

SEMI-QUANTITATIVE ANALYSIS OF RAT OSTEOCALCIN mRNA EXPRESSION BETWEEN SKELETAL AND NON-SKELETAL CELLS AS A FUNCTION OF IMMOBILIZATION STRESS

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Osteocalcin (OC) is a vitamin K and vitamin D dependent bone matrix protein, primarily serves to bind extracellular mineral in bone. OC, also known as bone Gla protein (BGP) accounts for 15-20% of the non-collagen proteins in the bone matrix. Small in size this protein contains approximately 49-50 amino acid residues (~5,900daltons). OC initial synthesis occurs osteoblasts (bone forming cells) after formation glutamic acid residues located at positions 17, 21, and 24 are then posttranslationally carboxylated at the gamma position. The gamma- carboxylation of these three glutamic acid residues gives OC unique properties that allows it to bind onto hydroxyapatite ($\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$) crystals in bone.

Although, OC is primarily produced in the osteoblasts (bone producing cells) it has also been shown to be transcribed in non-skeletal tissues such as adrenal, kidney, muscle, and leukocytes. Serum OC levels decrease in response to mild stressors and increase in response to acute immobilization. These results suggest a relationship between stress and the production of OC.

This study attempts to determine if transcription serves as a control point for changes in rat serum OC levels. Several tissues such as adrenal, kidney, muscle, bone and leukocytes were obtained from rats following two hours of immobilization. After tissue extraction RNA was then isolated and Polymerase Chain Reaction (PCR) was preformed using a OC protein specific primer. The PCR products were evaluated using visual methods to determine if changes in transcriptional concentrations of OC mRNA production in specific tissues in response to acute stressors.