

Collagen Type I and II Cleavage Assay (C1,2C ELISA)

Cat. # 60-1002-001

Brief literature review of some publications where IBEX C1,2C ELISA assay was used.

- A recent randomized double-blind placebo-controlled clinical trial evaluated the chondroprotective action of salmon nasal cartilage proteoglycan in individuals with knee joint discomfort but without diagnosis of knee osteoarthritis (Tomonoga *et al*, 2017). C1,2C levels dropped significantly in the treatment group compared with the placebo group following a 16 week intervention of subjects with high levels of knee pain and physical dysfunction and subjects with constant knee pain. The C1,2C : PIICP ratio decreased in the treatment group, whereas it increased a little in the placebo group following treatment.
- C1,2C biomarker was found to be one of the most discriminatory biomarkers for the study of hand OA. (Ramonda *et al*, 2013).
- Patients at risk for OA following knee ACL injury, with or without abnormal joint space width (JSW) reflective of cartilage loss showed an increased ratio of urine C1,2C : serum CPII compared to controls after 1 and 4 years (Tourville *et al*, 2013).
- Increase 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.
- 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).
- There is recent evidence that mechanically-induced changes in serum cartilage matrix biomarkers can predict regional changes in cartilage thickness 5 years later in human subjects with early knee OA (Chu *et al*, 2017). Subjects were exercised on a treadmill for 30 minutes and blood samples were obtained 30 minutes and 5.5 hours after exercise. MRIs of the index knees were acquired at baseline and after 5-years. Serum biomarker concentrations of C1,2C and CS846 were measured. Changes in biomarker concentrations (0.5h vs 5.5h) were determined and correlations between changes in cartilage thickness and biomarker levels (as a percentage of 0.5 h post-activity levels) were assessed. For knees where the catabolic and anabolic marker concentrations increased, specific regions of articular cartilage were thinner. The study supports the hypothesis that a mechanical stimulus can produce a change in both markers of degeneration and synthesis that correlate with subsequent changes in cartilage thickness. Chu CR, Sheth S, Erhart-Hledik JC, Do B, Titchenal, MR, Andriacchi, TP. (2017). Mechanically stimulated biomarkers signal cartilage changes over 5 years consistent with disease progression in medial knee osteoarthritis patients. *J Orthop Res*. 2017 Sep 1. doi: 10.1002/jor.23720. [Epub ahead of print].

Collagen Type I and II Cleavage Assay (C1,2C ELISA)

Cat. # 60-1002-001

1. Kong SY, Stabler TV, Criscione LG, Elliott AL, Jordan KM, Kraus VB. (2006). Diurnal variation of serum and urine biomarkers in patients with radiographic knee osteoarthritis. *Arthritis Rheum* 54: 2496-2504.
2. Mullan RH, Matthews C, Bresnihan B, Fitzgerald O, King L et al. (2007). Early changes in serum type II collagen biomarkers predict radiographic progression at one year in inflammatory arthritis patients after biologic therapy. *Arthritis Rheum* 56: 2919-2928.
3. Ramonda R, Lorenzin M, Modesti V, Campana C, Ortolan A, et al. (2013). Serological markers of erosive hand osteoarthritis. *Eur J Intern Med* 24:11-15
4. Tomonaga A, Takahashi T, Tanaka YT, Tsuboi M, Ito K, Nagaoka I. (2017). Evaluation of the effect of salmon nasal proteoglycan on biomarkers for cartilage metabolism in individuals with knee joint discomfort: A randomized double-blind placebo-controlled clinical study. *Exp Ther Med*.14: 115-126.
5. Tourville TW, Johnson RJ, Slauterbeck JR, Naud S, Beynnon BD. (2013). Relationship between markers of type II collagen metabolism and tibiofemoral joint space width changes after ACL injury and reconstruction. *Am J Sports Med* 41: 779-787.