Zohaib Y Lakhani
L2
LSU Health Sciences Center, New Orleans, LA

Dr. Jennifer Simkin
LSU Health Sciences Center, New Orleans, LA

"Patient-Specific decrease in circulating level of TGFα is associated with lower pain after Total Knee Arthroplasty"

10-30% of patients undergoing Total Knee Arthroplasty (TKA) for osteoarthritis (OA) have poor or no improvement in pain after surgery which can lead to reduced work productivity and poorer general health. Attempts to identify predictors of poor surgical outcome have focused on patient reports of physical limitations and pain prior to surgery, single health traits (e.g. BMI), or psychological factors. However, several structural characteristics of OA are thought to contribute to pain prior to surgery. These include increased inflammatory cytokines. In this study, we aim to investigate if changes in specific serum cytokines can predict levels of pain after TKA.

Serum was collected during and three months after surgery from 60 New Orleans patients undergoing Total Knee Arthroplasty. Patients answered a Knee Osteoarthritis Outcome Scores (KOOS) survey for self-reported pain and symptoms prior to and 3 months after surgery. A multiplex ELISA was performed on patients' serum to measure the concentration of 10 cytokines associated with inflammation (IL1α, MCP1, TNFα, IL6, IL10, IL13, IL4, mCSF, IL1b, IFNγ), 4 enzymes associated with tissue degradation (TIMP1, MMP1, MMP9, MMP13), and 3 mediators of fibrosis (LAP, TGFα, TGFβ). Wilcoxon Mann-Whitney U Test, Pearson Correlation or Spearman Correlation (depending on data distribution) were used to perform statistical analysis, where $P<0.05$ was deemed significant. Running an initial analysis on our cohort (38.9% black patients, 61.1 % white patients), we found, in parallel to nationwide studies, black patients with knee OA report higher levels of pain before surgery. Although black patients reported higher pain before undergoing TKA, on average, no difference between black and white patients' pain is detected at 3 months after surgery in our cohort. Measuring peri-operative serum cytokine concentrations, we found that black patients had higher TGFα serum levels compared to white patients. Further, we found improvement in pain was inversely correlated with a pre-op to post-op increase in TGFα serum concentration in black patients ($R=-0.489$, $P=0.038$, $N=14$). Finally, we observe three months post-TKA, when no significant difference between white and black patient's KOOS pain scores is detected, the absolute concentration of TGFα is inversely correlated with pain scores ($R=-0.356$, $P<0.01$, $N=47$), such that the lower the pain, the lower the TGFα concentration in both black and white patient populations. The primary correlating factor, TGFα, has been previously identified as a potent activator of epidermal growth factor receptor (EGFR), associated with cartilage degeneration and increase in nocifensive behavior in mouse models. Thus, the correlation of TGFα with pain warrants further investigation in this biomarker's role in mediation of pain in osteoarthritis.