THE ASSOCIATION OF BIOMARKERS OF JOINT DISEASE TO THE OUTCOME OF GLUCOCORTICOID INJECTIONS FOR KNEE OSTEOARTHRITIS

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INTRODUCTION

• Glucocorticoid injections are commonly prescribed for individuals with knee osteoarthritis (OA) to improve pain and function

• Outcome of these procedures is variable in terms of magnitude and duration of symptom improvement

• Physicians are unable to reliably predict who will benefit the most from these injections

• The present study is a pilot exploring the relationship between patient response to injections and change in biomarker concentrations over time

OBJECTIVE

Determine the relationship between knee glucocorticoid injection outcomes and baseline concentrations of a panel of biomarkers in the synovial fluid (SF), serum and urine.

METHODS

- This prospective observational study recruited a cohort of 10 participants who underwent a glucocorticoid injection for knee pain
- Baseline concentrations of biomarkers of cartilage tissue turnover and inflammation were measured in the SF, serum, and urine
- Participants rated their pain and function using the Knee Osteoarthritis Outcomes Score (KOOS) survey and the Lower Extremity Functional Scale (LEFS) at baseline and at 4 weeks
- Linear regression analyses performed to assess for relationships between change in these measures and baseline demographics, radiographic OA grade and biomarker concentration

RESULTS

Table 1. Participant demographics

Characteristic	N=10
Age	66.0 ± 10.8
Sex	M (n=2), F (n=8)
BMI	30.3 ± 5.5

Figure 1. Lower Extremity Functional Scale at Baseline and 4 Week Time Points

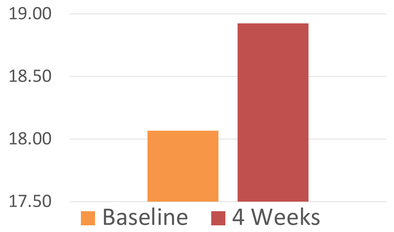

Figure 2. KOOS Scores at Baseline and 4 Week Time Points

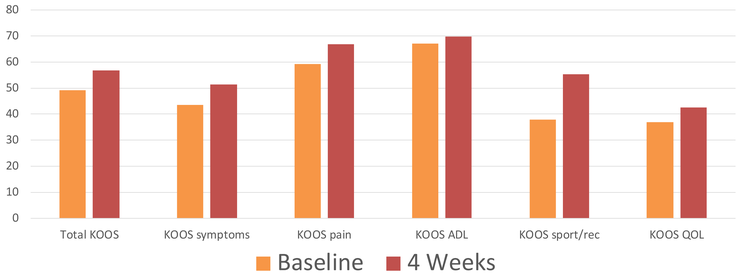

Table 2. Pearson correlations of inflammatory cytokines and injection outcome measures

	KOOS Coeff.	P value	Koos symptom subscale	P value	LEFS Coeff.	P value
MIP-1β serum	0.138	0.704	-2.63	0.142	-0.183	0.612
MIP-1β SF	-0.421	0.225	**-0.741**	**0.014***	-0.195	0.588
MCP-1 serum	0.102	0.779	0.183	0.613	-0.089	0.806
MCP-1 urine	- 0.266	0.457	**-0.656**	**0.039***	0.013	0.196
MCP-1 SF	-0.590	0.072	-0.499	0.299	-0.264	0.462
RANTES serum	0.233	0.517	0.180	0.394	-0.019	0.958
RANTES urine	-0.562	0.091	**-0.701**	**0.022***	-0.432	0.212
RANTES SF	-0.332	0.350	-0.236	0.512	0.074	0.838

Table 3. Pearson correlations of baseline biomarkers of tissue turnover and change in clinical outcome measures

	KOOS coefficient	P value	LEFS coefficient	P value
CTX-II serum	-0.513	0.130	0.505	0.137
CTX-II urine	0.380	0.279	0.564	0.089
CTX-II SF	-0.519	0.124	-0.139	0.703
COL-2-1 serum	-0.127	0.635	0.111	0.760
COL-2-1 urine	**-0.658**	**0.039**	**-0.697**	**0.025***
COL-2-1 SF	-0.119	0.742	0.077	0.833

- Mean improvement in KOOS was 8 points (+/-12.4, p>0.05) and LEFS 3 points (+/-13.0, p>0.05).
- KOOS and LEFS did not significantly differ post-injection compared to baseline (p>0.05).
- Baseline, age, BMI and radiographic OA did not relate to outcome (p>0.05).
- Urinary concentration of Col2-1, a marker of cartilage tissue turnover, had a significant negative correlation to change in KOOS (r=-0.66, p=0.04) and LEFS (r=-0.697, p=0.03).
- Inflammatory markers, MIP-1β (SF concentration, r=-0.741, p=0.01), MCP-1 (urine r=-0.656, p=0.04) and RANTES (urine r=-0.701, p=0.02) also had significant negative correlations to change in KOOS symptom subscale.
- No significant relationships were identified between markers of cartilage degradation (MMPs) and change in function

DISCUSSION

• Knowledge of predictors of response could facilitate selection and counseling of patients

• Further larger scale studies are required to characterize biomarker predictors of response and reliably demonstrate if there is a change in biomarker response following corticosteroid injection

CONCLUSIONS

- **Biomarkers of cartilage turnover and inflammation had significant relationships to outcome of glucocorticoid injections for knee OA**
- **This pilot study is a first step in the development of a predictive tool for injection outcome that accounts for the biological state of an individual's joint disease.**