Use of Urine Cultures in a Novel Filter Paper Dilution System

In a recent issue of the *Journal of Clinical Microbiology*, Kunin and Buesching (1) describe a novel technique to diagnose common urinary pathogens in office-collected samples. Using a three-layer circular sandwich with filter paper as the solid-phase dilution device, it was possible to pick up members of the family *Enterobacteriaceae* and staphylococci from urine specimens. The technology was standardized by monitoring the penetration of microbes through the filter paper onto MacConkey or Trypticase soy medium seeded onto a template. As a control to the sandwich technology, serial 10-fold dilutions of various organisms were cultured on the surfaces of agar plates. The sensitivity and specificity with 487 urine samples for gram-negative bacteria or with 405 samples for gram-positive bacteria were excellent. There is no information on any residual antimicrobial (AM) activity in 892 specimens. However, it would be pertinent to standardize the technology for urine samples with residual AM activity.

Bacteriuria and AM activity are often encountered during clinical practice. Recent investigations of AM activity in Taiwan pointed to such an activity in 55.5% of 112 patients on their arrival at an emergency department (2). Furthermore, AM activity was also evident in 25.1% of 203 internal medicine outpatients, 7.6% of 471 high school students, and 7.4% of 202 people at a center for senior citizens. There was no correlation between the bacterial counts and sterility of a specimen and its AM activity.

Residual AM activity in urine was likely to interfere in the three-layer sandwich technique during filtration of microbes onto culture medium. Antibacterial substances block the filter paper pores, lowering the number of microbes that filter through. The differently sized AMs may clog the pores in an unspecified manner. Any differential concentration of an antibacterial agent on the culture medium after filtration through the clogged filter paper would adversely affect sensitivity and specificity. Such an effect should be determined by soaking antibacterial agents and microbes onto filter paper.

Well-designed experiments to address blockage of filter paper pores or any differential inhibition of bacterial growth are desirable. Such experiments would guarantee that concurrent bacteriuria and AM activity in urine would not interfere with a correct diagnosis, even in areas where AM drugs are freely available and histories of patients tend to be unreliable (2).

REFERENCES

Author’s Reply
Dr. Arya’s comments on our report and our studies of antibiotic use in Taiwan are appreciated. He is quite right to be concerned about whether the use of antimicrobial drugs might interfere with urine cultures, but this is a potential problem with all urine culture methods. The excellent correlation of results from the filter paper with results from the standard streak plate method strongly indicates that if there were interference by antimicrobial drugs, it would be essentially the same with both methods.

There is no reason to believe that “antimicrobial substances block the filter paper pores.” Antibiotics can readily penetrate micron-sized pores large enough to allow passage of bacteria.

Calvin M. Kunin
Department of Internal Medicine
The Ohio State University
Columbus, Ohio 43210