

CHARACTERISTICS OF THE BLOOD SYSTEMS OF INBRED AND NONINBRED MICE

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Indices of the peripheral blood and bone marrow were studied in inbred (101/H, CC57W, A2G, CBA/Lac, B6W^v, C57BL/6, ACR) and noninbred mice. Standard norms for the morphological composition of the blood and bone marrow were established. Comparative analysis showed differences in these indices not only between inbred and noninbred mice, but also among animals of the same strain.

KEY WORDS: mice; peripheral blood; bone marrow.

In experimental and clinical medicine during the study of different pathological processes and states, in order to assess changes taking place in the body as a whole and also in its individual organs and systems it is essential to have physiological indices for use as the normal standard basis. Indices of the blood system are among the most important and most frequently used norms. In order to obtain them it is necessary to study the parameters of the peripheral blood and bone marrow of certain inbred and also of noninbred mice.

EXPERIMENTAL METHOD

Altogether 220 noninbred and inbred (of strains 101/H, CC57W, A2G, CBA/Lac, B6W^v, C57BL/6 and ACR) sexually mature mice were studied (the inbred animals were obtained from the Research Laboratory of Experimental Biological Models, Academy of Medical Sciences of the USSR). The hemoglobin concentration and the erythrocyte, reticulocyte, platelet, and leukocyte counts were determined in the animals' blood. Differential counts were obtained and the absolute numbers of the different forms of leukocytes determined. The absolute number of myelokaryocytes was counted in the bone marrow (per femur) and the myelogram was studied in stained films. All investigations were carried out by generally accepted methods.

TABLE 1. Peripheral Blood Indices of Inbred and Noninbred Mice ($M \pm m$)

Strain of mice	Hemoglobin, g %	Erythrocytes, millions	Reticulo-cytes, %	Platelets, thousands	Mucocytes, thousands	Differential count				
						stab cells, thousands	polymorphs, thousands	eosinophils, thousands	monocytes, thousands	lymphocytes, thousands
101/H	15,8±0,4	10,1±0,4	34,1±1,9	579,0±42,9	13,7±0,9	0,1±0,04	4,1±0,5	0,05±0,02	1,2±0,2	8,2±0,4
CC57W	16,3±0,4	8,2±0,4	66,7±6,6	369,0±36,1	15,2±1,3	single	1,8±0,3	0,1±0,08	0,3±0,07	12,8±1,0
A2G	16,2±0,3	8,7±0,4	45,1±3,5	568,9±68,9	17,8±1,8	0,1±0,04	3,5±0,5	0,2±0,06	1,0±0,11	12,9±1,5
CBA/Lac	15,8±0,5	8,1±0,7	35,2±4,5	636,7±48,7	10,5±1,3	0,2±0,04	2,6±0,4	0,09±0,07	0,4±0,1	6,9±0,9
B6W ^v	15,6±0,3	8,0±0,2	55,9±9,2	463,9±19,8	13,4±1,6	0,09±0,002	2,9±0,5	0,1±0,03	0,7±0,1	9,6±1,1
C57BL/6	15,6±0,15	8,2±0,6	59,2±7,3	384,8±50,5	8,5±0,9	single	3,3±0,5	0,2±0,04	0,8±0,17	4,2±0,7
ACR	13,4±0,6	7,9±0,3	49,0±6,2	389,2±34,3	12,9±1,6	0,1±0,02	2,9±0,4	ed.	0,7±0,13	9,1±0,9
Noninbred	16,2±0,4	9,2±0,1	61,0±9,0	606,2±19,7	13,4±0,4	0,2±0,03	3,9±0,2	0,3±0,06	0,5±0,1	8,5±0,3

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TABLE 2. Myelograms of Inbred and Noninbred Mice (M ± m)

Indices of myelogram, %	Strains of mice							Noninbred mice
	101/H	CC57W	A2G	CBA/Lac	B6W ^V	C57BL/6	ACR	
Total number of myelokaryocytes (per femur), millions	18,8±0,82	18,5±1,0	19,8±1,21	22,1±1,7	30,8±1,34	28,6±1,5	29,9±1,5	23,2±0,6
Reticulum cells	2,4±0,24	2,0±0,33	1,5±0,25	1,7±0,46	1,6±0,24	2,5±0,32	1,5±0,34	2,5±0,29
Undifferentiated blast cells	2,4±0,54	2,7±0,36	2,1±0,19	2,2±0,22	1,5±0,27	2,5±0,32	2,0±0,37	1,5±0,17
Myeloblasts	2,9±0,30	2,0±0,21	2,5±0,27	2,1±0,27	2,4±0,17	2,0±0,27	2,5±0,27	1,4±0,13
Promyelocytes	2,7±0,28	2,4±0,19	2,0±0,17	1,5±0,16	2,3±0,22	3,7±0,35	3,2±0,92	2,4±0,27
Neutrophilic myelocytes	3,2±0,25	1,7±0,17	2,5±0,37	0,6±0,06	3,7±0,29	2,2±0,21	2,0±0,23	1,5±0,17
Neutrophilic metamyelocytes	5,5±0,62	5,8±0,57	5,2±0,36	3,5±0,28	7,0±0,41	4,5±0,40	6,0±0,60	6,3±0,71
Stab cells	9,2±1,07	8,8±0,84	9,8±0,88	8,5±1,03	12,8±0,68	8,5±0,64	10,5±0,69	8,5±0,69
Polymorphonuclear neutrophils	25,6±1,51	25,0±1,80	25,6±3,12	30,0±1,73	31,8±2,27	24,5±1,20	38,5±1,15	32,5±1,67
Eosinophils	2,9±0,47	1,8±0,30	2,7±0,57	0,7±0,23	2,9±0,32	1,5±0,11	1,5±0,23	2,0±0,21
Mitoses in myeloid cells	0,2±0,05	0,1±0,02	0,2±0,06	0,2±0,04	0,2±0,05	0,3±0,07	0,3±0,01	0,2±0,05
Lymphocytes	21,5±1,69	21,0±2,09	19,3±3,54	21,0±1,31	12,4±1,83	18,0±1,57	13,5±0,96	16,5±2,12
Monocytes	1,4±0,28	0,6±0,18	0,4±0,17	0,7±0,08	0,5±0,12	0,2±0,03	1,5±0,31	1,0±0,13
Plasma cells	0,2±0,08	0,3±0,02	0,1±0,08	0,5±0,01	0,3±0,07	0,5±0,04	0,7±0,24	0,4±0,02
Megakaryocytes	0,6±0,09	0,4±0,08	0,5±0,09	0,3±0,02	0,3±0,07	0,4±0,08	0,3±0,01	0,3±0,01
Erythroblasts	0,9±0,12	1,0±0,21	0,8±0,13	0,5±0,07	0,5±0,11	0,9±0,12	0,5±0,12	0,5±0,07
Pronormoblasts	0,5±0,08	0,5±0,14	0,2±0,08	0,4±0,04	0,2±0,04	0,3±0,07	0,4±0,08	0,2±0,04
Basophilic normoblasts	10,6±0,95	6,5±0,41	13,0±1,12	5,5±0,43	8,7±1,2	5,0±0,60	2,0±0,39	7,5±1,07
Polychromatophilic normoblasts	6,6±0,49	14,4±0,96	9,5±0,76	18,0±1,23	10,2±1,12	19,5±1,07	9,0±0,92	12,5±1,32
Eosinophilic normoblasts	0,4±0,04	2,7±0,67	0,3±0,14	1,5±0,2	0,2±0,03	2,5±0,28	3,4±0,67	1,5±0,21
Mitoses in erythroid cells	0,3±0,01	0,3±0,08	0,9±0,13	0,6±0,02	0,5±0,13	0,5±0,07	0,7±0,02	0,8±0,17

EXPERIMENTAL RESULTS

As Table 1 shows, the erythrocyte count in most strains of mice was practically the same, and only in mice of strain 101/H and the inbred mice was it significantly higher. The reticulocyte count in the 101/H mice and also in strain CBA/Lac was significantly lower than in animals of the other strains with which they were compared. The hemoglobin concentration in the mice of all strains and the noninbred mice did not differ significantly. The platelet count in mice of strains 101/H, A2G, CBA/Lac, and the noninbred mice did not differ significantly, but was significantly higher than in B6W^V, CC57W, and C57BL/6 mice. The leukocyte count in mice of most strains and in the inbred mice was identical (mean 13,400), and only in the A2G strain did it reach 17,800±1800, whereas in the C57BL/6 mice it was only 8500±900. The low leukocyte count in this last strain was due to the small number of lymphocytes (mean 4300±700), whereas the number of neutrophils was the same as in the animals of the other groups.

Analysis of the bone marrow indices (Table 2) showed a significantly higher content of myelokaryocytes in mice of strains B6W^V (308±1.3 millions), C57BL/6 (28.1±1.5 millions), and ACR (29.9±1.5 millions) compared with mice of other strains and noninbred mice. In all cases this was due to an increase in the number of mature neutrophils, whereas in mice of strain C57BL/6 it was also due to the larger number of erythroid cells (8.3±0.5 millions compared with 3.6 to 5.7 millions in mice of the other groups).

On the basis of this investigation normal indices for the peripheral blood and bone marrow of healthy inbred and noninbred mice were established. Comparative analysis showed differences in these values not only between inbred and noninbred animals, but also between the different strains of inbred mice.