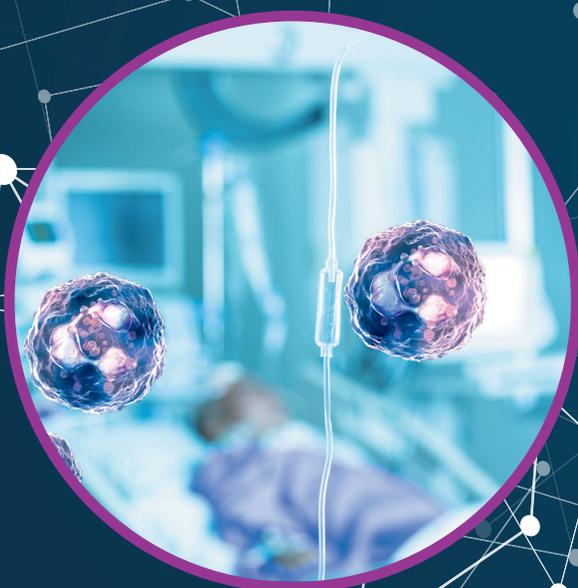


# Calprotectin in the inflammatory response to infections

GCAL<sup>®</sup> - Gentian Calprotectin Immunoassay for plasma and serum



➔ Turbidimetric assay ➔ Inflammation marker in infections ➔ Assessment of disease severity

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## What is calprotectin?

Calprotectin is a heterodimer of two calcium-binding proteins and belongs to the S100 protein family, also known as S100A8/A9 or MRP8/14. It is one of the most abundant proteins in the cytosol of neutrophils, comprising approximately 40%-60% of cytosolic proteins. Upon bacterial infection and inflammation, activated neutrophils release calprotectin, which serves as an alarmin and exerts anti-microbial and pro-inflammatory functions.<sup>1-4</sup>

Calprotectin has emerged as a promising biomarker for neutrophil activation and the inflammatory response to infectious diseases. Its release is associated with various infectious conditions, and it correlates with disease activity.<sup>1-5</sup>



Calprotectin's early increase in inflammation and infections provides fast information on the patient's inflammatory response and disease status

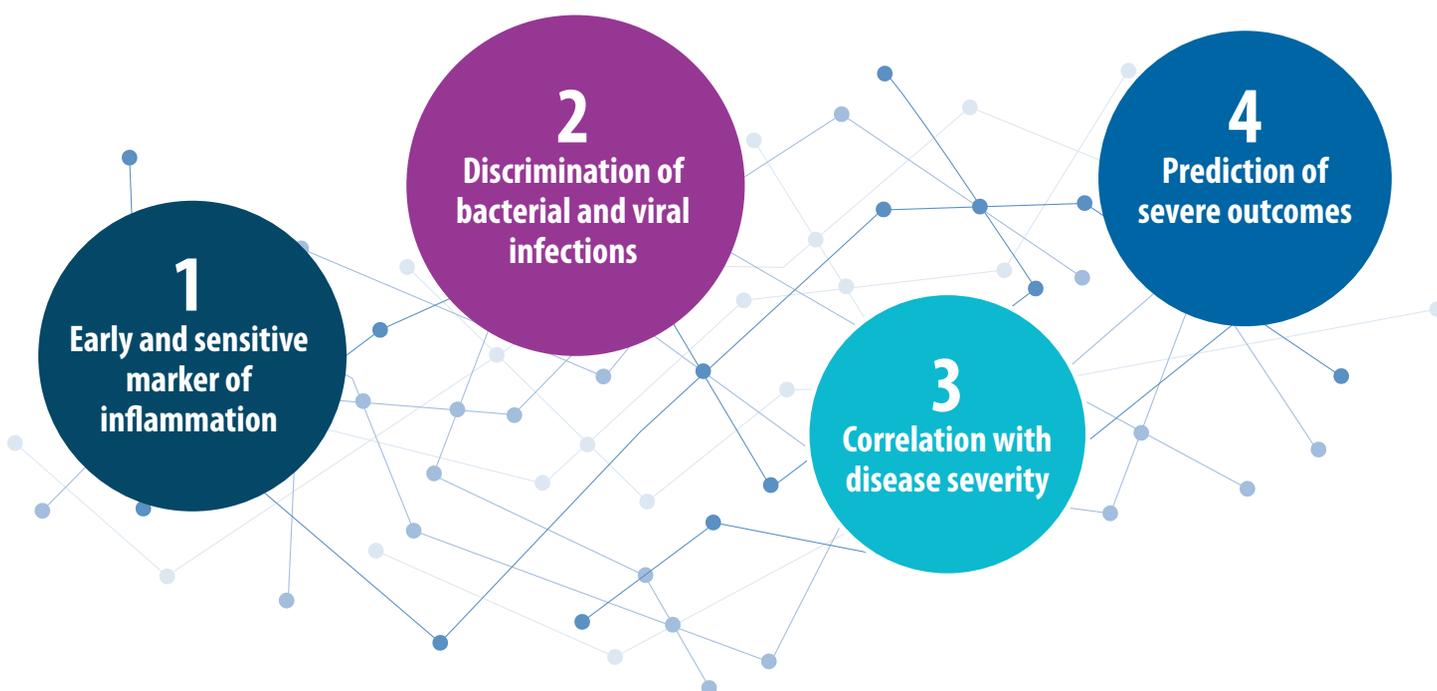
## Differentiation of bacterial infections

Calprotectin has proven to be a valuable marker in bacterial infectious conditions since it is released during the inflammatory response.<sup>5-8</sup> Importantly, calprotectin has demonstrated the ability to differentiate between viral and bacterial infections<sup>8-10</sup>, a crucial factor in determining the appropriate course of treatment and the use of antibiotics. Moreover, calprotectin has exhibited higher predictive values than procalcitonin (PCT) and heparin-binding protein (HBP), particularly in distinguishing mycoplasma infections from viral infections.<sup>8</sup> Additionally, calprotectin serves as a valuable tool in detecting infection and distinguishing it from other causes of inflammation, such as trauma or heart failure.<sup>7,11</sup>

## Detection of infection in early stage

Calprotectin levels have been shown to increase rapidly within a few hours of bacterial infections<sup>12-14</sup>, rendering it an excellent early and sensitive biomarker for detecting and assessing the inflammatory response. Early detection is particularly beneficial for patients who are susceptible to infections, such as those in the ICU or post-operative settings, as well as for the timely diagnosis of localised infections before the onset of systemic inflammatory response. Calprotectin can predict bacterial infections even before the appearance of clinical symptoms<sup>5</sup>, thereby enabling the earlier initiation of antibiotic treatment. Consequently, measuring calprotectin can reduce total costs, shorten the average duration of in-patient care, and lower mortality rates.<sup>15</sup>

## Clinical value of calprotectin



## Calprotectin in risk stratification

Calprotectin's usefulness as a biomarker for assessing the inflammatory response to infections has been linked to the evaluation of sepsis, a life-threatening organ dysfunction resulting from a dysregulated host response to infection. Sepsis is the most common cause of ICU admission and mortality among critically ill patients.<sup>16</sup>

Early detection and intervention are critical in preventing the development of sepsis and severe outcomes. Calprotectin has demonstrated early diagnostic and predictive value<sup>7,10,17-22</sup> and gradually increases with disease severity in septic patients.<sup>5,17</sup> Elevated calprotectin levels can predict severe events, clinical course, and mortality in septic patients<sup>7,17-20</sup> and improve classical risk scoring.<sup>20</sup> Early detection and risk stratification at the emergency department can thereby help to identify patients at risk for deterioration and guide decisions on course of treatment and necessary transfer of patients to ICU.<sup>23</sup>

## Hyperinflammation and calprotectin in severe COVID-19

Calprotectin has been proven as a valuable marker for disease severity in COVID-19. The biomarker is elevated in severe compared to mild cases and has been demonstrated to correlate with and predict various clinical outcomes, such as oxygenation status, mechanical ventilation need, ICU admission, multiorgan failure (MOF), and mortality.<sup>24-31</sup>

Interestingly, calprotectin's reported diagnostic value in SARS-CoV-2 infection is linked to the hyperinflammatory response observed in severe COVID-19 cases that leads to viral sepsis.<sup>32-35</sup> Additionally, neutrophils are upregulated and activated in COVID-19 patients, serving as potential drivers of disease severity.<sup>36-38</sup> Hospitalised COVID-19 patients with a severe form of the disease exhibit dysregulated immune response and cytokine induction (also known as cytokine storm or hyperinflammation), a response similar to bacterial sepsis.<sup>35,38-41</sup> This connection links the diagnostic value of calprotectin to its correlation with neutrophilic activation and the increase in the inflammatory response.

## Why the Gentian Calprotectin GCAL® Immunoassay?

GCAL® is a novel Particle-Enhanced Turbidimetric Immunoassay (PETIA) that can be applied on a wide range of automated clinical chemistry analysers. The assay is rapidly performed in only 10 minutes. The GCAL® immunoassay is developed and manufactured by Gentian. GCAL® is CE-marked and IVDR certified.



**Turbidimetric  
test**  
**Faster  
throughput**



**Can be applied  
on most  
automated  
platforms**



**Process time  
normally less  
than 10 minutes**



**Avian  
antibodies**

## Contact information

**Gentian Diagnostics HQ**  
PO Box 733,  
1509 Moss  
Norway

**Gentian Diagnostics AB**  
Kungsgatan 8  
11143 Stockholm  
Sweden

**Gentian USA Inc**  
215 N Eola Dr  
Orlando  
Florida USA

**Beijing Rep. Office**  
Zhongren Building Rm. 4076  
Chaoyangmen Outer St Jia No.10  
Chaoyang District, Beijing, China

## Immunoassay performance

Gentian Calprotectin Immunoassay Performance	
Sample type	Li-Heparin plasma, Serum
Assay type	PETIA
Format	Liquid reagents, ready to use
Precision (sample > 1 mg/L)*	Total CV < 4.0%
LoQ*	0.3 mg/L
Security zone*	Up to 95 mg/L
Measuring range*	0.4 - 20 mg/L
Calibration stability*	4 weeks

\*Instrument dependent results achieved on Architect c4000 during validation.

## Calibrator standardisation

The calibrator for the Gentian Calprotectin Immunoassay is available as a 6-point pre-diluted calibrator kit. The calibrator is established according to section 5.6 in ISO 17511:2003. The calibrator is traceable via a published value transfer protocol<sup>138</sup> to a highly pure recombinant calprotectin solution with assigned value by total protein determination by UV280 and known extinction coefficient.

## Product range

Product no.	Product	Content
1201	Gentian Calprotectin Reagent Kit	R1 54 mL + R2 9 mL
1202	Gentian Calprotectin Reagent Kit S	R1 30 mL + R2 5 mL
1219	Gentian Calprotectin Control Kit	2 x 1 mL
1251	Gentian Calprotectin Calibrator Kit	6 x 1 mL



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