Genomic Load from Sputum Samples and Nasopharyngeal Swabs for Diagnosis of Pneumococcal Pneumonia in HIV-Infected Adults

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Quantitative lytA real-time PCR (rtPCR) results from nasopharyngeal (NP) swabs distinguish community-acquired pneumococcal pneumonia (CAP) from asymptomatic colonization. The use of an optimized cutoff value improved pneumococcal etiology determination compared to that of traditional diagnostic methods. Here, we compare the utility of lytA rtPCR from induced sputum and from NP swabs. Pneumococcus was considered the cause of CAP in HIV-infected South African adults if blood culture, induced-sputum culture or Gram stain, urine antigen test, or whole-blood lytA rtPCR revealed pneumococcus or if lytA rtPCR from NP swabs gave a result of >8,000 copies/ml. lytA rtPCR was also performed on induced sputum. Pneumococcus was detected by lytA rtPCR from sputum in 149 (67.1%) of 222 patients with available induced sputum, whereas the results of either Gram stain or culture of sputum were positive in 105 of 229 patients (45.9%; \( P < 0.001 \)). The mean copy numbers from sputum were higher when the sputum cultures were positive than when the sputum cultures were negative (7.9 versus 5.6 log10 copies/ml; \( P < 0.001 \)).

Against the composite diagnostic standard, a cutoff value of 10,000 copies/ml for good-quality sputum lytA rtPCR had a sensitivity of 78.1% and a specificity of 80.0%. This cutoff value performed similarly to the previously identified cutoff value of 8,000 copies/ml for NP swab lytA rtPCR (area under the curve receiver operating characteristic [AUC-ROC], 80.4% for sputum of any quality versus 79.6% for NP swabs). The AUC-ROC for good-quality sputum was 83.2%. Overall, lytA rtPCR performs similarly well on induced sputum as on NP swabs for most patients but performs slightly better if good-quality sputum can be obtained. Due to the ease of specimen collection, NP swabs may be preferable for the diagnosis of pneumococcal pneumonia.

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