Chemotaxis of Monocytes in Hanseniasis

To the Editor:

Mycobacterium leprae is an intramacrophagic parasite. The performance of the macrophage during infection with this organism constitutes the basis for the polarity doctrine ([3]); if the macrophage has the ability to lyse *M. leprae*, the tuberculoid form of hanseniasis (TH) will occur; if not, the virchowian form (VH) will develop. It is possible that this characteristic of the macrophage is hereditary. Additionally, lymphocytes play an important role in the lysis of *M. leprae*. If T cells are specifically sensitized by *M. leprae*, delayed or cellular hypersensitivity will occur with the production of specific lymphocyte mediators. These mediators, in turn, can activate specific lysis by the macrophage. If it is a B cell that is sensitized, humoral immunity will be produced without any effect on macrophagic lysis of *M. leprae*.

Recently numerous reports have centered their attention on the phenomenon of chemotaxis in infections, i.e., the directed migration of leukocytes following stimulation by substances known as chemotactic factors. In general, these factors are nonspecific, but there are a few that are selective such as the C 567 activator for neutrophils, the eosinophil chemotactic factor of anaphylaxis (ECF-A) and certain peptides derived from lysosomal granules of neutrophils with specificity for the chemotaxis of monocytes. The action of these factors explains the presence of cells, specific or nonspecific, in inflammatory processes. On the other hand, a chemotactic inactivating factor (CIF) has been detected in trace amounts in normal serum. It is probably an enzyme, possibly an aminopeptidase. The significant elevation of CIF in certain diseases has made different interpretations of the role of inflammation possible. In delayed or cellular hypersensitivity, the specific antigen causes the T cell to liberate lymphocyte mediators, among which are chemotactic factors. There seems to be a correlation between delayed hypersensitivity and the amount of CIF. Van Epps, *et al.* ([2]) and Ward and Beremberg ([5]) found an elevation of CIF in cases with depressed delayed hypersensitivity. Ward and Beremberg ([5]) found high levels of CIF in nine patients with Hodgkin's disease, thus demonstrating a decrease in the ability to mobilize inflammatory cells in this entity.

In hanseniasis, Bullock, *et al.* ([1]) and Ward, *et al.* ([6]) found marked depressions

THE TABLE. *Chemotaxis of human monocytes from normal individuals and from patients with virchowian hanseniasis (VH) in the presence of normal sera (N) and sera from virchowian (V), tuberculoid (T), borderline (B), and indeterminate (I) hanseniasis patients. Numbers are mean numbers of monocytes per 10 oil immersion fields (1000×) ± standard deviation, N = 4.*

Sera & chemotactic factor (CF)	Monocytes	
	Normal	VH
HBSS[a] alone	26 ± 4	35 ± 9
HBSS + CF	329 ± 58	154 ± 63
N + CF	312 ± 55	205 ± 37[b]
V + CF	185 ± 35[c]	174 ± 38
T + CF	309 ± 52	181 ± 31
B + CF	317 ± 90	188 ± 37
I + CF	308 ± 59	169 ± 41

[a] HBSS = Hanks' balanced salt solution; no serum present.

[b] $p < 0.05$, Student's t test; compared to normal monocytes in normal sera.

[c] $p < 0.05$, Student's t test, compared to normal monocytes in normal sera (41% inhibitory).

in the number of neutrophils and increases in CIF in relation to these leukocytes. We have studied monocyte chemotaxis in hanseniasis because of the importance of the macrophage in this disease.

The method employed was according to Snyderman, *et al.* ([4]) and casein was the chemotactic substance used. Monocytes from four VH patients and from four normal individuals were tested according to the data presented in The Table. We also investigated the sera of patients with various forms of the disease to see if they presented any differences in relation to CIF levels (The Table).

Compared with normal monocytes, monocytes from VH patients incubated in normal serum are chemotactically deficient; in other words, they are "lazy monocytes." Serum from VH patients inhibits the chemotaxis of normal monocytes; in other words, the serum of VH patients contained elevated CIF.

Hanseniasis is a specific infection in which the macrophage plays an important role. Chemotactic phenomena have relevant roles in infection. In virchowian hanseniasis, there is a depressed cellular immune response which is both specific to *M. leprae* and non-specific. Deficient chemotaxis of monocytes in VH and elevated serum levels of CIF in this clinical form are elements that help one to understand the intense specific and non-specific immunologic damage found in VH. Whether these immunopathologic changes are primary or secondary to infection with *M. leprae* remains unknown.

—Rubem David Azulay, M.D.

Professor of Dermatology
University Hospital
Federal University of Rio de Janeiro
Brazil

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