

Neutrophil CD64 Expression, A Marker of Sepsis/Infection

Neutrophil CD64 (high-affinity Fc receptor) expression is a sensitive and specific laboratory indicator of sepsis. Neutrophil CD64 expression is negligible in the healthy state. It is, however, one of many activation-related changes manifested by neutrophils during the normal pathophysiologic stage of an acute inflammatory response.

The expression of CD64 is up regulated under the influence of inflammatory-related cytokines such as interleukin 12, interferon gamma, and granulocyte colony-stimulating factor. The CD64 expression on neutrophils becomes up regulated in a graded fashion depending on the intensity of cytokine stimulation. Furthermore, the up-regulation of neutrophil CD64 expression is of pathophysiologic significance because it is involved in receptor mediated endocytosis of IgG-antigen complexes, antigen capture for presentation to T cells, antibody-dependent cellular toxicity and the release of cytokines and reactive oxygen intermediates. These processes are brought into play as a response to bacteria and elicit antibacterial effect. Thus, CD64 is ideal as a surrogate marker of neutrophil activation and neutrophilic response to bacterial inflammation.

Recent studies have shown that the diagnostic performance in bacterial infection or sepsis of Neutrophil CD64 (sensitivity 90.5%, specificity 96.3%, positive predictive value 95.0%, negative predictive value 92.9%) is above that of C-reactive protein (sensitivity of 88.2% and specificity of 59.4), absolute neutrophil count (ANC) and sedimentation rate. Published articles have verified the findings in all age groups including neonates and have evaluated its performance in emergency room and intensive care patients.

Key Points

- Neutrophil CD64 is a sensitive, specific indicator of sepsis.
- Diagnostic performance (sensitivity and specificity) is greater than that for the measurement of C-reactive protein, absolute neutrophil count and sedimentation rate.
- The semi-quantitative Neutrophil CD64 test used at Danbury Hospital for the evaluation of acute leukemia and myeloid disorders, will also be available for the evaluation of patients suspected of sepsis.
- Questions may be directed to Flow Cytometry at 203-739-7578 or to Dr. Edwards at 203-739-7527.

Neutrophil CD64 has been used routinely at Danbury Hospital for many years for the evaluation of acute leukemia and other myeloid disorders. The assay is semi-quantitative, based on the commercially available Coulter CD64 antibody.

In our hands neutrophil CD64 has a high sensitivity and specificity with a promising 100% positive predictive and negative predictive value noted in a subset of 40 adult patients evaluated with blood and urine cultures in the Microbiology section of the laboratory.

Furthermore, after following 10 of those adults after initiation of antibiotic therapy and in patients who have responded to therapy, a dramatic decrease in neutrophil CD64 expression occurred which suggests the test could be a surrogate marker for the effectiveness of therapy.

Upon request, the neutrophil CD64 test may be performed on a CBC specimen (lavender stoppered tube) and will be available Monday thru Friday in the Flow Cytometry area of the laboratory. Results will be reviewed by a pathologist who will issue the interpretative report. Questions regarding the test and its interpretation may be directed to Flow Cytometry at 203-739-7578. Additional questions may be forwarded to Dr. Leonel Edwards at 203-739-7527.