Collagen Type II Cleavage Assay (C2C ELISA)
Cat. # 60-1001-001

Brief literature review of some publications where IBEX C2C ELISA assay was used.

- Sera from patients with rheumatoid arthritis (RA) reveal increases in C2C level over controls. Moreover, compared to RA patients with slow radiographic changes, those with rapid radiographic progression over a 4 year period had persistently elevated levels in sera of C2C, C12C and CS846 but not CPII. The values after one year predicted subsequent progression, especially in the case of C2C. (Verstappen et al, 2006).

- Another RA treatment study showed that the serum ratio of C2C : CPII was decreased in early RA on treatment with infliximab, compared to baseline, regardless of the EULAR response grade . The ΔC2C : CPII over 54 weeks correlated with the changes in CRP, DAS28 levels, radiographic progression and patient function (HAQ). But C2C : CPII remained unchanged in established RA. These results suggest that the ability to control cartilage type II degradation (C2C) and promote its synthesis is most effective in early RA. (Niki et al, 2012).

- Balance between serum type II collagen (C2C) and type I collagen (C1,2C) degradation products and synthesis of type II collagen (CPII) revealed that after 1 month of biologic treatment, changes in these three biomarkers predicted radiographic outcome in 88% of patients after 1 year. An increase in C2C alone at 1 month predicted radiographic progression at 1 year. Clinical remission was predicted by a decline in serum C2C at 1 month. (Mullan et al, 2007).

- Studies of serum C2C have revealed no detectable changes following the menopause in contrast to increases in the bone biomarkers bone alkaline phosphatase and cross-linked type I collagen N-telopeptide. (Kojima et al, 2008).

- Using MRI, positive correlations were observed between the C2C serum assay and cartilage degeneration in male OA knee T2 images (King et al, 2004). Increases in serum C2C and C1,2C, but not CPII and CS846, are associated with radiographic knee OA (Kong et al, 2006) reflecting the increased cleavage of type II collagen by collagenases viewed in situ in diseased joints. (Wu et al, 2002; Dejica et al, 2012).

- When knee or hip OA patients were haplotyped for mitochondrial haplogroups , the C2C, CPII and the C2C : CPII ratio were significantly increased in sera of OA patients carrying the haplogroup H compared to OA carriers of the J haplogroup (Fernandez-Moreno et al, 2012). The collagenase MMP-13 is also more elevated in patients of the more common haplogroup H who are more likely to need total joint replacement than non-H haplotypes (Soto-Hermida et al, 2015).

- In a study following knee ACL rupture, in which baseline serum pre-injury were available, subsequent serum changes in C2C, C12C, CPII and CS846 were observed compared to age-related changes in uninjured controls (Svoboda et al, 2013).

- Patients at increased risk for ACL rupture can be identified prior to injury by differences in serum C2C, C12C, CPII and CS846 levels (Svoboda et al, 2016). These findings suggest that fundamental genetic and/or biomechanically related differences exist that influence cartilage metabolism.

- Arthroscopic analyses of pre-radiographic knee cartilage degeneration following ACL injury have revealed significant associations of increased synovial fluid C2C with the presence of three or more high Outerbridge graded cartilage lesions (Yoshida et al, 2013).
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