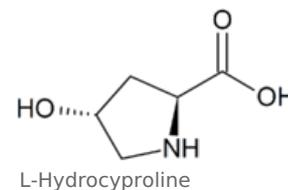


# Bone remodeling indicators

## Markers of Bone Formation

### Bone alkaline phosphatase (bALP)

- The enzyme is part of the membranes of osteoblasts, it enters the bloodstream with their increased activity (it must be different from hepatic ALP). **Osteocalcin**
- In addition to collagen, the main protein of bone tissue, binds hydroxyapatite, during bone formation its concentration in the blood rises slightly, but its molecule is very small, so it is rapidly excreted by the kidneys (biological half-life is 4 minutes), its concentration also falsely increases in patients with renal insufficiency.



### Type I procollagen carboxy-terminal propeptide

- It is a chip of procollagen I (C terminal propeptide), which is a precursor of collagen I (N terminal propeptide is very unstable, therefore it is not used), it has a large molecule, therefore its concentration does not affect kidney function

## Bone Resorption Markers

### Hydroxyproline

- one of the main amino acids of collagen, a highly non-specific indicator, because in addition to collagen I bone may come from other types of collagens ligaments, cartilage, food, etc., its concentration also depends on kidney function (hydroxyproline passes through the glomerulus but is almost completely resorbed) and liver (metabolize hydroxyproline), determined in urine in 24 hours

### Hydroxylysine glycoside

- one of the main amino acids of collagen, is excreted in the form of a glycoside, where the sugar component typical for bone is galactose (for connective tissue it is glucose, hydroxylysine is, therefore, a more specific marker than hydroxyproline).

### Carboxyterminal telopeptide of collagen I

- It is released from collagen I during bone resorption, but it has a fairly small molecule, so it is rapidly excreted by the kidneys, tartrate-resistant ALP - ALP thus differs from prostatic ALP, which is degraded by tartrate.

### Pyridinoline and deoxypyridinoline

- These are cross-links that connect collagen molecules (post-translational modifications), they are found in the urine (deoxypyridinoline is more specific because it is formed only from bone collagen, pyridinoline is also formed from cartilage collagen).

## References

### Source

- SCHNEIDERKA, Petr. *Kapitoly z klinické biochemie*. 2. edition. Karolinum, 2004. ISBN 80-246-0678-X.