toxin, the filtrate obtained from coliform organisms growing in beef broth;[5] (b) poliomyelitis virus; (c) virus in "enteric" toxin and (d) sterile physiological saline. Two experiments were made with each test suspension, in the first of which a drop of material was placed on the fourth leaf from the tip of 6 plants and rubbed in with a smooth spatula; a second set of 6 plants were each injected with a drop of the same test substance just below the third internode. None of the 48 plants showed any reaction. Growth was neither disturbed nor stunted by the rubbing nor by the injections of any of the test suspensions.

We were not able to demonstrate any injury to the plant though it might be possible that virus could be present without producing any obvious disease in the host. Therefore, the plants which received virus were ground, the material filtered, and the fluid obtained was injected into one monkey (2 cc intracerebrally—I.C.), 3 Eastern cotton rats (0.06 cc I.C.—0.5 cc subcutaneously—S.Q.), 3 white rats (0.06 cc I.C.—0.5 cc S.Q.) and 3 mice (0.03 cc I.C.—0.5 cc S.Q.). No symptoms developed in any of the animals.

Thus, we have not been able to demonstrate that poliomyelitis virus can either live or multiply in the tomato plant.

5 Toomey, John A., PROC. SOC. EXP. BIOL. AND MED., 1934, **31**, 1015.

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Effect of Sodium Alkyl Sulfate on Peptic Activity of Gastric Contents in Man and *In vitro*.

JOSEPH B. KIRSNER AND REGIS A. WOLFF. (Introduced by Walter L. Palmer.)

From Frank Billings Medical Clinic and Department of Medicine, University of Chicago.

Recent studies by Shoch and Fogelson[1] and by us[2] have shown that sodium alkyl sulfate, a synthetic detergent of the anionic series, is capable of eliminating the peptic activity of gastric juice *in vitro*. This effect is produced without any significant deviation in pH. A similar inhibition of peptic activity by this detergent has been demonstrated *in vivo*[3] and has greatly increased the survival time of dogs with ulcers induced experimentally by the massive histamine injection technic described by Wangensteen and his coworkers.[4] The purpose of this communication is to present further data regarding the effect of sodium alkyl sulfate* on the peptic activity of the gastric contents in man and *in vitro*.

The gastric contents were partially aspirated in 3 adult male patients with duodenal ulcer every 2 hours from 8 a.m. to 8 p.m. The 8 a.m. sample served as a fasting control for each experiment. The peptic activity of the gastric contents was measured during the administration of 90 cc of an equal mixture of milk and cream alone at hourly intervals from 8:30 a.m. to 7:30 p.m. and together with varying amounts of sodium

1 Shoch, D., and Fogelson, S. J., PROC. SOC. EXP. BIOL. AND MED., 1942, **50**, 304.

2 Kirsner, J. B., and Wolff, R. A., to be published.

3 Shoch, D., and Fogelson, S. J., *Quart. Bull. Northwest. U. Med. Sch.*, 1942.

4 Walpole, S. H., Varco, R. L., Code, C. F., and Wangensteen, O. H., PROC. SOC. EXP. BIOL. AND MED., 1940, **44**, 619; Varco, R. L., Code, C. F., Walpole, S. H., and Wangensteen, O. H., *Am. J. Physiol.*, 1941, **33**, 475.

* Supplied in generous amounts by Dr. S. J. Fogelson and by the Abbott Laboratories, North Chicago, Illinois. Chemical name, sodium lauryl sulfate; formula $NaC_{12}H_{25}SO_4$. Molecular weight, 288.3. The preparation contains 64.2% lauryl alcohol and 33.3% SO_4. It is a white crystalline solution of highest purity, soluble in water producing a neutral solution. Its principal property is that of reducing surface tension.

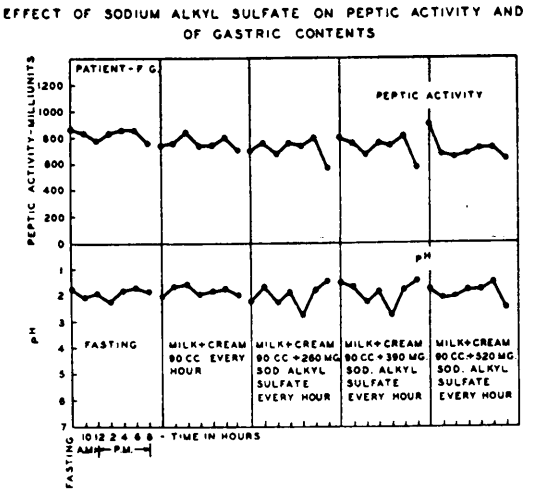

FIG. 1.

alkyl sulfate. The pH of the samples of gastric content was measured by the Beckman glass electrode. Peptic activity was determined in duplicate by the Beazell modification of the Anson-Mirsky method, adapted for the Evelyn photoelectric colorimeter.[5]

Sodium alkyl sulfate in doses of 130, 260, 390, 520 or 780 mg hourly did not produce a detectable lowering of peptic activity in man. The results of a typical series of experiments in one patient are shown in Fig. 1. Baker and her associates[6] had found previously that aqueous suspensions of lecithin, cephalin, and sphingomyelin prevented the inhibiting action of various synthetic anionic and cationic detergents on the respiration and glycolysis of gram-positive and gram-negative microörganisms. Information was sought therefore concerning the effect of sodium alkyl sulfate on peptic activity in 5 patients receiving a diet low in lipids. The results of a typical experiment are shown in Fig. 2. Peptic activity during the use of the special diet did not differ from that observed in previous control studies. The addition to the program of 780 mg of the detergent at hourly

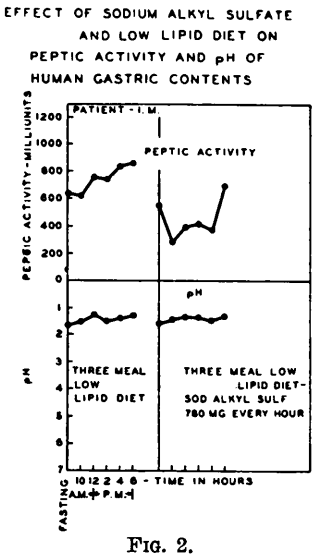

FIG. 2.

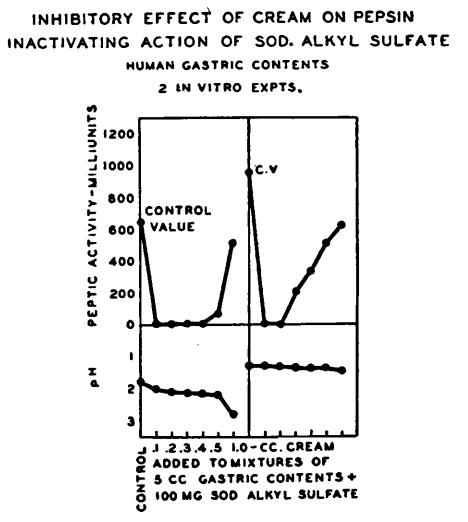

FIG. 3.

[5] Warren, I. A., Front, J., and Kirsner, J. B., *Gastroenterology*, 1943, **1**, 102.

[6] Baker, Z., Harrison, R. W., and Miller, B. F., *J. Exp. Med.*, 1941, **73**, 249; 1941, **74**, 621.

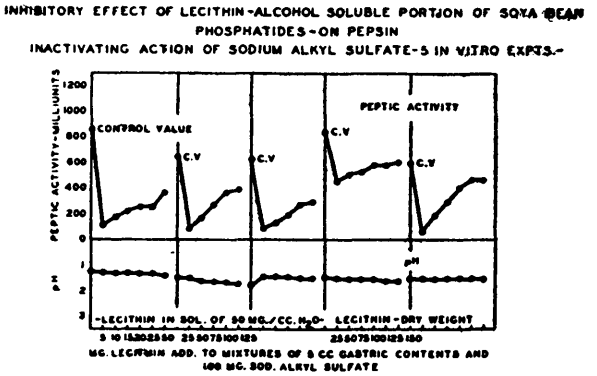

FIG. 4.

intervals resulted, however, in an appreciable decrease in peptic activity. This inhibitory effect was temporary and towards evening, at a time when gastric secretion increased, peptic activity rose to levels approximating the control values.

A series of *in vitro* experiments tended to confirm the above observation. Thus, the addition of small amounts of 20% cream to gastric juice before the addition of 100 mg of sodium alkyl sulfate resulted in a less effective inhibition of peptic activity by the detergent (Fig. 3). This effect was noticeable especially when 1.0 cc of cream was added. Similar results were obtained with ordinary butter. Five experiments in which increasing quantities of lecithin (the alcohol soluble portion of Soya bean phosphatides) were added to 5 cc amounts of gastric contents before the addition of 100 mg of sodium alkyl sulfate demonstrated that lecithin likewise retarded the effect of the detergent (Fig. 4). Lard and mineral oil, on the other hand, were practically ineffective. Olive oil exerted a slight effect.

Small quantities (0.1 cc) of pure triacetin, ethyl butyrate, ethyl caprylate, ethyl laurate, ethyl myristate, butyl stearate, and glycerin also retarded the pepsin-inactivating action of sodium alkyl sulfate; triacetin proved the most effective and glycerin the least effective (Table I). The degree of "protection" from the action of the detergent appeared to be greater with the fatty acid esters than with the other lipids tested. The pH of the gastric contents was not altered significantly in these experiments.

Conclusion. Sodium alkyl sulfate decreases the peptic activity of the gastric contents in man when administered in adequate doses in conjunction with a diet low in lipids. The pepsin-inactivating action of sodium alkyl sulfate is inhibited *in vitro* by cream, butter, lecithin, glycerin, and esters of fatty acids with carbon chains of varying length. Lard, mineral oil and olive oil are practically ineffective in this respect.

TABLE I.
Inhibition of Pepsin-Inactivating Action of Sodium Alkyl Sulfate by Esters of Fatty Acids and by Glycerin.

	Peptic activity (Milliunits per cc)	
Gastric juice alone	728	985
" " + 100 mg Sodium Alkyl Sulfate	0	0
" " " " " " " " + Triacetin	538	708
" " " " " " " " " " Ethyl Butyrate	394	625
" " " " " " " " " " " " Caprylate	483	645
" " " " " " " " " " " " Laurate	466	686
" " " " " " " " " " " " Myristate	473	665
" " " " " " " " " " Butyl Stearate	319	645
" " " " " " " " " " Glycerin	149	559

0.1 cc quantities of fatty acid esters and glycerin added to 5 cc gastric juice before addition of 100 mg sodium alkyl sulfate.