

## Letter

# A persistently elevated C-reactive protein level in pneumonia may indicate empyema

Michael Eisenhut

Luton and Dunstable Hospital, NHS Foundation Trust, Lewsey Road, Luton LU4 0DZ, United Kingdom

Corresponding author: Michael Eisenhut, [michael\\_eisenhut@yahoo.com](mailto:michael_eisenhut@yahoo.com)

Published: 27 February 2008

This article is online at <http://ccforum.com/content/12/1/409>

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*Critical Care* 2008, **12**:409 (doi:10.1186/cc6204)

See related research by Coelho *et al.*, <http://ccforum.com/content/11/4/R92>

Coelho *et al.* [1] investigated the use of C-reactive protein (CRP) levels for monitoring of patients with severe community-acquired pneumonia (CAP). They found that patients without a decrease in CRP levels on treatment had an increased mortality compared to patients with a rapid fall of this marker. The authors did not discuss another important use of the analysis of the time course of CRP levels in CAP that applies to patients on both the intensive care unit (ICU) and the general paediatric ward. Empyema fluid has been identified as an important source of CRP in pneumonia [2]. Patients with empyema may have CRP levels of a similar

magnitude as the non-survivors in Coelho's study on admission [3]. Adults as well as children who develop empyema were shown to have persistently elevated CRP or a secondary rise of this parameter despite adequate antibiotic treatment [3,4]. A persistently elevated or rising CRP level in a patient on the ICU should, therefore, alert the clinician not only to a potentially poor prognosis but also prompt a reassessment of the patient with a chest X-ray and chest ultrasound for the presence of an empyema that may require surgical evacuation.

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## Authors' reply

Luís Coelho and Pedro Póvoa

We thank Dr Eisenhut for his wise commentary regarding our published manuscript. It represents an important contribution to this discussion.

In our study assessing severe CAP [1], patients whose CRP levels remain elevated, those with non-response and biphasic response patterns, had significantly higher mortality rates. These persistently elevated CRP levels suggest an ongoing inflammatory process that could be associated with a failure of initial antibiotic therapy as well as with a septic complication such as an empyema or an abscess, as Dr Eisenhut pointed out. Likewise, in our clinical practice, we also found elevated CRP levels in patients with empyema.

Similarly, in a paediatric patient population with pneumococcal CAP, Hsieh *et al.* [5] clearly demonstrated that continuously elevated CRP levels were also associated with necrosis and empyema. Although not specifically studied, we speculate

that CRP should present the same time course in patients with ventilator-associated pneumonia complicated with empyema.

As referenced by Dr Eisenhut, Chen *et al.* [2] found that, in addition to serum CRP, pleural fluid CRP can also be useful in the differentiation of complicated from uncomplicated pleural effusions.

As a result, in patients with persistently elevated or rising CRP levels an aggressive diagnostic and therapeutic approach should be attempted in order to prevent further clinical deterioration and to diagnose potential infectious complications, not only an empyema, as Dr Eisenhut mentioned, but also other complications, such as acalculous cholecystitis, appendicitis or a catheter-related bloodstream infection.

## Competing interests

The authors declare that they have no competing interests.

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