone Marrow of Dominant Negative Erg Transgenic Mice

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Abstract:

In monolayer culture, primary articular chondrocytes have an intrinsic tendency to lose their phenotype during expansion. The molecular events underlying this chondrocyte dedifferentiation are still largely unknown. Several transcription factors are important for chondrocyte differentiation. The Ets transcription factor family may be involved in skeletal development. One family member, the *Erg* gene, is mainly expressed during cartilage formation. To further investigate the potential role of Erg in the maintenance of the chondrocyte phenotype, we isolated and cultured chondrocytes from the rib cartilage of embryos of transgenic mice that express a dominant negative form of Erg (DN-Erg) during cartilage formation. DN-Erg expression in chondrocytes cultured for up to 20 days did not affect the early dedifferentiation usually observed in cultured chondrocytes. However, lipid droplets accumulated in DN-Erg chondrocytes, suggesting adipocyte emergence. Transcriptomic analysis using a DNA microarray, validated by quantitative RT-PCR, revealed strong differential gene expression, with a decrease in chondrogenesis-related markers and an increase in adipogenesis-related gene expression in cultured DN-Erg chondrocytes. These results indicate that Erg is involved in either maintaining the chondrogenic phenotype *in vitro* or in cell fate orientation. Along with the *in vitro* studies, we compared adipocyte presence in wild-type and transgenic mice skeletons. Histological investigations revealed an increase in the number of adipocytes in the bone marrow of adult DN-Erg mice even though no adipocytes were detected in embryonic cartilage or bone. These findings suggest that the Ets transcription factor family may contribute to the homeostatic balance in skeleton cell plasticity.

Full text: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3498236/