Rapid Test Flags *S. aureus*, Methicillin Susceptibility

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WASHINGTON — A single-use bacteriophage amplification test kit was able to accurately identify *Staphylococcus aureus* and determine whether it was methicillin sensitive or resistant within 5 hours in a study of clinical bacteremia isolates.

The findings suggest that it is possible not only to slash the diagnostic time for bacteremia—from 2-3 days to 5 hours—but also to obtain rapid results that will guide treatment and prevent overuse of broad-spectrum antibiotics, Dr. J. Drew Smith said in an interview during a poster presentation at the jointly held annual Interscience Conference on Antimicrobial Agents and Chemotherapy and the annual meeting of the Infectious Diseases Society of America.

The test, made by MicroPhage Inc., uses bacteriophage amplification technology, which detects proteins produced by viruses that are selected to amplify in response to *S. aureus*. Blood culture samples are mixed in two separate tubes and placed in an incubator for 5 hours. The tubes are removed and six drops of each sample are applied to dipstick-type detectors similar to those used in home pregnancy tests. One tube determines if the sample contains *S. aureus*; the other determines if the bacteria are antibiotic resistant or susceptible, explained Dr. Smith, director of research and development at MicroPhage.

Diagnostic time for bacteremia could be slashed from 2-3 days to 5 hours, and the rapid results would help guide treatment and prevent overuse of antibiotics.

In a panel of 120 *S. aureus* clinical isolates and 120 closely related nonpathogenic coagulase-negative staphylococci, the identity test for *S. aureus* had a sensitivity of 93% and a specificity of 96%. Among the strains identified as *S. aureus*, methicillin susceptibility was determined with 99% sensitivity and 99% specificity. Only 1.8% of samples were falsely identified as methicillin-resistant *S. aureus* (MRSA) and no samples were falsely identified as methicillin sensitive (MSSA), Dr. Smith and his associates reported.

Current polymerase chain reaction (PCR) technology allows for rapid detection of MRSA but doesn't accurately determine susceptibility. With the bacteriophage test, a result indicating MSSA allows for the patient to be safely switched from empiric vancomycin to nafcillin or another conventional β-lactam antibiotic, which are more effective against *S. aureus* than is vancomycin and can reduce mortality by 30%-50% if the organism is susceptible. The PCR test gives too many false positives for MSSA to be used for this purpose, Dr. Smith said in the interview.

Bacteriophage amplification technology also could be used to prospectively screen patients for MRSA carriage.

In a separate study presented in another poster, nasal swabs were collected from preoperative and ICU patients and were streaked on agar plates for MRSA detection. The swabs were then transferred to MicroPhage tubes, incubated for 7-24 hours, and read in the same way as was done for the bacteremia test. This time, 32 samples were read at 7 and 24 hours and 77 were read at 12-18 hours and again at 18-24 hours. (More time is needed for nasal swabs than blood cultures because fewer bacteria are present, Dr. Smith explained.)

Sensitivity for detecting MRSA nasal carriage was just 33% at 7 hours, but improved to 92% at 12-18 hours and 100% by 18-24 hours. There was little loss of specificity, which began at 100% at 7 hours and dropped to 98% at 12-18 and 18-24 hours. Positive predictive value was 100% at 7 hours, dropping to 88% by 18-24 hours whereas negative predictive value rose from 94% at 7 hours to 100% at 18-24 hours.

Lab personnel were trained to use the test in less than half an hour, it required no specialized or dedicated equipment, and it can be "adapted to a variety of testing and reporting schedules," the authors said.

MicroPhage is hoping to market both uses for the technology to community hospitals and to offer the nasal tests to outpatient settings such as nursing homes. Clinical testing will begin in early 2009, and the company hopes to obtain licensure from the Food and Drug Administration by late 2009 or early 2010, Dr. Smith said. ■