

Translating Best Evidence into Best Care

EDITOR'S NOTE: Journals reviewed for this issue: *Archives of Disease in Childhood*, *Archives of Pediatrics and Adolescent Medicine*, *British Medical Journal*, *Journal of the American Medical Association*, *The Journal of Pediatrics*, *The Lancet*, *New England Journal of Medicine*, *Pediatric Infectious Diseases Journal*, and *Pediatrics*. Gurpreet K. Rana, BSc, MLIS, Taubman Medical Library, University of Michigan, contributed to the review and selection of this month's abstracts.

—John G. Frohna, MD, MPH

Serum procalcitonin levels aid in distinguishing bacterial from aseptic meningitis in children

Dubos F, Korczowski B, Aygun DA, Martinot A, Prat C, Galetto-Lacour A, et al. Serum procalcitonin level and other biological markers to distinguish between bacterial and aseptic meningitis in children: A European multicenter case cohort study. *Arch Pediatr Adolesc Med* 2008;162:1157-63.

Question Among children with meningitis, is an elevated serum procalcitonin (PCT) level a valid biologic marker to distinguish bacterial from aseptic meningitis?

Design Secondary analysis of retrospective multicenter hospital-based cohort studies.

Setting Pediatric emergency and intensive care units in 5 European countries.

Participants A total of 198 children (age 29 days to 18 years) with acute bacterial (n = 96) and aseptic (n = 102) meningitis.

Outcomes Univariate and meta-analysis comparing serum PCT levels to standard serum and cerebrospinal fluid markers of meningitis in patients with either acute bacterial or aseptic meningitis in order to evaluate the sensitivity/specificity and receiver operator curve characteristics of each test to distinguish bacterial and aseptic meningitis.

Main Results A serum PCT level greater than 0.5 ng/mL was 99% sensitive (95% confidence interval [CI], 0.95-0.99) and 83% specific (95% CI, 76-90%) for distinguishing bacterial and aseptic meningitis in children in the emergency department or admitted to the intensive care unit (positive likelihood ratio = 5.8, negative likelihood ratio = 0.01). The PCT level had an area under the receiver operator curve (0.98, $P = .001$) superior to other single serum (C-reactive protein, white blood cell count, neutrophil count) or cerebrospinal fluid (gram stain, white blood cell count, neutrophil count, glucose, protein) markers of meningitis. The diagnostic odds ratio of high PCT and bacterial meningitis was 139 (95% CI,

39-498). No significant heterogeneity was observed among centers contributing to the data set.

Conclusions A serum PCT greater than 0.5 ng/mL predicts bacterial rather than aseptic meningitis in children. Its combination with other parameters in an effective clinical decision rule could be helpful.

Commentary The use of biomarkers to distinguish between children with aseptic meningitis and life-threatening bacterial meningitis has been pursued for many years without significant changes to the routine evaluation of such patients. Indeed, the catastrophic consequences of making the wrong diagnosis in this setting mean that it is unlikely that any single test will be sufficiently sensitive to conclusively distinguish aseptic from bacterial meningitis. The authors, however, make a compelling case for the addition of serum PCT to the routine evaluation of acute meningitis, on the basis of the findings that PCT is certainly similar and may even be slightly superior to other single laboratory tests in current use for the evaluation of meningitis. Two important limitations to this study are (1) its retrospective design and (2) the high prevalence of bacterial meningitis in the data set. The latter limitation affects the ability to generalize the results because the prevalence of bacterial meningitis in most developed countries (~5%)¹ is 10-fold lower than that observed in this study (50%). The final judgment on the utility of PCT will be its ability to “rule out” bacterial meningitis (negative predictive value) and will require a large prospective trial. Toward that end, this work is an important hypothesis-generating study that could ultimately lead to the improved care of children with meningitis.

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REFERENCE

1. Nigrovic LE, Kuppermann N, Macias CG, Cannavino CR, Moro-Sutherland DM, Schremmer RD, et al. Clinical prediction rule for identifying children with cerebrospinal fluid pleocytosis at very low risk of bacterial meningitis. *JAMA* 2007;297:52-60.