A LOCALIZATION OF CHOLINESTERASE ENZYME IN BONE CELLS DURING OSTEOGENESIS

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Identification of the molecular components involved in bone formation is fundamental in understanding bone remodeling and regeneration. It is believed that the temporal and spatial expression of many non-collagenous proteins is instrumental in regulating osteoblast activity and therefore critically important in the maintenance of bone mass. Expression of the cholinesterase (ChE) enzyme in osteoblast-like cells has been shown in an in vitro study. In view of the recent evidence that ChE enzyme has an effect on osteogenesis, the present study aims to localize ChE enzyme in bone cells during intramembranous ossification and bone remodeling in vivo.

Specimens of human fetal calvarium obtained from spontaneously aborting fetuses and dissected guinea pig jaws were used as detecting sites for intramembranous ossification and bone remodeling respectively. Decalcified frozen sections of fetal calvarium and guinea pig jaw were processed for cytohistochemistry for ChE enzyme by means of Kanowsky and Root (1964) method.

ChE enzyme reactions were seen in osteoblasts lining the bone trabeculae of both the calvarium and alveolar bone. Some cells entrapped within the bone matrix (osteocytes) were also shown to be positive for ChE enzyme. The staining in osteoblasts was significantly higher than that of osteocytes. In addition, some periodontal nerve fibers, which were located adjacent to the alveolar bone, were also visualized by ChE enzyme reactions.

Our observation of ChE cytohistochemical enzyme reactions in oesteoblasts of the fetal calvarium and the alveolar bone confirms that this enzyme is involved in both intramembranous bone formation and bone remodeling in developing and mature bones respectively. This study also localized ChE enzyme in osteocytes for the first time. Therefore, it is suggested that cholinesterase enzyme may act as an oesteoblast-derived bone matrix protein, which may contribute to cell-matrix interactions during osteoegenesis.

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