

On the Alleged Antitoxic Action of Kombucha for Vitamin D*

EDMUND HOMBURGER AND C. I. REED.

From the Department of Physiology, University of Illinois, Chicago Colleges.

Because of the occasional observation of toxicity from vitamin D, even in comparatively moderate dosage, it would be highly desirable to have available a definite antagonist for use when for any reason it is desirable to continue administration of the vitamin at a given level. Numerous agents have been utilized with varying degrees of success, but none have seemed to be sufficiently dependable for general application.

In a number of publications, Hermann¹ reported that cats were protected against the intoxication induced by high doses of vitamin D as vigantol. The evidence was based on survival time, blood nitrogen level, and on histological examination of the liver, spleen, kidney, aorta, and lung.

This author has described in considerable detail the composition and other characteristics of Kombucha, according to which it is a fungus used in the far east to antagonize the tissue changes incident to aging. An extract of a culture consisted primarily of *d*-gluconic acid, with lesser quantities of keto-gluconic acid, vitamin B-complex, vitamin C, and unspecified enzymes. The *d*-gluconic acid appeared to be the active agent when each component was tested alone. However, the author postulated that the pharmacological effects might be due to the most abundant member, to some unidentified trace substance, or to a combined influence of all the observed constituents. His reports seemed sufficiently conclusive to justify a trial as an anti-intoxicant in rats treated with other forms of vitamin D, since the particular preparation used by Hermann has been claimed to be more toxic than many others. The Kombucha was

supplied in generous quantities by Hermann, after his own formula, which information was not supplied in detail to the authors.

Albino rats weighing 200-300 g were treated as indicated in the table for a period of 4 weeks. All animals were on a physiologically adequate diet throughout.

In view of the conclusive nature of the results, it was not deemed worthwhile to examine tissues. The animals in Group 1 gained weight in a physiological range. Those in Group 2 also gained within physiological range, but not so rapidly; possibly the Kombucha inhibited the growth rate slightly. But in all groups receiving toxic doses of vitamin D, there was, uniformly, weight loss that was not inhibited by any range of dosage of the alleged protective agent. The spread was about that occurring in Group 3, which received no Kombucha. All premature deaths occurred in the groups receiving the higher protective doses. The fact that the carcasses were eaten by the survivors doubtless inhibited to some degree the rate of loss in the survivors so that their final weights may have been higher, and the weight losses correspondingly less, than would otherwise have been the case. At any rate, the deleterious effects of hypervitaminosis appeared to be of about the same order in all groups receiving the vitamin whether treated or not, and if treated, irrespective of the dose of Kombucha administered.

Conclusion. 1. The claims of anti-vitamin-D-toxication action by an extract of a fungus, Kombucha, have been investigated in albino rats. 2. When administered orally to rats, a dosage of 100,000 units of vitamin D per kilo per day was definitely toxic to all animals. 3. Kombucha, administered as above, was practically without effect over a period of 4 weeks. 4. Kombucha did not protect rats against vitamin D toxication in any dosage when administered isochronously. 5. So far

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¹ Hermann, S., *Klin. Woch.*, 1929, **8**, 1752; *Arch. Exp. Path. u. Pharm.*, 1933, **171**, 756; *Biochem. Z.*, 1933, **266**, 418.

TABLE I.

Group	No. rats	Vitamin D, units/kg	Kombucha, cc/kg	Wt change in g
1	2	0	0	+68, +89
2	2	0	10	+45, +65
3	4	100,000	0	-47, -44, -85, -127
4	4	100,000	2	-70, -75, -98, -150
5	4	100,000	5	-85, -90, -90*, -90*
6	5	100,000	10	-72*, -70, -95, -120, -122

* Died during last week and were eaten by cage mates. Weights recorded at end of 3rd week.

as may be judged from this type of experiment, the claim of antagonism of Kombucha to the toxic action of vitamin D was not supported.

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Supra-Diaphragmatic Section of Vagus Nerves and Gastric Secretion in Patients with Peptic Ulcer.

THOMAS F. THORNTON, EDWARD H. STORER, AND LESTER R. DRAGSTEDT.

From the Department of Surgery of The University of Chicago.

The studies on gastric secretion to be reported in this paper were performed on 19 patients with duodenal ulcers both before and after division of all vagus fibers to the stomach. The nerves were divided just above the diaphragm by a method previously described.¹ Observations have been made on the continuous night secretion of gastric juice, and the secretory response to histamine, caffeine, insulin, and sham feeding.

a. *Continuous Night Secretion.* There are surprisingly few data on the secretion of the empty stomach of ulcer patients in the absence of any known gastric stimulant. The studies embodied in this report were made as follows: At 9:00 p.m. the stomach was emptied and lavaged with an Ewald tube. When the returns were clear, a Levine tube was introduced through the nose into the stomach and continuous suction maintained until 9:00 a.m. with the Wangenstein apparatus. In 9 patients with carcinoma of the

stomach an average of 261 cc of secretion was obtained with a free acidity between 0 and 21 clinical units. In 5 patients with carcinoma of the colon an average of 238 cc was obtained with a free acidity between 0 and 18 clinical units. In 6 patients with gall stones an average of 385 cc of secretion was obtained with a free acidity of 0 to 13 clinical units. In contrast to these findings in 19 patients with duodenal ulcer the night secretion averaged 820 cc with a free acidity between 24 and 82 clinical units. After recovery from the operation for division of the vagus nerves, the ulcer patients secreted an average of 415 cc with a free acidity between 0 and 61 clinical units. These observations indicate an abnormally large secretion of gastric juice commonly occurs in the empty stomach of ulcer patients in the absence of any of the usual types of secretory stimuli and that this excessive secretion is neurogenic in origin.

b. *Gastric Secretion in Response to Histamine.* In 19 patients with duodenal ulcers the gastric secretory response to histamine was determined by the usual technic. In each case an abundant flow of gastric juice with high free acidity was obtained and there was

¹ Dragstedt, Lester R., and Owens, Frederick M., Jr., *Proc. Soc. Exp. Biol. and Med.*, 1943, **53**, 152; Dragstedt, Lester R., Palmer, Walter L., Schafer, Paul W., and Hodges, Paul C., *Gastroenterology*, 1944, **3**, 450.