EDITORIAL

The Immunologically Competent Cell ("Immunocyte") System—An Attempt at a Delineation of Cellular Relationships

By Lawrence Berman

A PREVIEW of Dr. Dameshek's terminology for the cells involved in immunologic processes (this issue, pp. 243-245) led me to suggest "equal time" to present a point of view of an individual morphologist. If we must focus our attention on the lymphoid tissue and ignore the possibility of a role for the eosinophil leukocyte (Spiers, 1958), the proposed nomenclature applies very well to certain functions of the cells but not to their morphogenic relationships. Ideas expressed in this editorial are part of the fall-out of the impact of the revival of interest in the cellular aspects of immunity upon some relatively ancient notions about lymphoid tissue. It may be useful to place established morphologic concepts alongside the newer functional concepts to see where that leads us.

The Immunologically Competent Cell System

Functional Classification According to Dameshek

1. Immunoblast—a precursor of cells involved in production of antibody or graft rejection phenomena.

2. Immunocytes—end organs involved in immunologic reactions.
   a. Cells involved in graft rejection phenomena.
   b. Cells involved in production of humoral antibodies.

Morphological Equivalents According to Berman (and Dameshek)

1. A large basophilic lymphoblastoid cell with primitive undifferentiated morphology (haemocytoblast [of Prague convention], hematopoietic reticular cell, transitional cell, etc.).

2. Morphologically differentiated cells.
   a. Lymphocytes (probably small lymphocytes).
   b. Plasma cells.

Dameshek regards (1) to be derived from the histiocyte of RE origin, or a cell having the morphologic appearance of a small lymphocyte. Berman regards (1) to be a temporary condition of a cell that is morphologically indistinguishable from the hematopoietic reticulum cell or reticular lymphocyte of lymphoid tissue. The relationship between (2a) and (2b) is not well defined functionally or morphologically.

The maturation or differentiation process involving cells of the so-called immunocompetent group may be depicted as follows:

Functional Concept

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  Immunoblast
               |
               v
Immunocyte involved in graft rejection phenomena  (?)  Immunocyte involved in production of humoral antibody
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Morphologic Concept

Macrophages ⇆ Reticulum cells
(2) (3)
↓
Basophilic lymphoblastoid cells*
(4) (5)
↓
Embryonic thymus — (1) — Lymphocytes — (7) — Plasma cells
(8) (8)
↓
Death or utilization for
graft rejection, etc.
(8)
Death or utilization for
humoral antibody, etc.
(8)

*Synonyms and other terms used for cells with varying degrees of differentiation toward lymphocytes or plasma cells, included in this general category are: free reticular cell, transitional cell, haemocytoblast, lymphoblast, lymphoblastoid, cytologically identical, plasmablast, lymphocytoid, large basophilic lymphoblastoid cell, large pyroninophilic cell.

Explanation of Numerals Used in Diagram Showing Morphologic Concept

(1) The "seeding" of lymphoid tissue from the embryonic thymus.
(2) Phagocytosis of lymphocytes or lymphocytic debris by reticulum cells in the Trowell cycle; transformation of lymphocytes into macrophages in vitro and in vivo.
(3), (4) Cytodifferentiation in vitro and in vivo.
(5) "Dedifferentiation" of lymphocytes to large basophilic lymphoblastoid cells, as observed in leukocyte cultures treated with phytohemagglutinin.
(6) Cytodifferentiation in vitro and in vivo in normal or naturally occurring infectious conditions and in experimental exposure to antigens.
(7) Cytodifferentiation of antigenically stimulated lymphocytes to plasma cells.
(8) The fates of these cell types are not mutually exclusive.

The chief difficulty in understanding the morphologic concept is overcoming the resistance to the idea that cells of so-called morphologically differentiated form, such as the small lymphocyte, can transform or modulate into cells of so-called morphologically undifferentiated form, such as macrophages, reticulum cells, or the basophilic lymphoblastoid cells of cultures or lymphoid tissues affected by antigenic stimuli. Another difficulty is the apparent assumption of the fixed or irreversible presence of the lamellar ergastoplasm in cells designated as plasma cells or their precursors. Harris has made an observation that seems very pertinent, namely, that the speed with which the whole endoplasmic reticulum can be reformed in cells may mean that the presence of abundant ergastoplasm may have less significance for the classification of cells than formerly thought. As with the "blast" nucleus as a sign of "undifferentiation" in stained films studied by light microscopy, the presence or absence of lamellar ergastoplasm may represent temporary morphologic phenomena, especially in elements considered to be precursors of either lymphocytes or plasma cells.

Although tinctorial or structural phenomena, whether observed by light or
electron microscopy, are valuable clues to function, they are by themselves without meaning. In each of the proposed steps indicated by numerals in the diagram illustrating morphologic concepts, it is the factor initiating the change that is the important point of interest remaining to be identified in well-conducted definitive experiments. In the meantime, it seems unnecessary to put ourselves in a terminological strait jacket by excluding any possibly useful bits of information or ignoring any well-established criteria, morphologic or other.

REFERENCES


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