Letter

Does serum procalcitonin have a diagnostic value in febrile adult patients presenting to the emergency department?

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Hausfater and colleagues stated that in febrile adult patients presenting to the emergency department (ED) a procalcitonin (PCT) ≥0.2 mcg/l can help physicians to identify bacterial/parasitic infections [1]. We disagree and want to illustrate that by calculating likelihood ratios (LR). A LR is a semi-quantitative measure of the performance of a diagnostic test, expressing the magnitude by which the pre-test probability of a diagnosis in a given patient is modified by the results of a test [2]. A positive result with a high positive likelihood ratio (LR+) can rule in a diagnosis. A negative result with a low negative likelihood ratio (LR-) can rule out a diagnosis. LR+ for the emergency physician 1.98, LR- 0.26. Using prevalence of bacterial/parasitic infections as pre-test probability, a positive diagnosis by the physician modified pre-test probability from 69% to 82% and a negative diagnosis to 37%. PCT ≥0.2 mcg/l, LR+ 1.88 and LR- 0.39. Pre-test probability changed to 81% by PCT ≥0.2 mcg/l and to 47% by PCT <0.2 mcg/l. The performance of the emergency physician is based on anamnesis, physical examination and traditional markers such as neutrophil leukocytes and C-reactive protein (CRP). For example, CRP ≥40 mg/l, LR+ 2.0, LR- 0.39. Pre-test probability changed by CRP ≥40 mg/l to 82% and to 47% by CRP <40. Will the likelihood ratios of the emergency physician change much when PCT is added to the spectrum of available diagnostic tests? We don't think so.

Competing interests

The authors declare that they have no competing interests.

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Authors' response

Pierre Hausfater and Bruno Riou

We thank van Oers and colleagues for their comments. We agree that likelihood ratios (LR) are useful tests in interpretation of clinical findings, laboratory tests, and image studies, although they are little used [1]. However, we do not think that LR is the unique response to a complex issue. First, LR is provided for a given predetermined threshold and we are convinced that the threshold of procalcitonin (PCT) highly depends on the population tested and the type of infection studied. Moreover, we recently observed that this threshold is markedly modified by renal function [2]. It should also be pointed out that the threshold is usually provided without confidence interval whereas this information might be very important [3]. In contrast, the receiver operating curve (ROC) provides a global assessment of diagnostic accuracy without any focus on a given threshold. Second, we do not think that the LR of PCT should be applied to the global population tested and compared to that of the emergency physician. Actually, the best way to use LR should have been to identify the real pretest probability by collecting more accurately the diagnostic suspicion of the emergency physician, and to test the LR of PCT in the different subgroups (low, intermediate, and high pretest probability of bacterial infection). Unfortunately, we did not assess that in our study. It is likely that PCT may be particularly useful in patients with an

CRP = C-reactive protein; ED = emergency department; LR = likelihood ratio; PCT = procalcitonin; ROC = receiver operating curve.

intermediate pretest probability and maybe not in patients with a low or high pretest probability. This hypothesis deserves further studies. Thirdly, it should be pointed out that, in contrast to the etiological diagnosis of the emergency physician found in the medical chart, we observed that administration of antibiotics was not always in accordance with that diagnosis, emphasizing the complex issue of the prescription of antibiotics and the potential added value of biomarkers like PCT. Therefore we think that the next important steps in assessing PCT diagnostic values are the following: Firstly, assess the LR in subgroups of patients, according to the pretest probability determined by the physician; secondly, test an algorithm that includes PCT measurement; thirdly, test the usefulness of PCT on the outcome (antibiotic administration, morbidity, mortality) in a randomized study as recently performed by Christ-Crain *et al*. [4].

References

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