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Gastric Mucin a Prophylactic Against Gastro-Duodenal Ulcers and "Acute" Toxicity Resulting from Cincophen.

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It has been shown by Van Wagoner and Churchill[1] and Barbour and Fisk[2] that relatively large doses of cincophen administered daily by stomach tube will cause gastro-duodenal ulcer and liver damage. The occurrence of ulcer after cincophen administration has recently been reported to occur in man.[3] It has also been found that gastric mucin is prophylactic against the gastro-duodenal ulcer and disturbance of nutrition that results in some biliary fistula dogs[4] and is of benefit in the nutritional disturbance that occurs in some Eck fistula (liver damage) dogs.[5] Accordingly, we decided to ascertain if gastric mucin might prevent the occurrence of "peptic" ulcer in and prolong the life of dogs receiving large doses of cincophen.

Twenty-eight healthy dogs were used. Fifteen served as controls in that they received only cincophen, and 13 received both cincophen and mucin. The cincophen was made up in a starch paste solution (20 gm. of cincophen, 40 gm. starch and 2000 cc. H_2O), and administered by stomach tube to all dogs once daily in a dose of 100 mg. per kilo. The dogs that were given mucin received 30 gm. in solution in water about 2 hours before the cincophen in the morning and a second dose of 30 gm. during the evening. The dogs were given the regular stock diet consisting of yellow corn meal, bone soup, ground meat and baker's bread. The treatment was continued in the control group until they died, and in the group treated with mucin until they died or the experiment was terminated at 60 or 80 days. Portions of the liver and kidneys were removed for histologic study.

Results. Gastro-duodenal ulcer. Controls. Gastro-duodenal ulcers were found in all of the 15 control dogs in from 7 to 59 days. The ulcers were like those obtained by Van Wagoner and Churchill. In regard to susceptibility to the cincophen, the dogs varied consider-

[1] Van Wagoner and Churchill, Proc. Soc. Exp. Biol. and Med., 1931, **28**, 581.

[2] Barbour and Fish, *J. Pharm. and Exp. Therap.*, 1933, **48**, 341.

[3] Block and Rosenberg, *Am. J. Dig. Dis. and Nutr.*, 1934, **1**, 29.

[4] Ivy and Kim, *J. Am. Med. Assn.*, 1931, **97**, 1511; Proc. Soc. Exp. Biol. and Med., 1932, **29**, 686.

[5] Crandall, Roberts and Gibbs, Proc. Soc. Exp. Biol. and Med., 1932, **29**, 1082.

ably as is shown in Table I. The average length of life was 22.4 days.

TABLE I.
Dogs Receiving Cincophen Alone.
Cincophen: 100 mg. per kilo daily.

Dog No.	Initial Weight lbs.	Loss (—) or Gain (+) wt. lbs.	Length of life, days	Ulcer	Cause of Death
1	26.4	— 1.7	9	+	Hemorrhage from multiple gastric erosion and a large pyloric ulcer
2	39.1	— 0.5	7	+	Sacrificed due to asthenia. Gastric erosions and large pyloric ulcer
3	26.4	— 3.3	14	+	Perforating ulcer near pyloric outlet
4	21.8	— 0.9	7	+	Gastric erosions and large pyloric ulcer
5	24.0	— 3.2	19	+	Hemorrhage from ulcer at pyloric outlet
6	19.8	— 2.2	14	+	Hemorrhage from ulcer at pyloric outlet
7	17.6	— 5.3	11	+	Sacrificed. Ulcer of pylorus and duodenum
8	19.8	—	22	+	Pneumonia. Large ulcer at pyloric outlet
9	19.0	— 6.0	16	+	Perforation—duodenal ulcer
10	22.0	— 8.8	15	+	" " "
11	18.7	— 3.3	21	+	Ulcer at pylorus
12	35.6	—16.4	59	+	Duodenal ulcer—hemorrhage
13	27.0	— 8.6	26	+	Ulcer at pylorus
14	19.0	— 6.0	47	+	Perforation—duodenal ulcer
15	23.0	— 8.0	49	+	Duodenal ulcer
Aver. 15		— 5.3	22.4	15	

TABLE II.
Dogs Receiving Mucin and Cincophen.
Cincophen: 100 mg. per kilo daily. Mucin: 30 grams twice daily.

Dog No.	Initial Weight lbs.	Loss (—) or Gain (+) wt. lbs.	Length of Expt. Days	Ulcer	Cause of Death
1	16	+ 2.0	37	+	Perforated duodenal ulcer
2	16	+ 0.5	60	None	Sacrificed. Normal grossly
3	17	— 7.0	54	"	Pneumonia. Completely healed ulcer scar in duodenum
5	16	+ 2.5	60	"	Sacrificed. Normal grossly
6	39.7	—13.7	80	+	Sacrificed. Chronic indurated duodenal ulcer
7	36	— 6.0	80	None	Sacrificed. Normal grossly
8	26.5	— 5.0	80	"	" " "
9	35.5	— 3.0	80	"	" " "
10	20.0	+ 6.0	60	"	" " "
11	20.0	+ 1.0	60	"	" " "
12	22.0	— 0.5	60	"	" " "
Aver. 11 dogs		— 2.1		2 ulcers	18 % ulcers

Dogs 4 and 4b died of pneumonia on the 32nd day without ulcer. They are omitted from the table because they died prior to 60 days without ulcer.

In dog 3 pneumonia and in dog 6 hemorrhage accounts for some of the loss of weight.

Treated. The dogs receiving mucin and cincophen reacted quite differently as a group. All had some diarrhea during the first 2 weeks; one-half of them had a bloody diarrhea during this period. Five of them (Dogs 1, 3, 6, 7, 8) had some diarrhea and anorexia intermittently throughout the experimental period. The remainder after the first 2 weeks were apparently unaffected. Five even gained weight. Of the 11 dogs in which the experiment was completed, only 2 developed ulcer, or 18%, in contrast to the 100% incidence of ulcer in the control or untreated group. (Table II.)

The histology of the liver and kidney of both groups of animals is being studied by Dr. T. P. Churchill, Pathologist.

Conclusion. The administration of gastric mucin is markedly effective in preventing the gastro-duodenal ulcer and "acute" toxicity of cincophen in dogs.

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Dextrose Yield of Glycinin.

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Since soy bean foods have been found to be useful in the diabetic dietary,[1] it was thought desirable to determine the dextrose conversion of soy bean protein.

Glycinin, a specific globulin, which constitutes 90-95% of the protein of the soy bean,[2] was prepared by a new method, since older methods were found to be tedious. Commercial soy bean flour was freed of fat by ether extraction. The residue was then suspended in water at a pH of 2-3, filtered, and the dissolved glycinin precipitated at its isoelectric point by adjusting the reaction to pH 4.7. The flocculent precipitate was washed with distilled water, redissolved at pH 2-3, filtered, and reprecipitated at pH 4.7. After washing, the precipitate was dried with alcohol and ether. This preparation contains 15.56% nitrogen, 5.5% moisture, 0.82% ash, and gives a negative Molisch test for carbohydrate.

Glucose yields were obtained on completely phlorizinized dogs, using the method applied by Janney[3] to the determination of glucose

[1] Friedenwald and Rurah, *J. Am. Med. Sci.*, 1910, **140**, 793.

[2] Osborne and Campbell, *J. Am. Chem. Soc.*, 1898, **20**, 419.

[3] Janney, *J. Biol. Chem.*, 1915, **20**, 321.