Osteocalcin in Maternal, Neonatal, and Cord Blood

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Gamma-carboxyglutamic acid (GLA) results from the posttranslational carboxylation of glutamic acid. A GLA-containing protein [GLA-protein, bone GLA-protein (BGP), also called osteocalcin] was discovered independently in chicken bone by Hauschka and in calf bone by Price. Osteocalcin is the most abundant noncollagenous protein of bone, comprising 15% to 20% of the noncollagenous matrix. Its biological function remains unknown. It is synthesized in osteoblasts.

Osteocalcin present in bone has a strong affinity for hydroxyapatite crystals, and its synthesis is vitamin K and vitamin D dependent. Thus, osteocalcin might play a major role in bone physiology. It is the first sensitive and specific marker of bone and provides a new tool for the investigation of metabolic bone disease. Since osteocalcin circulates in blood, the significance of serum BGP (sBGP) has been investigated and measured by radioimmunoassay.

In normal adults we found a mean value of 6.8 to 7.8 ng/ml in men and 4.9 to 6.2 ng/ml in women; in pregnancy, up to 8 to 9 ng/ml. We have measured circulating osteocalcin in 63 mothers, 63 umbilical cords, and 63 newborns. Circulating osteocalcin was significantly higher in cord (29 ± 0.4 ng/ml) and neonatal blood (33 ± 0.3 ng/ml) than in maternal samples (8 ± 0.7 ng/ml).

A negative correlation between circulating neonatal osteocalcin and neonatal weight was found. Such osteocalcin did not, however, correlate with gestational age, neonatal length, Apgar score, and maternal age.

Osteocalcin is likely to play a role in the local regulation of bone metabolism. The question remains, Does measurement of serum osteocalcin provide useful information about bone metabolism in newborns? Further studies are necessary.