The Origin of Monocytes in the Spleen

P. BUENO

Department of Pathology, Biological Institute, São Paulo, Brazil

In recent studies on the reactions of the RES to various antigens and during infectious processes, observations were made by the writer which seem to indicate the site of origin of monocytes in the spleen. These observations were made in guinea pigs which had been inoculated with bacterial toxins or which were carriers of experimental brucellosis.

The histological study of the spleen in these cases showed peculiar reactions which were characterized by regressive or proliferative changes in the lymph follicles and by the presence of numerous mononuclear cells in the sinuses of the pulp.

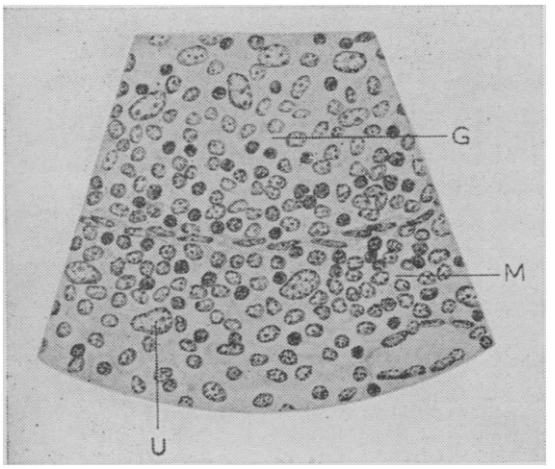

FIG. 1. Sector of a Malpighian corpuscle: G, germinal center; M, marginal zone; U, undifferentiated cell. Hematoxylin-eosin stain. (About 700 ×.)

These mononuclears may be regarded as being perfectly identical with monocytes or macrophages. Generally they have a large, rounded or kidney-shaped nucleus with scarce chromatin, and slightly acidophile and well-developed cytoplasm. In the case of *Brucella* infection they appear in great numbers showing marked phagocytic activity, their cytoplasm containing red blood cells as well as cell particles and granules of hemosiderin.

What seemed particularly interesting, however, was the fact that, according to our findings, these elements apparently derive from the marginal zone of the follicles. Here numerous mesenchymal, undifferentiated cells are found proliferating, especially during the infectious process, and apparently producing the monocytes, which emigrate and fall into the lumen of the perifollicular sinuses.

Therefore, a picture similar to that observed in the lymph-nodes is found in the spleen. In fact, at the periphery of the lymph-node follicles, undifferentiated or germinal cells can be seen which are equally considered as a source of monocytes (*1*).

There are, then, evidences that two types of cells, with different morphological characteristics, derive from the lymph follicles or Malpighian corpuscles of the spleen, viz., cells that are typical lymphocytes, which come from the germinal centers, and the elements we have described as monocytes, which apparently originate from the marginal zone of the follicles.

Reference

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Ultraspectrophotometric Studies in Extracts of Normal and Tumor Tissue of Human Origin

MACHTELD E. SANO and MONA SPIEGEL-ADOLF

Temple University Medical School and Hospital, Philadelphia

Histologic properties frequently have a chemical correlate traceable also after cell destruction. It seems highly probable that the cell characteristics of malignant tumors should become manifest in their extracts as an increase of the nucleic acids or their cleavage products. Claude and Rothen (*1*), Thomas (*3*), and Stowell (*2*) suggest that nucleic acids or their protein compounds may be part of the active principle of tumor formation. Our studies are based on ultraspectrophotometric analysis of tissue extracts.

Tissues were obtained at operation in 26 cases, postmortem in 4. Fourteen specimens were from malignant tumors, one each of Hodgkins' disease and leukemia, and three from benign tumors. Seven were inflammatory lymph-nodes, one an inflammatory tumor. The tissue was finely cut, suspended in saline solution (pH 7.2–7.4), and heated ½ hour at 65°C. to inhibit enzyme action. It was centrifuged for ½ hour at 9,000 r.p.m. in an angle centrifuge. For ultraspectrophotometric studies, a DU Beckman electric quartz spectrophotometer was used. Comparison of the optical density of the solutions was made in the same quartz cell at equal degrees of dilution. Measurements were made in steps of 10 A. between 3,100 and 2,200 A.

Normal leucocytes showed a faint indication of selective absorption at 2,600 A., but the graph looks rather S-shaped within a wave-length range between 2,800 and 2,500 A. Normal liver and endometrium are characterized by selective absorption with a peak at 2,650 A. Seven inflammatory lymph-nodes gave uniformly selective absorption with a peak in 6 cases at 2,500 A. An inflammatory tumor of the breast had an S-shaped absorption graph. Nine carcinomas showed selective absorption at 2,600 A.; a scirrhous tumor had an S-shaped graph. The height of the peak seemed in certain relation to the number of cells in the neoplastic tissues. One case, a medulloblastoma, was distinguished by two peaks at 2,550 and 2,700 A. Three lymphosarcomas and one Hodgkin's case gave similar absorption graphs with peaks at 2,600 A. Of the lymphosarcomas, one was atypical but was so clinically and histologically, diagnosis being based on tissue culture. The absorption peak in a case of lymphatic leukemia (chronic) was 2,500 A. Of the three benign tumors, two showed no selective absorption, one a low peak at 2,550 A.

Tentative suggestions can be offered regarding the selective absorption peak at 2,650 A. in normal liver and endometrium, 2,600 A. in carcinoma, and 2,500 A. in the inflammatory nodes.