OPN (Osteopontin), Plasma

Analyte: Osteopontin

Specimen Type: EDTA Plasma

Optimum Volume: 0.5 mL **

2-8°C	-20°C	-70°C
Unstable*	N.A.*	N.A.*

Reporting units: ng/mL

Method: ELISA

Biological or Clinical Significance:

Osteopontin (OPN), also known as early T lymphocyte activation 1 (Eta-1), is a secreted multifunctional glycoprotein. Its putative functions include roles in bone metabolism, immune regulation, wound healing, cell survival, and tumor progression. Based on gene structure and chromosomal location, OPN is a member of the small integrin-binding ligand N-linked glycoprotein (SIBLING) family that also includes bone sialoprotein (BSP), dentin matrix protein 1 (DMP1), dentin sialophosphoprotein (DSPP), enamelin (ENAM), and matrix extracellular phosphoglycoprotein (MEPE). Human OPN cDNA encodes a 314 amino acid (aa) precursor protein with a predicted 16 aa signal peptide that is cleaved to yield the 298 aa mature protein. It is a highly acidic, multi-domain protein with a predicted molecular weight of approximately 33 kDa, although it may range up to 75 kDa due to extensive glycosylation and phosphorylation.

OPN is expressed mainly by bone, kidney, and epithelial tissues but can also be found in endometrial tissues, endothelial cells, T cells, macrophages, smooth muscle cells, and many tumor types. It is upregulated in tissues during several pathological processes including atherosclerosis, valve stenosis, myocardial infarction, and rheumatoid arthritis. OPN is found in several biological fluids including human plasma, serum, breast milk, and urine, and is upregulated in certain cancers, fulminant hepatitis, tuberculosis, and autoimmune diseases such as multiple sclerosis and lupus erythematosus.

OPN may have a role in bone metabolism. In vitro, it stimulates the adhesion of osteoclasts to bone, and bone resorption is blocked by inhibition of this interaction. Knockout mice have outwardly normal bone development, but do exhibit deficient postnatal bone resorption in several contexts, supporting a role for OPN in osteoclast function. OPN may also contribute directly to the regulation of mineral crystal formation and growth. It binds hydroxyapatite and suppresses crystal formation both in vitro and in vivo. OPN is also a regulator of inflammation.

Inflammatory mediators including LPS, NO, IL-1β, and TNF-α, stimulate OPN expression. OPN regulates macrophage differentiation and recruitment. It also functions as a chemotactic factor and co-stimulator of T cells and may act as a Th1 cytokine, stimulating IL-12 production.

The activities of OPN and proteases are reciprocally modulated. Cleavage by thrombin, MMP-3, MMP-7, or MMP-12 can produce OPN fragments that have biological activity different from the whole protein. For instance, thrombin, MMP-3, or MMP-7 cleavage may enhance integrin-dependent cell adhesion and/or migration. In turn, OPN is shown to activate MMP-2 or -3 by mechanisms that may include conversion/activation of the pro-form or reactivation of TIMP-inhibited enzyme.

Principle of Test Method:

The OPN assay is a solid-phase ELISA designed to measure human OPN in cell culture supernates, plasma, urine, and breast milk. This assay employs the quantitative sandwich enzyme immunoassay technique.

*Please contract nexelis for stability information.

**Note: Due to instabiltiy of sample, it is recommended that 2 aliquots (0.5 mL each) be submitted in order to perform repeat analysis if needed.