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Test accurately and swiftly detects most leading causes of bacterial blood stream infection

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A new automated diagnostic test can quickly and accurately identify most leading causes of Gram-positive bacterial blood stream infections and the presence of three antibiotic resistance genes, according to a new study published this week in *PLOS Medicine*. The findings from the study, conducted by a team of researchers led by Nathan Ledeboer from the Medical College of Wisconsin (MCW), USA, suggest that the new technology could lead to faster diagnosis and treatment of patients suffering from sepsis.

Severe sepsis is a life-threatening condition that is usually triggered by a bacterial infection of the bloodstream. In the most severe cases of sepsis multiple organs can fail and in the US alone sepsis causes up to 250,000 deaths a year. The outcome of sepsis is affected by many factors, but fast, accurate identification of the bacterial infection and determination of its antibiotic susceptibility is essential to ensure that patients receive appropriate antibiotics. In the study published this week the researchers evaluated a new test, called Verigene BC-GP, that has been designed to simultaneously detect the DNA of 12 species of Gram-positive bacteria, which are the most common cause of bacterial bloodstream infections, and three antibiotic resistance genes in cultures grown from patient blood samples.

The researchers evaluated the Verigene BC-GP test using 1252 blood cultures from five US clinical centers and 397 contrived cultures (that

contained rarer bacterial species found in blood stream infections) compared to standard culture techniques. They found that the test was able to correctly identify patients who were positive for a specific infection in 92.6% to 100% of samples and to correctly determine patients that did not have a specific infection in 94.5-100% of samples. However, about 7.5% of cultures contained Gram-positive bacteria that the test was not designed to detect. The researchers also found that the test was able accurately identifying three bacterial resistance genes (the mecA, vanA, and vanB genes), which confer resistance to the antibiotics vancomycin and methicillin. The test takes about 2 hours to run and in an analysis of 107 blood culture broths the researchers found the test was able to return a result about 42 hours faster than the conventional culture methods.

The researchers say, "[t]he high sensitivity and specificity characteristics of this test, coupled with on-demand testing capability and a [2 hour turnaround time] enable reporting of both the identification and antimicrobial resistance genes of bacteria obtained from blood culture significantly faster than using routine culture methods."

The faster diagnosis should improve the care of patients with sepsis by allowing physicians to prescribe appropriate antibiotics much earlier than is currently possible.

More information: Buchan BW, Ginocchio CC, Manii R, Cavagnolo R, Pancholi P, et al. (2013) Multiplex Identification of Gram-Positive Bacteria and Resistance Determinants Directly from Positive Blood Culture Broths: Evaluation of an Automated Microarray-Based Nucleic Acid Test. PLoS Med 10(7): e1001478. doi:10.1371/journal.pmed.1001478