

tonuric patient it is not the vitamin but some other factor as yet unknown.

*Summary.* The administration of from 1 to 4 g of ascorbic acid per day has been found to be without effect on the excretion of homogentisic acid by an alkaptonuric individual excreting an average of 7 g of the metabolite daily. The ineffectiveness of this excessive amount of vitamin is a finding which is in agreement with results with smaller doses obtained by other investigators.

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### 11535 P

#### Relation of Pantothenic Acid to Dermatitis of the Rat.\*

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Richardson and Hogan<sup>1</sup> demonstrated that rat dermatitis (acro-dynia) is prevented or cured by an aqueous extract of yeast or rice bran, and by certain oils. The activity of the aqueous extracts was ascribed to the presence of a vitamin, presumably the one later designated as vitamin B<sub>6</sub>. Since this communication is not immediately concerned with oils our observations, and those of other workers,<sup>2</sup> on their protective action will not be described. Birch<sup>3</sup> reported that two factors are required to prevent or cure acrodynia. One is vitamin B<sub>6</sub>, the other is one of the essential unsaturated fatty acids. György and Eckhardt<sup>4</sup> obtained complete protection with a

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<sup>1</sup> Richardson, L. R., and Hogan, A. G., *Mo. Agr. Exp. Sta. Res. Bul.*, 1936, No. 241.

<sup>2</sup> Salmon, W. D., and Goodman, J. G., *J. Nutr.*, 1937, **13**, 477; Schneider, H., Steenbock, H., and Platz, Blanche R., *J. Biol. Chem.*, 1940, **132**, 539.

<sup>3</sup> Birch, T. W., *J. Biol. Chem.*, 1938, **124**, 775.

<sup>4</sup> György, P., and Eckhardt, R. E., *Nature*, 1939, **144**, 512.

combination of vitamin B<sub>6</sub> and various filtrates after fuller's earth adsorption. Under our experimental conditions both pantothenic acid and vitamin B<sub>6</sub> are required to cure this type of rat dermatitis, but additional time will be required to determine whether the cure is permanent.

The rats receive a ration of casein 20, sucrose 71, cellulose 3, cod liver oil 2, and salts 4, supplemented with 0.2 mg thiamin and 0.4 mg riboflavin per 100 g of food. After mild dermatitis developed vitamin B<sub>6</sub> was supplied to Group I, pantothenic acid to Group II, and both were supplied to Group III. Group IV contained three rats that had become moribund on vitamin B<sub>6</sub> and were then rescued

TABLE I.  
A Combination of Pantothenic Acid and Vitamin B<sub>6</sub> Cures Rat Dermatitis.

No. of rats	Supplement	μg	Avg Exp. period, days	Avg wt		Remarks
				Initial, g	Final, g	
<b>I</b>						
5	B <sub>6</sub>	10	20.5	47	54	All improved, 4 had recurrence, died. 1 normal last observation.
4	B <sub>6</sub>	20	13	39	42	All improved, 3 had recurrence, 2 died. 1 normal last observation.
2	B <sub>6</sub>	30	18	40	37	Improved slightly, died.
<b>II</b>						
7	Sodium pantothenate*	70	9.3	40	34	2 healed. 1 died though norm. in appearance, 1 recurrence. 1 improved but died before it was normal. 4 died without improving.
3	Calcium pantothenate†	70	12	39	45	All improved but not normal. 2 had recurrence at last observation.
<b>III</b>						
2	B <sub>6</sub> 10 + Na pantothenate	70	30	50	116	Dermatitis disappeared, norm.
3	B <sub>6</sub> 20 + Ca pantothenate	70	12	44	72	Dermatitis disappeared, norm.
<b>IV</b>						
2	Na pantothenate	70	16	52	90	Dermatitis disappeared, norm.
1	" "	70	15	60	67	Dermatitis disappeared, but infection in both eyes, died.

\*We are greatly indebted to Dr. T. H. Jukes who supplied us with this preparation. The amount is calculated from his assay in chick units.

†We are greatly indebted to Merek and Co., Rahway, New Jersey, who supplied us with this preparation.

with sodium pantothenate. Our observations are summarized in Table I.

All rats that received vitamin  $B_6$  improved, but 9 of them had a recurrence within an average of 15 days. Of the other 2, one has been receiving vitamin  $B_6$  for 12, the other for 30 days. Of the rats that received a pantothenic acid salt, 2 were cured. One of these was normal at death and the other had a mild recurrence of the dermatitis at the last observation. Some of the others improved but as yet none has made a complete recovery. When both vitamins were supplied simultaneously the animals recovered within a week and made considerable gains in weight. Three other rats, which failed to recover on vitamin  $B_6$  alone and were on the point of death, responded in a similar manner when a pantothenic acid salt was also supplied. One animal died after the dermatitis had disappeared, from a secondary infection in both eyes.

The eyes of the animals which do not respond to vitamin  $B_6$  alone are affected more severely than those of the animals which do not respond to pantothenic acid salts alone. The lids adhere and are soon covered by a large scab. If pantothenic acid is supplied in addition to vitamin  $B_6$  at this stage the scab falls off, leaving a spectacled appearance which disappears without any additional treatment as the hair grows back in the denuded areas. Up to the present the other lesions characteristic of this type of dermatitis, if either vitamin  $B_6$  or a pantothenate is supplied singly, are indistinguishable.

### 11536

#### Potencies of Vitamin $K_1$ and of 2-Methyl-1, 4-Naphthoquinone.

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In a previous investigation<sup>1</sup> we have confirmed the report of the marked antihemorrhagic activity of 2-methyl-1,4-naphthoquinone.<sup>2</sup> A careful comparison of the potencies of this compound and of pure vitamin  $K_1$  by our 18-hour procedure<sup>3</sup> showed that the latter is

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