

## ◇ Diagnosing Periprosthetic Joint Infection: The Era of the Biomarker has Arrived

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**Introduction:** The diagnosis of periprosthetic joint infection remains a serious clinical challenge and currently requires an algorithmic approach utilizing a multitude of clinical and laboratory considerations. There is a need for improved diagnostics. We report on completion of our 8 year biomarker program, evaluating the diagnostic profile of the 16 most promising synovial fluid biomarkers.

**Methods:** Synovial fluid was prospectively collected from 95 patients being evaluated for infection in the setting of revision hip or knee arthroplasty. All synovial fluid samples were tested by immunoassay for 16 putative biomarkers that were developed and optimized specifically for use in synovial fluid. The MSIS criteria, including cultures, CRP, ESR, fluid WBC, PMN %, and histology, was used to classify 29 PJIs and 66 cases of aseptic failure. Sensitivity, specificity and ROC curve analysis were performed for all biomarkers.

**Results:** Five synovial fluid biomarkers (alpha-defensin, neutrophil elastase 2, bactericidal/permeability increasing protein, neutrophil gelatinase-associated lipocalin, and lactoferrin) correctly predicted the MSIS classification of all patients in this study, exhibiting an AUC of 1.0 with >98% sensitivity and specificity for the diagnosis of PJI. Eight other biomarkers exhibited an AUC of >0.9. Pearson correlations comparing the biomarkers to each other and to the synovial fluid WBC revealed only weak correlations.

**Conclusions:** A comprehensive biomarker research program has led to the identification of several synovial fluid biomarkers that appear to be diagnostic for PJI. These host biomarkers are triggered by pathogen recognition, and concentrate in the synovial fluid to protect the host. Diagnostically, they outperform historically-reported results of other tests for periprosthetic infection. Given the ability of these assays to match the results of the more complex MSIS definition of PJI, we believe that synovial fluid biomarkers can elevate the diagnostic abilities of entire health care systems to the level of expert surgeons in the field.

◇The FDA has not cleared the following pharmaceutical and/or medical device (Leukocyte Esterase Test Strip; CD Diagnostics) for use described in this presentation.

