Paper #15



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Introduction: We report on the initial results of a novel ELISA assay that was developed to quantify the S. aureus antigen levels in a synovial fluid sample.

Methods: Banked clinical synovial fluid samples were utilized to form three groups of synovial fluid for testing. Group ASEPTIC included 10 synovial fluid samples that were alpha-defensin-negative and culture-negative, representing a negative control group. Group SaPJI included 10 synovial fluid samples that were alphadefensin positive and yielded S. aureus growth from cultures, representing a positive control group (S. aureus periprosthetic joint infection). Group CNPJI included 50 synovial fluid samples that were alpha-defensin positive but culture negative, representing a group of potentially culture-negative PJIs. A final group of 18 synovial samples that yielded growth of varied organisms (other than S. aureus) was also included. All clinical synovial fluid samples were subjected to several methods that isolate and extract bacterial antigens and tested with the novel synovial fluid S. aureus ELISA assay.

Results: All ten negative controls (ASEPTIC) yielded a negative assay result < 0.3 (mean=0.119; range: 0.115-0.119 OD). All ten positive controls (SaPJI) yielded a positive assay result > 0.3 (mean= 3.6; range: 0.91-4.0 OD). Of the alpha-defensin positive, culture-negative samples (CNPJI), 47 were negative with an assay result of < 0.17 OD, while 3 were positive with an assay result > 0.5 OD. The S. aureus ELISA test was not positive in any of 18 additional control samples that yielded other bacteria upon culture.

Conclusions: To our knowledge this is the first report of an immunoassay with high performance in detecting S. aureus antigen in synovial fluid. This novel synovial fluid S. aureus ELISA test was able to reliably discriminate between culture(+)S. aureus synovial fluid samples and negative controls. Additionally, the assay detected S. aureus antigen in 8.3% (3/36) of samples with possible culture-negative infection. Similar ELISA tests corresponding to other bacteria are currently in development.

