



Comparison of Basal and Cytokine Stimulated Metabolism of the Hamstring Tendon

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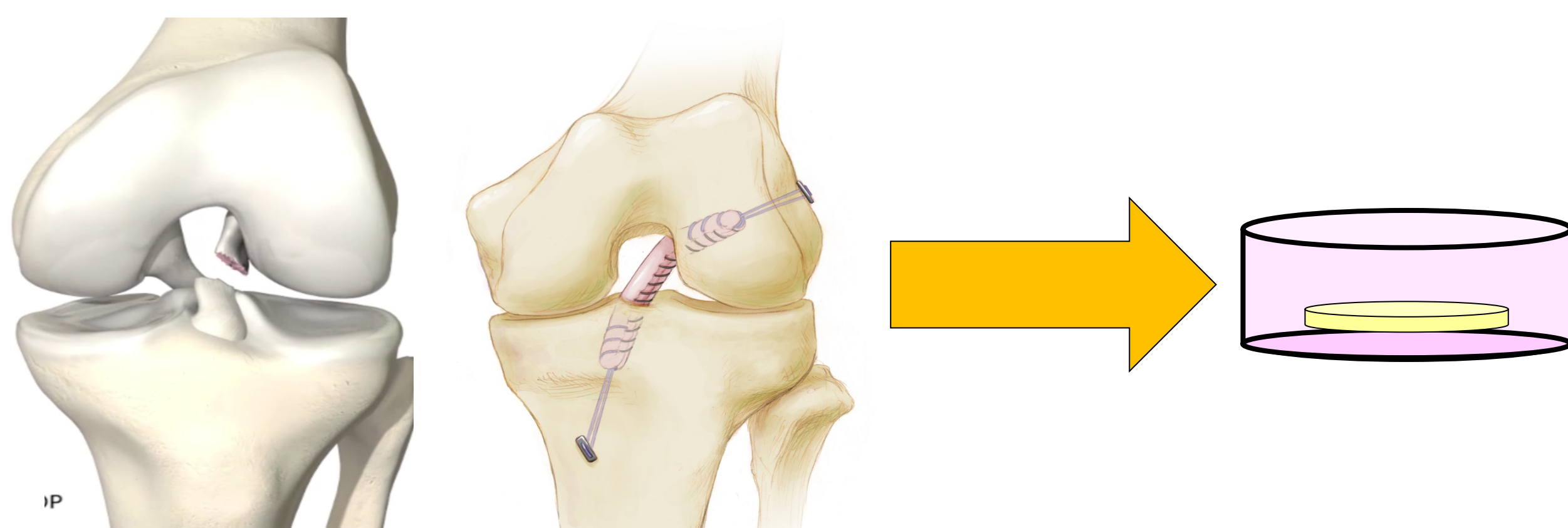
Introduction and Purpose

- Every year, over 250,000 people tear their Anterior Cruciate Ligament (ACL) in the U.S.¹
- ACL reconstruction using tendon autografts is a common treatment for patients after ACL rupture
- The environment of the joint after ACL injury/surgery is pro-inflammatory, which may have negative affects on the metabolism of the autografted tendon and contribute to tendon graft failure after ACL reconstruction.
- This study was designed to assess metabolic responses of Hamstring Tendon (HT) explants cultured with and without IL-1 β stimulation.

Hypothesis

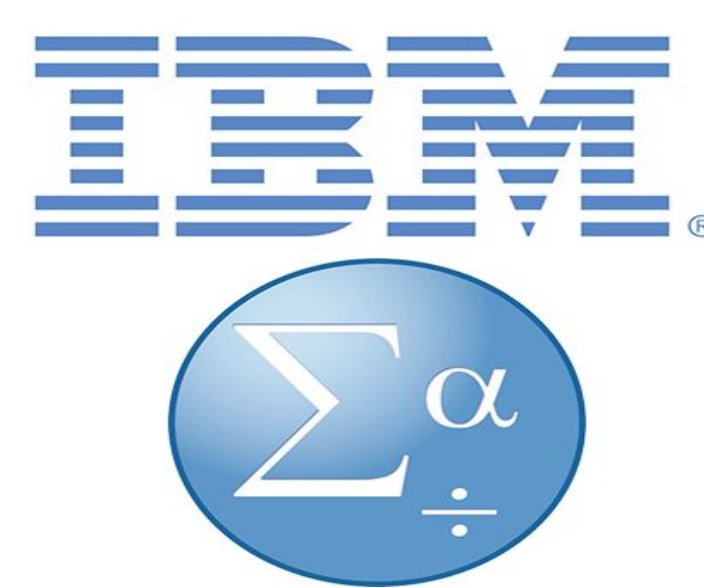
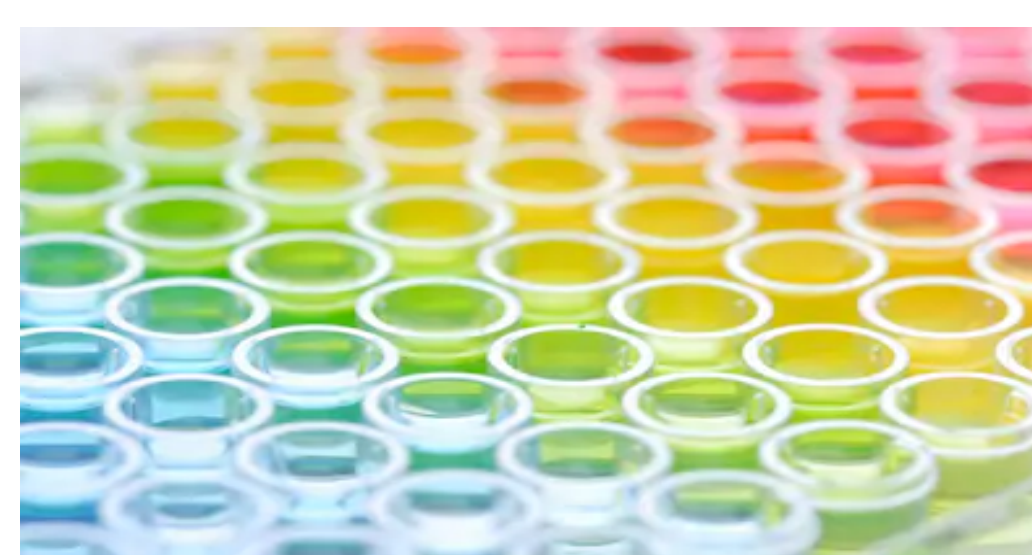
There would be a significant increase in the production of inflammation and degradation-related biomarkers by the HT in response to cytokine stimulation during culture compared to untreated controls.

Methods



1) HT (n=11) tissues were collected from patients (mean age 26.18, 17-57 range; 4 females and 7 males) undergoing ACL reconstruction surgeries (MU IRB 2009879).

2) 4mm explants (n=2/tissue/patient) were created and cultured for 3 days with or without IL-1 β and media were collected for biomarker analyses



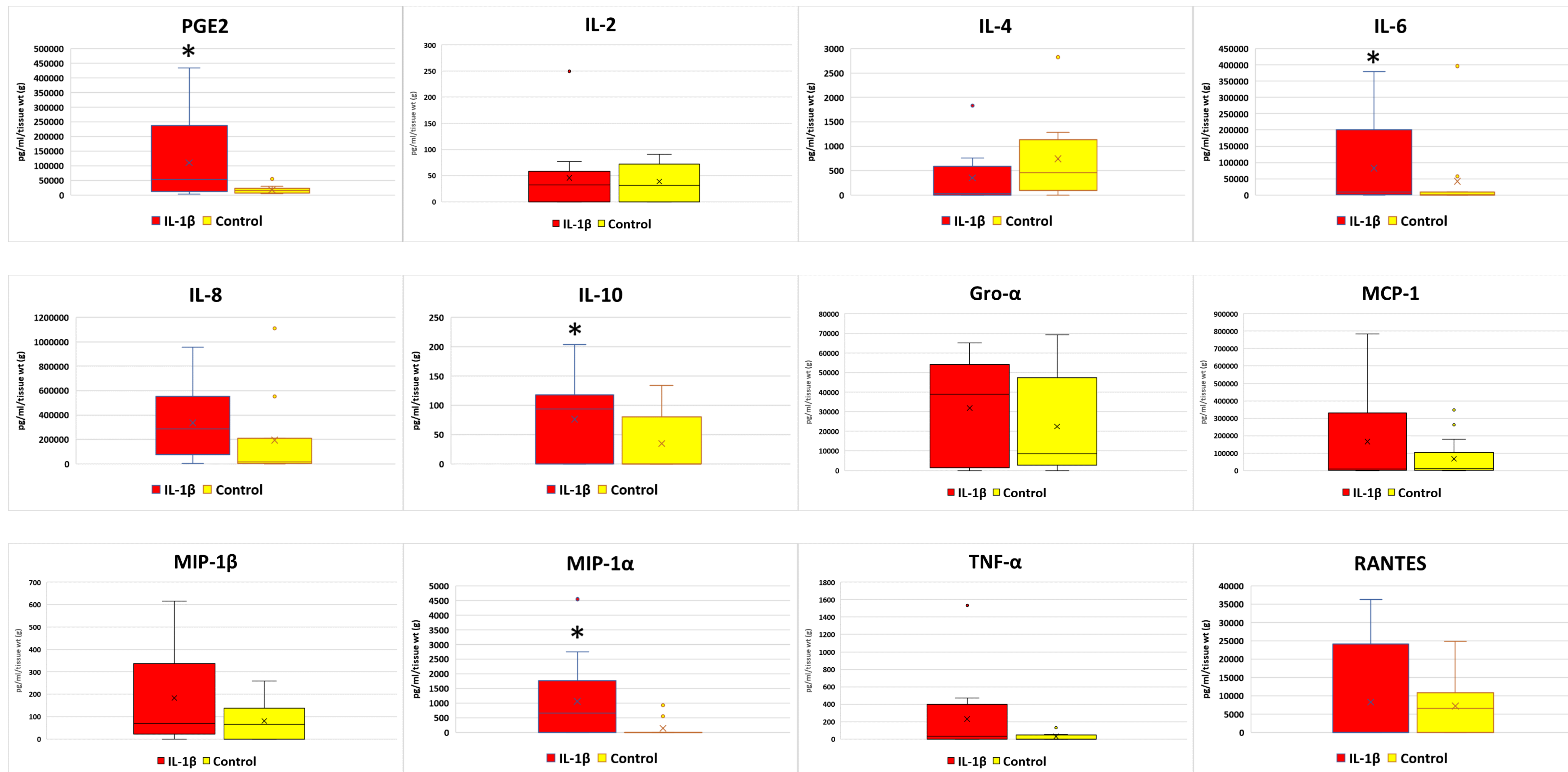
3) IL-2, IL-4, IL-6, IL-8, IL-10, MCP-1, GRO- α , MIP-1 α , MIP-1 β , RANTES, TNF- α , VEGF, MMP-1, MMP-2, MMP-3, MMP-7, MMP-8, MMP-9, MMP-13, total MMP activity (MMPACT), TIMP-1, TIMP-2, TIMP-3, TIMP-4, MGAG, and PGE2 media concentrations were determined using commercially available assays.

4) For statistical analysis, the concentrations of media biomarkers were standardized to wet weight of the explants. Significant differences between cytokine stimulated tissue and basal tissue were determined using Mann-Whitney Rank Sum test. Significance was set at p<0.05.

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Results

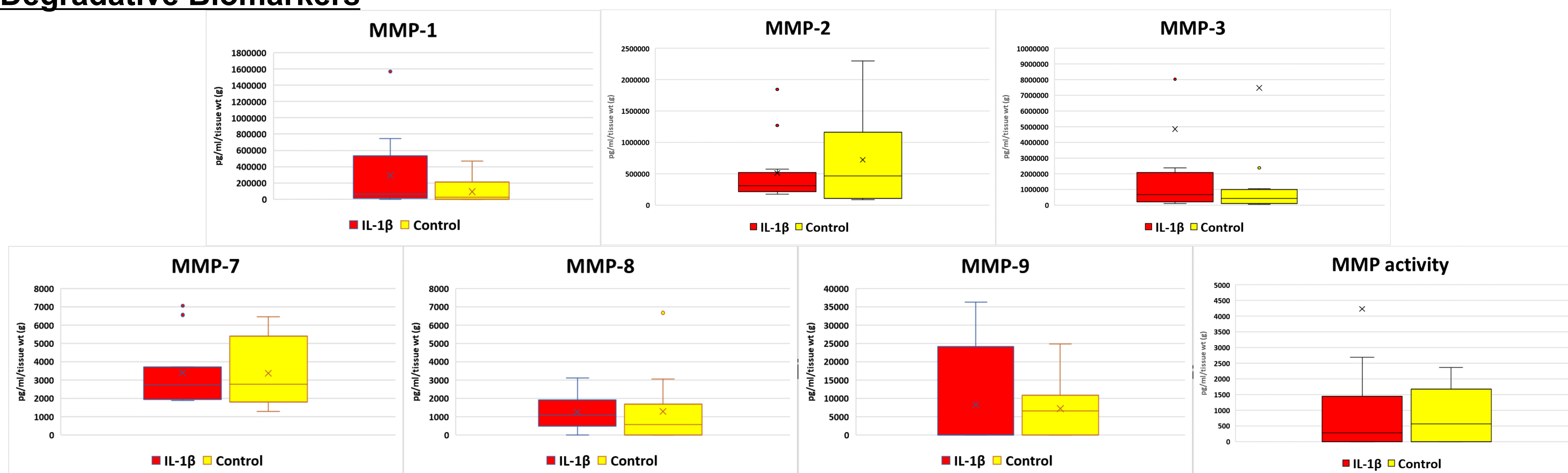
Inflammation Related Biomarkers



- IL-1 β stimulation significantly increased the production of PGE2, IL-6, IL-10, and MIP-1 α by the HT compared to untreated controls

(*) Significantly higher than untreated control

Degradative Biomarkers



- Significant differences were observed between IL-1 β treated and control HT groups for degradative biomarkers

Conclusions

- The data from this study indicates that the HT significantly increases the production of inflammation-related, but not degradative, biomarkers in response to IL-1 β stimulation
- It is not clear if the increased inflammatory response, and lack of degradative response, by the HT observed in this study will improve or inhibit the healing of the graft after ACL reconstruction surgery
- Ongoing studies in our lab are aimed at relating these observations to graft healing *in vivo*, and comparing the responses of the HT to other tendon tissues commonly used for ACLR clinically in order to improve treatment options and outcome for ACL injury patients

References: ¹Décary et al., *PLoS ONE*, 2018 ; ²Spindler et al., *Am J Sports Med*, 2020