

acids. The action of glucose in depressing the level of the blood fats of normal dogs is attributed to some effect upon fat mobilization which is dependent upon the presence of a normal pancreas.

9624

Red Cell and Reticulocyte Counts in Guinea Pigs Following Exposure to Low Pressures.

ALBERT S. GORDON AND WILLIAM KLEINBERG. (Introduced by Harry A. Charipper.)

From Washington Square College, New York University.

Young adult guinea pigs (wgt. 350-400 gm.) were subjected for continuous periods, varying from 5 to 14 days, to pressures of 370-380 mm. Hg. in a specially made low pressure chamber (for details of the chamber, see Dubin¹). This exposure is sufficient to cause an increase in red cell count of one to 2.5 million per cu. mm., and a reticulocyte count of 6% to 14%. Red cell counts were made from samples of blood drawn from the ear. The cells on 400 squares of a Levy-Hausser chamber were counted by each of us, and we were required to agree within 4%. Reticulocytes stained with brilliant cresyl blue were counted in wet smears according to the method described by Ramsey and Warren.² The behavior of the counts, following termination of the stimulus, in 4 representative animals exposed to the low pressures for different periods of time, is shown in Table I. The red cells are given in millions per cu. mm. and the reticulocytes as a percentage of the total reds.

The results obtained from experiments performed on 27 animals may be stated as follows. Soon after termination of the stimulus the counts begin to fall. The red cell counts attain normal values in 20-24 days and the reticulocytes in about 4 to 6 days. The red cell counts do not remain at this normal level but continue to drop, an anemia developing which reaches its maximum approximately a month after removal of the animals from the chamber. This anemia is similar to the one reported by Tyler and Baldwin³ in rats after exposure to low oxygen tensions. Accompanying this drop below

¹ Dubin, M., *Quart. J. Exp. Physiol.*, 1934, **24**, 31.

² Ramsey, R., and Warren, C. O., *Quart. J. Exp. Physiol.*, 1932, **22**, 49.

³ Tyler, D. B., and Baldwin, F. M., *PROC. SOC. EXP. BIOL. AND MED.*, 1934, **31**, 823.

TABLE I.

Normal Count Days Out of Chamber	59		61		62		—56	
	6 days at 380 mm. Hg.		10 days at 380 mm. Hg.		10 days at 380 mm. Hg.		14 days at 380 mm. Hg.	
	Reds	Retics.	Reds	Retics.	Reds	Retics.	Reds	Retics.
	5.0	0.8	5.6	0.1	5.2	1.2	5.4	0.2
0	6.3	6.5	7.0	8.4	6.8	8.6	7.6	8.2
2	6.2	2.0	6.6	3.3	6.6	3.4	7.5	4.3
4	6.0	0.2	6.5	0.4	6.5	0.4	7.3	0.2
8	5.8	0.4	6.3	0.2	6.3	0.1	6.8	0.1
12	5.5	0.2	6.1	0.1	6.0	0.1	6.5	0.2
16	5.3	0.1	5.9	0.1	5.8	0.2	6.0	0.1
20	5.1	0.1	5.8	0.2	5.6	0.1	5.7	0.1
24	4.9	0.3	5.5	0.1	5.2	0.4	5.2	0.3
28	4.6	1.0	5.2	0.2	4.8	1.6	4.5	1.6
32	4.6	1.2	4.8	0.8	4.6	1.9	3.8	8.2
38	5.1	1.2	4.6	2.2	4.8	0.9	4.4	1.2
44	5.0	1.8	5.0	1.6	5.1	0.5	4.8	1.3
50	5.4	1.0	5.1	1.2	5.4	0.4	5.1	0.8
56	5.6	0.5	5.3	1.0	5.6	0.5	5.0	1.0
62	—	—	5.8	0.6	5.8	0.2	5.5	0.6
70	5.6	0.4	6.2	0.9	5.6	0.5	5.3	0.5
82	5.4	0.4	6.1	1.2	5.4	0.2	5.7	0.4
101	5.0	0.3	5.8	0.6	5.2	0.2	5.9	1.0
120	4.9	0.4	5.4	0.4	5.0	0.8	5.2	0.2
142	5.2	0.4	5.5	0.2	5.0	0.2	5.5	0.1
150	5.2	0.2	5.5	0.2	5.3	0.1	5.4	0.2

0 days out of chamber refers to counts taken immediately after termination of the entire low pressure stimulus.

the normal count, there occurs an increase in the reticulocyte count which reaches a maximum at the time when the anemia is most intense. This would seem to indicate that the anemia occurs mainly because of excess destruction of red cells, especially in those cases where the period of exposure is greater than 10 days. The extent of this anemia depends on two factors: (1) the period of exposure to low pressures—in general, longer exposures produce greater rises in red cell count followed by greater percentage drops after withdrawal of the stimulus; (2) the magnitude of the normal red cell count—in animals with lower normal counts, the percentage increases in red cell count, for the same period of low pressure exposure, are almost invariably greater than in animals with higher normal counts. In the former, however, the percentage drops below the normal count of the animal, after termination of the stimulus, are always smaller than in the latter.

Following the anemia, the red cell counts rise, and within another month, pass the normal count and reach a level above it, which is not as high as the one attained originally. As the red cell counts increase, the reticulocyte percentages fall. These excursions of the

red cell count above and below normal are still evident 3 months after cessation of the stimulus. They become less and less marked, however, until shortly after the fourth or fifth month, the normal count or a figure near this, is maintained.

The results of this study shed further light on the delicate nature of what Krumbhaar⁴ has called the hemolyto-poietic equilibrium. It demonstrates that both the blood-forming and blood-destroying sides of the system possess, when stimulated excessively, a momentum which carries them beyond normal limits, this momentum becoming less and less marked, in pendulum-like fashion, as the stimulus (in this case, either more or fewer cells than normal) becomes less intense.

9625

Sensitization and Antibody Formation after Injection of Tubercle Bacilli and Paraffin Oil.*

JULES FREUND, J. CASALS AND ELIZABETH PAGE HOSMER.

From the Department of Pathology, Cornell University Medical College.

The synergistic effect of various substances upon immunization was noted a long time ago; the literature has been admirably reviewed by Swift and Schultz.¹ The experiments of Dochez² have direct bearing on our problem. He succeeded in promoting immunization by the incorporation of streptococci into agar and production of persistent foci. Coulaud³ sensitized 2 rabbits by the injection of melted paraffin containing killed tubercle bacilli. Ramon and others⁴ and Eisler and Gottdenker⁵ found that adding paraffin oil to diphtheric toxin accelerates antitoxin-production. Saenz⁶ discovered that one cc. of paraffin oil containing killed and dried tubercle bacilli injected into the subcutaneous tissue of guinea pigs produces a very

⁴ Krumbhaar, E. B., *Cowdry's Special Cytology*, 2nd edition, 1932, Vol. 2, Ch. XV.

* This study was aided by a grant from the International Health Division of the Rockefeller Foundation.

¹ Swift, F. H., and Schultz, M. P., *J. Exp. Med.*, 1936, **63**, 703.

² Dochez, A. R., *Harvey Lectures*, 1924-25, 131.

³ Coulaud, E., *Rev. de la Tuberculose*, 1934, **2**, 850.

⁴ Ramon, G., Lemetayer, E., and Richou, R., *Rev. d'Immun.*, 1937, **3**, 205.

⁵ Eisler, M., and Gottdenker, F., *Z. Immunitätsforsch.*, 1937, **90**, 427; **91**, 49.

⁶ Saenz, A., *Compt. rend. Soc. Biol.*, 1935, **120**, 870, 1050.