Decrease in the Density of IgG-Fc Receptor III (CD16) on 'Toxic' Neutrophils

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Changes in human peripheral blood neutrophils frequently occur during serious bacterial infections and certain other inflammatory states [1]. Best known is the 'shift to the left' defined by the presence of band forms of neutrophils, metamyelocytes, and sometimes myelocytes [2]. 'Toxic' neutrophils, which have azurophilic cytoplasmic granules in blood smears stained by the Wright or May-Grünwald-Giemsa stain [3], are another sign of bacterial infection in the blood. The migration, chemotaxis, phagocytosis, and bactericidal activity (measured by counting of the number of colonies formed by surviving bacteria) of toxic neutrophils are less than those of normal neutrophils [4], but myelo-peroxidase activity, a major bactericidal factor in phagocytes, is higher in toxic neutrophils [5, 6]. Therefore, the decrease in bactericidal activity observed in such neutrophils may arise from the decrease in phagocytosis.

Much has been reported about the relationship between cell function and cell surface antigens, and measurement of the density of cell surface antigens is useful for the diagnosis of some pathological conditions [7, 8]. The cell surface antigen(s) related to phagocytosis is unknown, but it seems that the CD16 antigen, which is an IgG-Fc receptor [9], is important for immunophagocytosis by neutrophils [10].

In this study, we examined the relationship between the density of CD16 antigen on neutrophils and the number of toxic neutrophils in patients with bacterial infections. In a sample, the mean fluorescence intensity of CD16⁺ neutrophils stained with an anti-CD16 monoclonal antibody conjugated with fluorescein isothiocyanate reflects the density of CD16 antigen on neutrophils. This intensity was ex-

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'Toxic' neutrophils, %

Fig. 1. Correlation between the percentage of 'toxic' neutrophils and the density of CD16 antigen on neutrophils.

analyzed in peripheral blood samples from 30 patients with bacterial infections and neutrophilia (neutrophil count, $> 8 \times 10^9/l$) with a flow cytometer (FACScan). The number of toxic neutrophils [3] among 500 neutrophils in a blood smear stained with the May-Grünwald-Giemsa stain was counted by two technicians working independently, and the mean of the two percentages of neutrophils that were toxic was calculated.

A negative correlation was found between the density of CD16 antigen on neutrophils and the percentage of toxic neutrophils in the neutrophil fractions ($n = 30$, $r = -0.67$, $p < 0.05$; fig. 1). This finding suggests that immuno-phagocytic activity was decreased in the toxic neutrophils. A decrease in the density of CD16 antigen on neutrophils may be an index of severe bacterial infections and other inflammatory diseases, as is the detection of toxic neutrophils.

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