Collagen Type II Synthesis Assay (CPII ELISA)
Cat. # 60-1003-001

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

- CPII levels may be affected by physical activities. Kong *et al,* 2006 reported serum CPII increased levels after physical activity of arising from bed unlike serum CS846, C2C and C12C which did not changed. As well, Hunt *et al,* 2013, reported that external knee adduction moment impulse relates to the ratio of urine CTX-II levels and serum CPII, even when controlling for various related variables.

- Higher peak vertical ground reaction force (vGRF) is associated with reduced serum C2C: CPII ratios in patients after ACL reconstruction (Pietrosimone *et al,* 2016). This ratio change would reflect an increase in cartilage type II collagen synthesis (CPII) in relationship to degradation of this molecule (C2C). In contrast, a reduction in peak vGRF and limb symmetry indices is associated with a higher ratio of serum C2C to CPII after reconstruction following ACL injury although the change it was not significant when corrected for walking speed (Pietrosimone *et al,* 2017).

- 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).

- Exercised horses display an increase in serum C1,2C, CS846 and CPII (Frisbie *et al,* 2008) . Yet in a human study serum C2C, CPII and C2C:CPII did not change significantly throughout a multistage ultramarathon (Mundermann *et al,* 2017).

- A 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).

- The risk of ROA versus no OA increased with increasing urine levels of C2C and C1,2C and was reduced in association with high levels of CPII (Cibere *et al,* 2009). The risk of pre-ROA versus no OA increased with increasing urine levels of C2C and C1,2C. However, the ratios of urine C2C or C1,2C : serum CPII were again more effective than individual biomarkers at differentiating the subgroups.

- 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.

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1. Cibere J, Zhang H, Garnero P, Poole AR, Lobanok T. et al. (2009). Association of biomarkers with with pre-radiographically defined and radiographically defined knee osteoarthritis in a population-based cohort. Arthritis Rheum 60: 1372-80.
2. Frisbie DD, Al-Sobayil F, Billinghurst RC, Kawcak CE, McIlwraith CW. (2008). Changes in synovial fluid and serum biomarkers with exercise and early osteoarthritis in horses. Osteoarthritis Cartilage. 16:1196-2004.
3. Hunt MA, Pollock C L, Kraus VB, Saxne T, Peters S et al. (2013). Relationships amongst osteoarthritis biomarkers, dynamic knee joint load, and exercise: results from a randomized controlled pilot study. BMC Musculoskeletal Disord 14:115.
4. 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.
5. Mündermann A, Klenk C, Billich C, Nüesch C, Pagenstert G et al. (2017). Changes in cartilage biomarker levels during a transcontinental multistage footrace over 4486 km. Am J Sports Med. 2017 Jun1:363546517712945.doi:10.1177/0363546517712945. [Epub ahead of print]
6. Niki Y, Takeuchi T, Nakayama M, Nagasawa H, Kurasawa T et al. (2012). Clinical significance of cartilage biomarkers for monitoring structural joint damage in rheumatoid arthritis patients treated with anti-TNF therapy. PLoS One 7: e37447
7. Pietrosimone B, Blackburn JT, Harkey MS, Luc BA, Hackney AC et al. (2016a). Greater mechanical loading during walking is associated with less collagen turnover in individuals with anterior cruciate ligament reconstruction. Am J Sports Med. 44:425-32.
8. Pietrosimone B, Loeser RF, Blackburn JT, Padua DA, Harkey MS, et al. (2017). Biochemical markers of cartilage metabolism are associated with walking biomechanics six-months following anterior cruciate ligament reconstruction. J Orthop Res 2 MAR 2017, DOI: 10.1002/jor.23534Svoboda, SJ, Owens, BD, Harvey TM, Tarwater,PM, Brechue WF Cameron, KL. (2016). Biomarkers of collagen turnover and subsequent anterior cruciate ligament rupture. Am J Sports Med. 44: 1687-93.
9. 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.