

A Pilot Study to Evaluate Next Generation DNA Sequencing Testing to Rectal Swabs prior to Transrectal Prostate Biopsy for Cancer Screening and Diagnosis

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Introduction and Objective: The introduction of next generation sequencing (NGS) via DNA technology allows us to analyze the complete genomic profile of the gut microbiota with detection of resistance genes to the most frequently used antibiotics in empiric prophylaxis. The aim of our study was to evaluate NGS of rectal swabs prior to transrectal prostate biopsy to prevent infectious complications.

Methods: Between June 2017 and December 2017, 32 patients were entered into the study. All were scheduled for prostate biopsy due to elevated PSA, abnormal DRE or multiparametric MRI. Two types of molecular microbial diagnostic testing “levels” were performed. The Level 1 Panel, received within 24 hours, is a quantitative real-time polymerase chain reaction (PCR) test for bacteria and fungi, and assessment of genetic factors conferring resistance to antibiotics. The Level 2 test, received within 3-5 working days, detects virtually all microbial organisms and fungal pathogens that may be present in patient specimens based on the database of 25,000 species. The rectal swabs were processed by MicroGen DX, which is the only CAP and CLIA certified lab in the U.S.A. providing diagnostics via NGS. The determination of the bacterial species, including resistance genes targets, provides for a susceptibility determination that clinicians can use to tailor the prophylactic regimen. Standard protocol for empiric prevention of infection included 2-day levofloxacin 0.5 g before biopsy and 1 g ceftriaxone with adjustment for targeted prophylaxis in each case.

Results: In all 32 patients, multiple microbial species were revealed with median 9 organisms (range: 2-16). The predominant flora was found to be E.Coli –in 11 men, Bacteroides – in 9, Prevotella – in 4, Citrobacter - in 2; Corynebacterium- in 2, Klebsiella, Campylobacter, Fenollaria and Faecallobacterium in 1 patient, respectively. In 20 of 32 cases, multidrug resistance genes were detected, and 18 of those 20- to fluoroquinolones. It allowed us to change our empiric prophylaxis in 18/32 (56.3%) those patients to other antibiotic(s) instead of levofloxacin. In 10 cases, the different fungal species were detected and in 6 of them –multifungal association that was an indication to add antifungal antibiotic. The targeted prophylaxis based on these results allowed avoidance of infectious complications in 30 of 32 patients within 30 days after biopsy. One patient, 3 weeks after biopsy, developed a subfebrile episode of UTI as an acute cystitis, and other- acute epididymitis, 2.5 weeks after biopsy.

Conclusions: The NGS test allowed us to implement a truly individualized and targeted prophylaxis of UTI therapy in patients undergoing transrectal biopsy. A phase II study is needed to compare the efficacy of NGS vs. standard culture and sensitivity testing of rectal swabs.