Pacific Biomarkers
The Value of Expertise

PYD, Total (Pyridinoline)

Analyte: Pyridinoline

Specimen Type: Serum

Optimum Volume: 1.0 mL

Stability:

2-8 Degrees C	-20 Degrees C	-70 Degrees C
4 days	21 days	1.5 years

Reporting Units: nmol/L

Method: ELISA

Biological or Clinical Significance:

The Serum PYD assay provides a quantitative measure of the excretion of pyridinoline crosslinks in serum. Structural collagens such as types I and II that are present in bone and cartilage, respectively, are crosslinked both within their a-chains and between adjacent molecules to provide rigidity and strength to the resulting collagen fibril. In bone and cartilage, pyridinoline (PYD), a trifunctional pyridinium crosslink, forms between specific hydroxylysine residues within the telopeptide regions of one collagen molecule and within the helical region of an adjacent collagen molecule. When bone or cartilage collagen is degraded, PYD is released into circulation and excreted in the urine. Deoxypyridinoline (DPD), a pyridinium crosslink differing from PYD only by the absence of a hydroxyl group, is essentially bone specific. The ratio of PYD:DPD in bone of approximately 4:1 is closely concordant with the ratio observed in urine of healthy individuals and those with metabolic bone diseases or osteoarthritis in spite of a much higher PYD:DPD ratio in non-bone tissues. This suggests that both crosslinks reflect bone resorption under these conditions. In rheumatoid arthritis, destruction of cartilage and other collagen-containing joint tissue may contribute to increased levels of PYD.

In humans, the total pool of urinary PYD is approximately 45% free, while the remaining fraction is bound to oligopeptides ranging from small linear peptides to very large crosslinked structures in excess of 10,000 Da. The proportion of free to total crosslinks appears to be constant in healthy individuals and those with metabolic bone diseases or arthritis conditions, thus providing the rationale for measuring free PYD. Improvements in immunoassay sensitivity have resulted in the ability to measure free PYD levels in serum, thus permitting a method for researching bone and cartilage collagen degradation. Since PYD is present and excreted in all mammalian species evaluated, including rodents, dogs, sheep, horses, and nonhuman primates, research applicability of a serum PYD immunoassay extends to animal model studies.

Principle of Test Method:

The Serum PYD assay is a competitive enzyme immunoassay in a microtiter plate format. PYD in the samples or standards competes with PYD immobilized on the plate for polyclonal rabbit anti-PYD antibody. Bound antibody is detected by goat anti-rabbit antibody conjugated to alkaline phosphatase, and the reaction is detected with pNPP substrate.

References:

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3. Lomeo A and Bolner A. Stability of Several Biochemical Markers of Bone Metabolism. Clin Chem 2000; 46:1200-1202.

4. Walne AJ, James IT and Perrett D. The Stability of Pyridinum crosslinks in urine and serum. Clin. Chim. Acta 1995; 240: 95-97.