COVID-19 pneumonia:
Procalcitonin for risk assessment and rule-out of bacterial coinfection

PCT on admission

Test PCT as an aid for early risk assessment of patients at high risk of bacterial coinfection

<0.5 µg/L* → low risk for bacterial coinfection and adverse outcome
≥0.5 µg/L → high risk patients, bacterial coinfection likely

PCT during hospital stay

Monitor PCT to detect secondary infections and progression of the severity of bacterial infection

* Majority of patients with mild disease had PCT values <0.25µg/L or even <0.1µg/L.[1 2 3 4 5 6]
Likelihood of bacterial infection and recommendation to start antibiotics in patients with LRTI at PCT >0.25µg/L.[7]

The biomarker Procalcitonin (PCT) is widely used to assess the risk of bacterial infection and progression to severe bacterial sepsis and septic shock in conjunction with other laboratory findings and clinical assessment. Further, the change of PCT over time is used to determine the mortality risk in patients with bacterial sepsis.
In patients with suspected or confirmed lower respiratory tract infections (LRTI), including community-acquired pneumonia (CAP), acute bronchitis and acute exacerbations of COPD (AECOPD), PCT is an aid in decision making on antibiotic therapy for inpatients or patients presenting in the emergency department (ED).

Procalcitonin has now been shown, in evolving descriptive studies, to be an additional valuable tool in the current COVID-19 pandemic to early identify patients at low risk for bacterial coinfection and adverse outcome.[1-6, 17]

New analysis of 1099 COVID-19 patient data sets from a range of medical centers in China[2] show that PCT was low (<0.5µg/L) in > 96% of cases with low disease severity and absence of adverse outcome (combined endpoint of ICU admission, invasive ventilation, death). Most of COVID-19 patients even had PCT values below 0.25µg/L or even below 0.1µg/L.[2-3] This correlates to findings from previous viral epidemics (influenza H1N1, SARS, MERS) that PCT is usually low (<0.1 to <0.5µg/L) in hospitalized patients with pure viral infection. [8 9 10 11 12 13]

In cases with bacterial coinfection and higher severity of disease PCT has been found >0.5µg/L.[1-6] Thus, according to a recent meta-analysis of published COVID-19 patient data, PCT >0.5µg/L corresponds to an almost 5 times higher risk of severe infection (OR, 4.76; 95% CI, 2.74-8.29) compared to patients with lower PCT[14]. Acute Respiratory Distress Syndrome (ARDS) and septic shock were the most frequent complications of COVID-19; secondary infections during the hospital stay were an additional risk factor.[1-6] Death was in almost all patients associated with sepsis/septic shock and respiratory failure/ARDS.[2 3 6 8]

IFCC Information Guide on COVID-19

The **IFCC** identifies PCT on the **Recommended Test List** for potential clinical and biological significance in recognizing bacterial (super) infection

*"The essential role of clinical laboratories in this pandemic extends beyond etiological diagnosis of COVID-19. Biochemical monitoring of COVID-19 patients through in vitro diagnostic testing is critical for assessing disease severity and progression as well as monitoring therapeutic intervention. Several common in vitro diagnostic tests have been implicated in unfavourable COVID-19 progression, potentially providing important prognostic information. A **recommended test list** based on current literature is included below along with the major laboratory abnormalities associated with adult COVID-19 patients and their potential clinical indication"*[15]

CDC Interim Clinical Guidance
for Management of Patients with Confirmed Coronavirus Disease (COVID-19)

The CDC identifies PCT among a list of inflammatory markers **correlating to the severity of illness**.

"Procalcitonin is typically normal on admission, but may increase among those admitted to the ICU. Patients with critical illness had high plasma levels of inflammatory markers, suggesting potential immune dysregulation."[16]

Take home message:

PCT testing on admission seems to be a valuable additional piece of information to aid in early risk assessment and rule-out of bacterial coinfection in COVID-19 patients.[1-6]
Monitoring of PCT was identified to be useful for detection of secondary infections and progression to more severe disease state like sepsis / septic shock.[2 3 14 15 16]

Find out more at www.thermoscientific.com/procalcitonin

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