

probably due to capillary embolism resulting from the precipitation of plasma protein by $Al(OH)_3$. Obviously, one should avoid the use of aluminum metal in contact with blood in any perfusion systems.

10123 P

Origin of Bone Marrow Plasma Cell Associated with Allergic and Immune States in the Rabbit.*

FRED KOLOUCH, JR. (Introduced by E. A. Boyden.)

From the Department of Anatomy, University of Minnesota, Minneapolis.

The observation of a plasmacytosis of the bone marrow of a man with a fatal endocarditis, coupled with Downey's description of a great number of plasma cells in the bone marrow of a rabbit with an incidental, non-specific, subcutaneous abscess suggested an experimental method for increasing the bone marrow plasma cell content. This reaction was also indicated by the bone marrow from rabbits allergic to and immunized against *Streptococcus viridans*, obtained through the courtesy of Dr. B. J. Clawson of the Department of Pathology, University of Minnesota. In these animals it was noted that the allergic and immune animals showed a more extensive medullary plasmacytosis than those that were immune but not allergic. Through the study of the myeloid tissue during the development of a plasmacytophilia, we felt something of the origin and function of the bone marrow plasma cell might be determined.

There are many conflicting theories regarding the origin of the myeloid plasma cell (Downey,¹ Michels,² Rohr,³ Jordan and Morton,⁴ and Osgood and Ashworth⁵). The current theories make the lymphocyte, histiocyte, fibroblast, myeloblast, erythroblast, plasmacytic reticulum cell and specific plasmablast the parent of the bone marrow plasma cell.

The procedure we employed was as follows: Obtain a control

*This work was carried out under the direction of Dr. Hal Downey in the Hematological Laboratory of the Department of Anatomy, University of Minnesota.

¹ Downey, Hal, *Folia Hæmat.*, 1911, **11**, 275.

² Michels, N. A., *Arch. Path.*, 1931, **11**, 775.

³ Rohr, K., *Folia Hæmat.*, 1936, **55**, 305.

⁴ Jordan, H. E., and Morton, C. B., *Am. J. Anat.*, 1937, **61**, 407.

⁵ Osgood, E. E., and Ashworth, C. M., *Atlas*, 1937, J. W. Stacey, Inc., San Francisco.

sample of normal marrow; induce an increase in the plasma cells and follow the bone marrow picture by means of successive biopsies while the increment in plasma cells is in progress. In this manner, we were able to identify the progenitor of these cells during their initial stage of differentiation in the bone marrow.

We treated a series of 13 rabbits by Clawson's method, *i. e.*, giving a subcutaneous injection of *Streptococcus viridans* broth agar mixture and thus making the animal allergic to this antigen. (Following the injection the agar solidifies on cooling and localizes the organism.) After allergy was induced, intravenous injections of a broth culture of *Streptococcus viridans* were made. The condition of the bone marrow was followed throughout this experimental procedure by means of subtotal costectomies. A control rib was removed before allergy was induced, another in the allergic state and successive ribs after the intravenous injection of *Streptococcus viridans*.

The normal bone marrow of rabbits, examined in imprints stained by the May-Grünwald-Giemsa technic, contains relatively few plasma cells and plasmacytic reticulum cells. The bone marrow of rabbits allergic to *Streptococcus viridans* showed an increase in the number of plasmacytic reticulum cells and a slight increase in plasma cells. Within 20 minutes after an intravenous injection of the antigen into the allergic rabbits, the bone marrow showed a great increase in plasmacytic reticulum cells—large, immature, basophilic cells with eccentric leptochromatic nuclei. The shock dose of antigen, in addition to causing an increase in plasmacytic reticulum cells, induced the transformation of these cells into plasma cells. This transition was morphologically evident within 2 hours, and complete to large plasma cells in 5 hours. In 5 days, small plasma cells—small, mature, basophilic cells with an eccentric, pachychromatic nucleus, some of which bear evidence of degeneration—predominated in the bone marrow plasma cell picture.

In addition to the bone marrow changes, the spleens of our rabbits showed the "acute splenic tumor" described by Rich⁶ as a reaction to an antigen bacterial or non-bacterial and probably related to antibody formation.

We conclude that the bone marrow plasma cell is a derivative of the plasmacytic reticulum cell. Since concurrently with the transformation of the plasmacytic reticulum cell to plasma cells the antibody titer of the blood rises (Clawson,⁷ Rich⁶) there may be a relationship between these two phenomena.

⁶ Rich, A. R., PROC. SOC. EXP. BIOL. AND MED., 1935, **32**, 1349.

⁷ Clawson, B. J., J. Inf. Dis., 1933, **53**, 157.