Characteristics of Dogs with Biofilm-Forming *Escherichia coli* Urinary Tract Infections

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In the Literature

Kern ZT, Jacob ME, Gilbertie JM, Vaden SL, Lyle SK. Characteristics of dogs with biofilm-forming *Escherichia coli* urinary tract infections. *J Vet Intern Med*. 2018;32(5):1645-1651.

FROM THE PAGE ...

Some strains of *Escherichia coli* have the ability to form biofilms, either in vivo or in vitro. Biofilm formation can lead to antibiotic resistance or tolerance and can be associated with complicated and/or recurrent UTIs in humans. The role of biofilms in UTIs in dogs, however, is not well-defined.

In this study of UTIs caused by *E coli* in dogs, 52.6% of the 78 *E coli* isolates tested had biofilm-forming capability. There were no differences in breed, age, sex, or body condition among dogs with biofilm-forming and non-biofilm–forming *E coli*, and presence of lower urinary tract signs was similar between groups (biofilm-forming, 34%; non-biofilm–forming, 32%). Although previous studies have typically shown associations between biofilm-forming bacteria and multidrug resistance, this study found biofilm-forming *E coli* to be less likely to exhibit multidrug resistance than were non-biofilm–forming *E coli*. It is important to note that susceptibility testing is performed on bacteria in a planktonic (vs biofilm) state, so antibiotic tolerance resulting from biofilm formation would not be included in a susceptibility report.

Results from this study did not address whether testing for biofilm-forming capability in *E coli* UTI cases is warranted or whether the presence of biofilm-forming *E coli* affects the patient's ability to clear infection. It is unknown whether *E coli* that form biofilms in laboratory settings also do so in patients. In addition, even if *E coli* do form biofilms in a patient, it is unknown whether this will impact antibiotic susceptibility in the patient. If there is difficulty in clearing a UTI, culture and susceptibility testing should be performed, as the bacteria may still be susceptible to less-restricted antibiotics (eg, amoxicillin–clavulanic acid, first-generation cephalosporin). This is also true of biofilms that may form on a urolith in the bladder. In cases in which the patient has an implant or urolith, both of which are not perfused with blood, bacteria may be protected in a biofilm from the action of antibiotics in the urine; thus, implant and/or urolith removal may be the best option.

... TO YOUR PATIENTS

Key pearls to put into practice:

1. Approximately half of *E coli* found in the urinary tract have the capability to form a biofilm.
2. The ability to form a biofilm does not necessarily mean the bacteria will be resistant to commonly used antibiotics.
3. Patients that may have an *E coli* biofilm on a urolith or urinary implant may require removal of the stone or replacement of the implant to eliminate the infection.