

RIBONUCLEIC ACID IN PERIPHERAL BLOOD CELLS

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The present work deals with the ribonucleic acid (RNA) content of the peripheral blood cells of the normal horse.

Published work on the RNA content of the blood cells and of the hematopoietic tissue cells has established that large amounts of RNA were present in the lymphoblasts and myeloblasts [1], myeloblasts and erythroblasts [5] and in hemocytoblasts [7].

During the "maturing" of hemoglobin in the erythroblastic elements, and of the specific granulation in the myeloid elements, the RNA content of these cells was observed to decrease [2]. Some workers claim that RNA is also present in the lymphocytes of rats [5] guinea pigs [6] monkeys [8] and in human lymphocytes [4]. According to E. I. Terent'eva, human lymphocytes contain little or no RNA. However, a search of the literature failed to reveal any published data on the RNA content of the peripheral blood cells of the horse.

EXPERIMENTAL METHODS

Two blood samples were taken from each of healthy, nonimmunized horses. The RNA content of the cells was determined according to Brachet (using ribonuclease and hot water for the controls). Usual clinical blood analysis was also carried out.

EXPERIMENTAL RESULTS

The RNA was found in the cytoplasm of monocytes and lymphocytes, where it forms fine, irregular granules. Some of the granules stained a deep red with pyronin, while others stained only faintly, which may be due to the different RNA content within the various granules. The monocyte cytoplasm was found to contain the largest amount of RNA granules; their content was sometimes sufficiently high to obscure the chromatin of the nucleus.

In the lymphocyte the RNA granules were distributed mainly on the periphery of the cytoplasm. Odd granules were frequently found on the cell surface. On the basis of the individual cell's granule content the lymphocytes may be divided into three groups. The first group was characterized by a very high content of RNA granules. Their entire (or nearly entire) cytoplasm was densely filled with granules; the granules thickly surrounded the nucleus. The second group comprised lymphocytes in which the granules occupied a more or less significant portion of the cytoplasm. Here the granules were found mainly on the cytoplasmic periphery, leaving the perinuclear portion free, while only few granules could be found on the nuclear surface. The third group comprised lymphocytes containing only few single granules (see Figure). No RNA in granular form could be found in other hematopoietic cells. Presented in the Table are the statistical data of the mean percent distribution, and the absolute number of lymphocytes containing large, moderate, and small amounts of granulated RNA, together with the standard deviation. The separation of lymphocytes into groups was carried out in each count of 100 cells in smears.

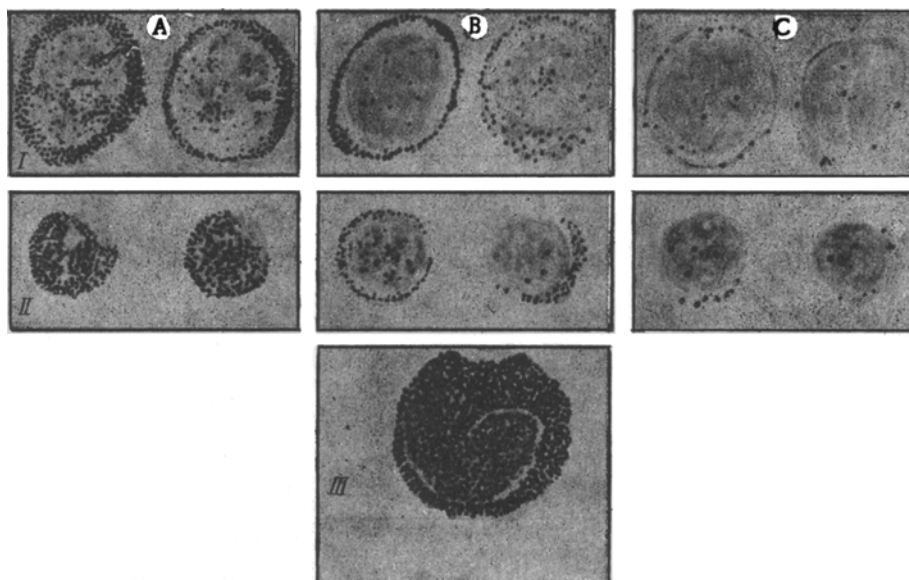
The observed differences in the degree of saturation of the lymphocytic cytoplasm with RNA, irrespective of cell size, shows that there exist cells, among both the large and small lymphocytes, with varying potential capacities for the carrying out of processes whose intensity depends on the cell's RNA content.

The Mean Per Cent Distribution and Absolute Numbers of Lymphocytes with Various Granulated RNA Content

Mean lymphocyte count per ml blood	Per cent lymphocytes containing RNA in			Numbers of lymphocytes per ml blood, containing RNA in		
	large amounts	moderate amounts	low amounts	large amounts	moderate amounts	low amounts
3234±912	11±2.2	85±2.7	4±2	363±105	2748±87	125±59

The possible function of RNA in the lymphocytes and monocytes requires further study. However, as found in other experiments in this laboratory, the RNA content of blood cells increased during immunogenesis. These results will be presented in more detail in a further communication.

The present work showed that the monocytes of horse blood contain large quantities of RNA granules.



The demonstration of ribonucleic acid (RNA) in horse lymphocytes and monocytes. I) Large lymphocytes, II) small lymphocytes, III) monocyte. A) Large quantity of RNA granules, B) moderate quantity of RNA granules, C) small quantity of RNA granules.

The RNA granule content of the lymphocytes was found to vary with individual cells, ranging from very high to but a few granules in some cells.

The difference in degree of saturation with RNA in the lymphocytic cytoplasm shows that individual lymphocytes vary in their activity with respect to RNA-dependent functions. No RNA-containing granules were found in other blood cells.

SUMMARY

The presence of RNA was investigated in the cells of peripheral blood of horses by Brachet's method. Monocytes contain many RNA granules, while the quantity of RNA granules in lymphocytes varies from single granules to a large number of them. Thus, it was demonstrated by the histochemical method that lymphocytes

possess different activity with regard to the functions caused by RNA. No RNA granules were revealed in other blood cells. The authors estimated the number of lymphocytes rich in RNA, of those containing a moderate amount, and those with only a few RNA granules.

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