Bone turnover process is a very dynamic process in which bone formation and bone resorption should be balanced to maintain normal bone density and quality and therefore bone strength. This helps to prevent damage and maintaining calcium homeostasis. However, under circumstances where bone resorption exceeds bone formation, bone loss increases. Bone density and bone quality deteriorate. The net result is a negative balance leading on to osteoporosis. During the process of bone formation and resorption, substances are being released into our circulation. Type I collagen, the most abundant bone protein (comprising 90% of the matrix), is broken down during bone resorption and synthesised during bone formation. During formation, type I pro-collagen is processed and assembled into cross-linked fibrils. Procollagen type I N-terminal propeptide (PINP) is cleaved and released into circulation as a trimer and monomer (total PINP). These substances can be measured and used clinically to assess the amount of bone formation and bone resorption. CTX and PINP are the reference BTMs recommended by the IFCC and IOF.

Clinical uses of BTM include prediction of bone loss, prediction of fracture, identification of secondary osteoporosis, monitoring of response to treatments especially anti-resorptive agents, identification of poor adherence, monitoring of offset of effect. Response to treatment and adherence can be assessed with BTMs earlier than with BMD, as early as 3 months after the start of therapy. Clinical Practice Guidance (CPG) has been developed and include appropriate treatment targets for BTMs, to help identifying patients with poor compliance and non-responders, which allows early intervention.
Consensus Of Using Bone Turnover Markers, Serum C-Terminal Telopeptide And Serum Procollagen Type 1 Amino-Terminal Propeptide, For Short-Term Monitoring Of Osteoporosis Treatment In The Asia-Pacific Region

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Osteoporosis is a major health issue. By 2050, a greater than 2-fold increase in hip fractures will occur in Asia representing 50% of all hip fractures worldwide. Bone mineral density (BMD) by dual energy X-ray absorptiometry (DXA) is commonly used to diagnose osteoporosis and monitor osteoporosis treatment. However, the inconvenience, cost, limited availability of DXA and the delay in detection of BMD changes after treatment initiation support an important role for bone turnover markers (BTMs), as short-term tools to monitor therapy. With regards to low adherence rates observed with medical treatment of osteoporosis, a panel of experts reached consensus on the use of BTMs for both raising awareness and in the short-term monitoring of osteoporosis treatment in the Asia-Pacific region. The experts endorse the use of BTMs, especially serum C-terminal telopeptide of type 1 collagen (CTX) and serum procollagen type 1 N propeptide (P1NP), as short-term monitoring tools to help clinicians assess the responses to osteoporosis therapies and appropriately adjust treatment regimens earlier than BMD. Either the absolute values or the degree of change from baseline in BTMs can be used to monitor the potential efficacy of osteoporosis therapies. The use of BTMs can be incorporated in treatment algorithms of osteoporosis care programs, such as fracture liaison service (FLS), to improve patient adherence and treatment outcomes. Encouraging sufficient reimbursement from health care systems may facilitate more widespread use of BTMs in clinical practice in the Asia-Pacific region.

(This consensus has been endorsed by ISCD, IOF and AFOS and submitted to Journal of Clinical Densitometry)