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Individual, DNA-guided, antibacterial prophylaxis prior to transrectal prostate biopsy based on results of next generation sequencing (NGS) of rectal swabs can be considered as a promising targeted approach to prevent severe urinary tract infection

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Introduction & Objectives: The introduction of NGS allows a comprehensive analysis of the genomic profile of rectal microbiota and, most importantly, the identification of resistance genes to the standard antibacterial empiric prophylaxis. The aim of our pilot study was to evaluate NGS of rectal swabs in patients before transrectal biopsy of the prostate, seeking to prevent urinary tract infection (UTI).

Materials & Methods: Between June 2017 and September 2018, 68 patients were prospectively entered into this study before scheduled prostate biopsy. The rectal swabs were processed by MicroGen^{DX}, performing diagnostics via NGS. The profiling of the population of bacterial species, including antibiotic resistance genes, provides for a susceptibility determination that clinicians can adjust using local antibiograms and/or clinical references. The standard protocol for prevention of infection included levofloxacin 0.5g orally and 1g ceftriaxone intramuscularly, with adjustment for targeted prophylaxis in each case.

Results: In all 68 patients, multiple bacterial species were reported, with a median of 10 (range: 2-16). The predominant flora most frequently found was Bacteroides spp. (dorei, fragilis, caccae, massiliensis, uniformis, and vulgatus) in 26 men; Escherichia coli in 18; and Prevotella (copri, timonensis, and corporis) in 11. In 47/68 (69%) men, multiple drug resistance genes were detected. In 32/68 (47%) men, resistance to fluoroquinolones was reported; in 5/68 (7%) men, resistance to β-lactams (without concomitant resistance to fluoroquinolones) was noted; and in 21/68 (31%) patients there was resistance to both groups. These data allowed us to modify our empiric prophylaxis in those 37 patients targeting the most dominant aggressive pathogen(s). In 27 men, fungal species were detected - 15 of these patients harbored multiple fungal species. The presence of a fungal species was used as an indication to supplement prophylaxis with an anti-fungal agent. This NGS-guided prophylaxis strategy was associated with avoidance of serious infectious complications, including urosepsis, in all patients within 30 days after biopsy. Two patients developed epididymitis, and there was only one case of cystitis.

Conclusions: NGS allowed the implementation of truly individualized and targeted prophylaxis for patients undergoing transrectal biopsy. Further studies will be required to compare the efficacy of NGS to standard methods of culture and sensitivity of rectal swabs.