Differential Gene Expression of MMPs, TIMPs and MSX2 During Early Endochondral Ossification in Mice

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Matrix metalloproteinases (MMP) are zinc-dependent endopeptidases that, collectively, degrade all components of the extracellular matrix (ECM). They are able to remodelate the ECM during normal developmental processes such as embryogenesis and organogenesis, as well as in pathological processes such as tumoral invasion. The biological mineralization research looking for discovering the genes involved in the molecular mechanisms that control the endochondral ossification process. MMPs and their inhibitors (TIMPs and RECK) are responsible for bone matrix remodeling and, probably, determinate the level of its turnover. MSX2 is a homeobox-contains gene important for a limb development. Thus, our aim was to evaluate the temporal-spatial gene expression of MMP-2, MMP-14, TIMPs -1, -2, -3, -4 and MSX2 in mice embryos during early endochondral ossification. Femurs (n=5/period) were collected from foetuses (E13-E15) and performed by Real-Time PCR (SYBR Green Dye). We used GAPDH as housekeeping gene, E13 as reference sample and comparative Ct method for analysis. No difference was observed in transcript levels for MMP-2 and -14, TIMP-2 and TIMP-3 and MSX2 in all periods analyzed. The mRNA levels of TIMP-4 were increased from E14 to E15. However, TIMP-1 transcripts increased at E14 and decreased at E15. Our previous results showed intense immunostaining for MMP-2, MMP-14 and MSX2 at E15. Taken together, our findings reveled a differential expression of MMPs and TIMPs and suggest that ECM control through MMP/TIMP balance during bone development may be regulated at transcription level.

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