teins in urine could be a factor has not been investigated.

It appears, then, that denatured and non-denatured serum proteins are not removed by the same mechanism, since rate of clearance of denatured proteins is very much altered by previous blockade of the R.E.S.(13,14).

Our data do not exclude that R.E.S. plays a part in turnover of plasma protein, but merely indicate that, if it does so, it is not through the same mechanism by which it usually handles colloidal suspensions. It is likely, however, from the work of Gordon(13), with perfusion of isolated livers from rats, that normal serum proteins are not predominantly broken down in the liver where the most active part of R.E.S. is found(6).

It seems, therefore, that other cells or possibly all body cells(16) are involved in this process. The observations of Coons(15) showing localization of normal foreign serum proteins in the parenchymal cells of organs like liver, kidneys and adrenals and in vascular endothelium, are in favor of this interpretation, though, of course, the fact that cells take up protein may not mean that they catabolise it.

Summary. 1) It was shown that 3 intravenous injections of thorotrast every 48 hours could induce an effective reticulo endothelial blockade in mice over 1 week. 2) S^{35} labelled mouse plasma proteins were transferred intravenously to 2 groups of 5 normal mice and 5 mice which then received such blockade treatment. 3) The average half life of labelled plasma proteins was 37 hours in the normal and 30 hours in the blocked mice. 4) The significance of these findings, as related to a possible function of the reticulo endothelial system in catabolism of plasma proteins, is discussed.

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Received July 11, 1958. P.S.E.B.M., 1958, v99.

Blood Leucocyte Response in Rats Fed a Magnesium Deficient Diet.* (24377)

HERBERT K. KASHIWA AND GERALD F. HUNGERFORD†

Dept. of Anatomy, George Washington University School of Medicine, Washington, D.C.

The magnesium deficiency syndrome in experimental animals is well known and reproducible(1,2,3,4). In the course of experiments designed to study the effects of magnesium deficiency, marked changes in blood leucocyte counts were observed which to our knowledge have not been previously reported. A general leucocytosis, which reached a peak

* Supported in part by grant from Washington Heart Assn., Washington, D. C.

† Present address: Dept. of Anatomy, Univ. of Southern California, Los Angeles.

TABLE I. Blood Counts of Rats on Control and Magnesium Deficient Diets.

		Day 1	Day 8	Day 15
Total WBC (cells/mm³)	Cont.	12,285 ± 753* (10)	18,105 ± 1590 (19)	24,108 ± 2790 (18)
	Def.	12,285 ± 753 (10)	42,835 ± 3740 (18)	30,693 ± 2520 (16)
Eosinophiles (cells/mm³)	Cont.	80 ± 9.8 (23)	136 ± 16.4 (32)	260 ± 35.2 (29)
	Def.	74 ± 2.5 (23)	901 ± 137 (32)	391 ± 63.5 (29)
Mononuclear leucocytes (cells/mm³)	Cont.	10,357 ± 817 (10)	13,737 ± 1250 (19)	19,335 ± 2580 (18)
	Def.	10,357 ± 817 (10)	27,881 ± 1740 (18)	23,379 ± 2540 (16)
Neutrophiles (cells/mm³)	Cont.	1871 ± 160 (10)	4232 ± 690 (19)	4413 ± 610 (18)
	Def.	1871 ± 160 (10)	14,311 ± 2330 (18)	6832 ± 990 (16)

* Stand. error. No. in parentheses = No. of rats.

during the hyperemic phase of the deficiency syndrome, was observed. While all of the white elements increased in number, the eosinophiles were elevated considerably more.

Materials and methods. Male rats of the Wistar strain, weighing 70-100 g, were fed synthetic diets and distilled water *ad libitum*. The composition of the diets was as follows:

	%	Salt composition	g
Dextrose	58	NaCl	15.
Casein	22	$CaCO_3$	25.
Wesson oil	12	$CaHPO_4$	15.
Vitamin‡	3	KH_2PO_4	35.
Salt	5	$FeSO_4$ $7H_2O$	3.
		$MgSO_4$§	7.
		KI	.1

Blood counts were taken on days 1, 8 and 15. Blood was obtained from the tail for all counts. Blood for eosinophile counts was diluted 1:20 with Speirs-Meyer's diluting fluid (4) and counted on the Speirs-Levy counting chamber (0.2 mm deep). Blood for total WBC counts was diluted 1:20 with 1% acetic acid solution. Differential counts were made on blood smears stained with Wright's stain. Each day from 4th to 15th day, the ears of each rat were indexed for hyperemia. The following criteria were used for the index:

1+ = Hyperemic at base of one ear.
2+ = Hyperemic at base of both ears, or completely on one ear.
3+ = Hyperemic at base of one ear and completely on other ear.
4+ = Hyperemic completely on both ears.

‡ Vitamin diet fortification mixture, Nutritional Biochemicals Corp.

§ Replaced with dextrose in magnesium deficient diet.

Results. The animals on the control diet gained weight normally and appeared to be in good health, while those on the magnesium deficient diet gained weight slower and lost some weight during the third week of the diet. After 20 days on the deficient regimen they began to die, usually in a convulsion which was spontaneous or induced by a sudden noise.

Hyperemia of the ears began to develop on the 4th day of the diet when 12% of the rats exhibited 3+ to 4+ ear response. On the 8th day 48% of the deficient rats developed hyperemia of the ear (3+ and 4+) ear response. By the 15th day no rats exhibited hyperemia. Although the daily hyperemia indices of the entire group of 56 rats spanned from the 4th day to the 15th day, the time of development and blanching of hyperemia in each rat differed. Thus the duration of hyperemia in the individual rats ranged from 0 to 9 days with an average span of 4 days. Out of the 56 rats examined for hyperemia, 6 rats did not develop this condition at all.

Contrary to the gradual rise of total WBC counts in the control group, the counts in the magnesium deficient group increased about 2.4 times the control on the 8th day. This increase in total WBC was due to increase in the 3 cell types—mononuclear leucocytes, neutrophiles, and eosinophiles. All cell types were significantly higher ($P = < .01$) on the 8th day.

The mononuclear leucocytes increased about 2 times its control values while the neutrophiles increased about 3.4 times its control value. The eosinophiles increased relatively more than any of the other white blood cell types, being 6.6 times its control value for the 8th day. By the 15th day the counts of these

3 cell types and total WBC returned toward the control values although they were slightly higher.

Discussion. The results indicate that the leucocytosis which develops in animals fed a magnesium deficient diet is coincident with development of hyperemia of the ears. During this phase of the magnesium deficient syndrome Tufts and Greenberg(2) reported that plasma magnesium concentration is at its lowest, a slight rise occurring with disappearance of the hyperemia. Belanger *et al.* (3) has recently reported that dermal mast cells are degranulated during the hyperemic phase of magnesium deficiency followed by regranulation with the disappearance of hyperemia.

It seems likely that these observations are interrelated. Belanger *et al.*(3) suggested that sudden deprivation of magnesium results in histamine liberation from mast cells which may be the cause of the hyperemia. The low magnesium levels, or histamine release, or both, may be the cause of the leucocytosis which occurs during this phase, especially the eosinophilia.

In the present report, the blood counts for all rats for day 8 were grouped regardless of the hyperemic state of the ears. If only those rats with 3+ to 4+ ear scores are considered, the leucocyte counts, especially that of the eosinophiles, average considerably higher. In this case, the eosinophiles were 1480/mm^3, mononuclear leucocytes 29,400/mm^3, and neutrophiles 16,400/mm^3. The eosinophile counts were now 11.6 times their respective control value, while mononuclears were 2.1 times the control value and neutrophiles 3.9 times their control value. Obviously, the eosinophiles were elevated relatively more than the other leucocytes.

It is known that the leucocyte count in rats increases with age from the immature to adult stage. However, the control leucocyte counts reported here increased slightly more than expected. A change in diet from pellets to the synthetic diet may have contributed to this unexpected rise. It should be emphasized that there was no macroscopic evidence of infection in the control group at autopsy.

Summary. Rats fed a magnesium deficient diet develop a leucocytosis during the hyperemic phase of the syndrome. Mononuclear leucocytes and neutrophiles contribute to the leucocytosis but eosinophiles are elevated relatively more, being increased over 1,000%. Possible relationships to the development of the leucocytosis are discussed.

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Received July 11, 1958. P.S.E.B.M., 1958, v99.

Ulcerogenic Property of Steroids. (24378)

ANDRÉ ROBERT AND JAMES E. NEZAMIS
Dept. of Endocrinology, Upjohn Co., Kalamazoo, Mich.

A serious side-effect of ACTH and corticoid therapy in man is development or reactivation of gastroduodenal ulcers(1-9). To understand the pathogenesis of their production and to find means of preventing their appearance, it became desirable to find a method to produce these ulcers in experimental animals. For various reasons, the existing methods of producing ulcers experimentally do not lend themselves to quantitative evaluation of the effect of steroids. The ulcers obtained by some technics, such as with the Shay rat, are inhibited by concurrent treatment with corticoids(10). Injection of a small amount of formaldehyde into the gastric wall of a rat leads to formation of a necrotizing ulcer which is aggravated by cortisone, but it is difficult to quantitate the degree of the lesion(11). In