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Influence of Diarrhea upon Gastro-Intestinal Auto-Disinfection.

LLOYD ARNOLD AND THOS. G. HULL.

From the Department of Bacteriology and Preventive Medicine, University of Illinois, and Diagnostic Laboratory, State Department of Public Health, Chicago.

Young dogs (2 to 4 mos. old) were placed in warm and humid rooms (90° F. temperature, 85 to 90% humidity) for 3 days. They were given 100 cc. of cows' milk every 8 a. m., 12 noon, and 4 p. m. Half of the animals were given sanitary tap water and half were given polluted water (Chicago River water). No diarrhea developed in any of these 12 animals. Two hours before killing them in an ether chamber, they were given 100 cc. of their respective drinking water samples plus one agar slant of *B. prodigiosus*. The contents of various levels of the gastro-intestinal tract were diluted in broth and immediately seeded on agar plates. The relative distribution of *B. prodigiosus* was determined in relation to the concentration of the ingested suspension. Six puppies of about the same size were given the tap water and 6 the polluted water in ordinary tem-

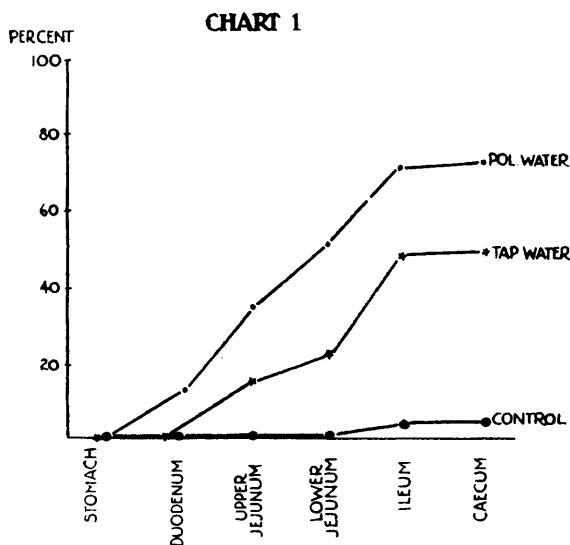


CHART 1.

Plain tap and sewage polluted water.

Ordinate—% *prodigiosus* in relation to concentration fed by mouth.

Abscissa—segments of gastro-intestinal tract.

—o—o— Controls in ordinary temperature room, tap and polluted water the same.

perature rooms. Chart I shows the results. There was an interference with the intestinal bactericidal power in the warm room; this was most marked when polluted water was given instead of tap water. The same experiment was repeated, except that the water samples were brought to pH 8.0 with sodium carbonate solutions. The alkalinized polluted water caused diarrhea in 8 of the 12 puppies. The alkalinized tap water caused semifluid stools in 6 of the 12 puppies. Chart II shows the results. There was an inhibition

CHART 2

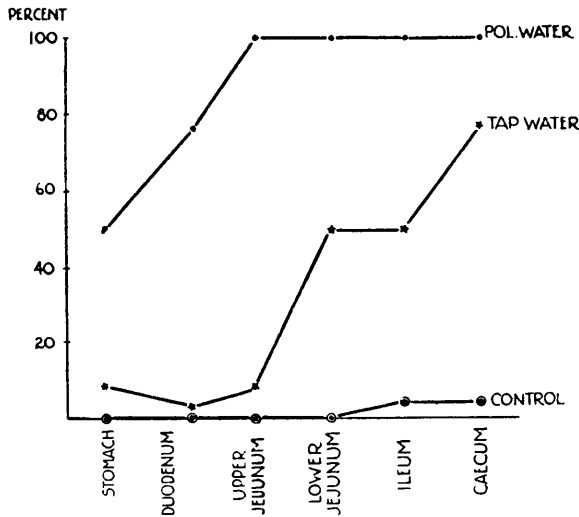


CHART II.

Alkalinized tap and sewage water.

Ordinate—% *prodigiosus* in relation to concentration fed by mouth.

Abscissa—segments of gastro-intestinal tract.

—o—o— Controls in ordinary temperature room, tap and polluted water the same.

in the bacterial killing power of the gastro-intestinal tract in the polluted water animals in this experiment.

Non-leaking gastric and appendicial fistulae were established upon 4 grown dogs. The small intestine was attached to the anterior abdominal wall at about the duodenojejunal junction. 300 cc. of cows' milk plus an agar slant of *B. prodigiosus* was ingested and specimens were removed at the same time from the stomach, small intestine and caecum. The acidity of the gastric contents was titrated for acid-deficit and free acid. The H-ion concentration of the intestinal contents was determined by colorimetric method. The

CHART 3

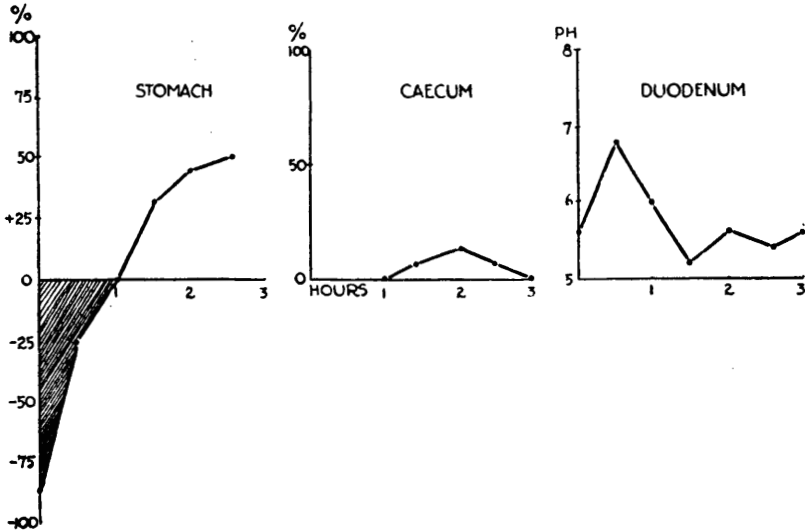


CHART III.

300 cc. plain milk plus *B. prodigiosus*.

Stomach—Ordinate—Acid deficit and free acid in clinical units.

Abcissa—Time in hours.

Caecum—Ordinate—% of ingested *B. prodigiosus* appearing in caecum in relation to concentration fed.

Abcissa—Time in hours.

Duodenum—Ordinate—pH of contents.

Abcissa—Time in hours.

caecal contents was diluted in broth and immediately seeded upon agar plates and the relative concentration of *B. prodigiosus* was determined in per cent as compared to the material fed to the animal. Chart III gives the results. The same experiment was repeated, except the milk was brought to pH 8.0 with sodium hydroxide. Chart IV gives the results. Young broth cultures of *B. shiga* were lysed with bacteriophage and the 150 cc. of the filtered material was diluted with an equal volume of broth and fed to these dogs plus a slant of *B. prodigiosus*. Specimens were removed and handled in the manner described for the previous experiment. Chart V gives the results. All 3 animals used for this experiment had diarrhœa, *B. prodigiosus* was present in the fluid feces in large number.

The self-disinfecting power of the gastro-intestinal tract was inhibited in experimental diarrhœa in young and adult dogs. Ingested bacteria are not destroyed in the usual manner. This would increase the hazard of infection if pathogenic bacteria were ingested during this period. There is a gastrointestinal irritant in polluted water. Water-borne out-breaks of diarrhœa in humans fol-

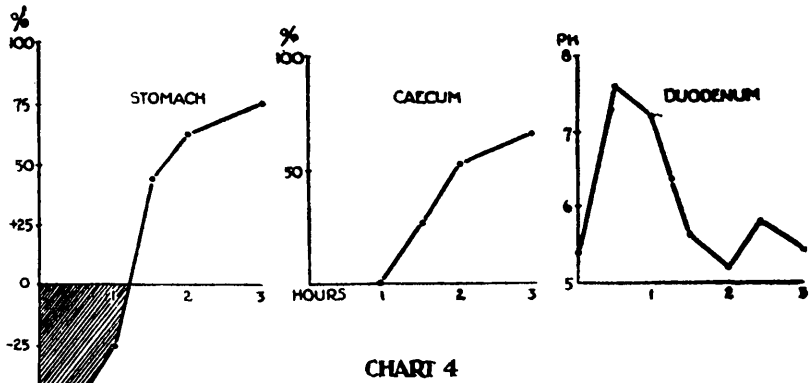


CHART IV.

300 cc. alkalized milk plus *B. prodigiosus*.
 Stomach—Ordinate—Acid deficit and free acid in clinical units.
 Abscissa—Time in hours.
 Caecum—Ordinate—% of ingested *B. prodigiosus* appearing in caecum in relation to concentration fed.
 Abscissa—Time in hours.
 Duodenum—Ordinate—pH of contents.
 Abscissa—Time in hours.

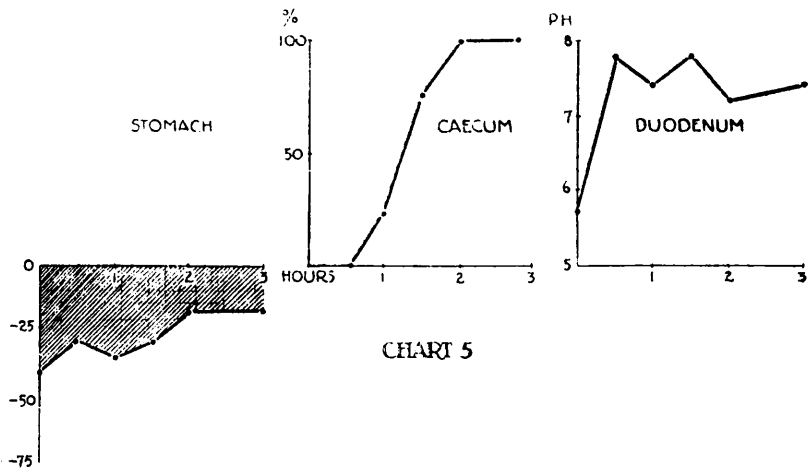


CHART V.

150 cc. *B. shiga* bacterial proteins.
 Stomach—Ordinate—Acid deficit and free acid in clinical units.
 Abscissa—Time in hours.
 Caecum—Ordinate—% of ingested *B. prodigiosus* appearing in caecum in relation to concentration fed.
 Abscissa—Time in hours.
 Duodenum—Ordinate—pH of contents.
 Abscissa—Time in hours.

lowing a pollution of the drinking water supply is well known. Chronic biliary typhoid carriers may be made large reservoirs of *B. typhosus* as a result of an attack of diarrhea. Epidemics of typhoid fever following a large water-borne diarrhea outbreak, may be due to disturbances in the equilibrium between parasites and host, namely, to increase in the distribution of *B. typhosus* and increase in the susceptibility of the host.

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Effect of Intratracheal Inoculation on Chronicity of Lung Abscess.

W. E. ADAMS, C. M. VAN ALLEN AND LOIS A. DAY.

From the Department of Surgery, University of Chicago.

It has been amply demonstrated experimentally that the type of organism infecting a lung abscess is important in determining the healing time. Thus, when *Staphylococcus aureus* alone is introduced into the lung parenchyma of dogs, abscesses are produced that heal within 4 weeks¹; when a mixture of the common pyogenic bacteria is used, the abscesses heal more slowly²; the spirillum and fusiform bacillus of Vincent give rise to abscesses that last 2 to 3 months³; and *Tubercle bacillus* abscesses may require a much longer time to heal.⁴

The purpose of the following experiments is to determine whether a lung abscess infected with an organism known to produce only acute lesions may be rendered slow to heal by intratracheal insufflation of organisms which are capable of originating chronic lung lesions. Dogs were used, and lung abscesses were obtained by liberating infected emboli into the venous stream (Cutler,⁵ Holman⁶). Intratracheal insufflation was done with the animal deeply morphinized to control the cough reflex, and thinned sputum was used, obtained freshly from patients with chronic lung suppuration.

Group A. 14 dogs. Embolus with *Staphylococcus aureus*. 3

¹ Van Allen, C. M., *Deutsche Z. f. Chir.*, 1928, ccix, 1.

² Holman, E., Chandler, L. R., and Cooley, C. L., *Surg., Gynec. and Obst.*, 1927, xlv, 328.

³ Weidlein, I. F., and Herrmann, L. G., *J. Am. Med. Assn.*, 1928, xci, 850.

⁴ Van Allen, C. M., Adams, W. E., and Day, Lois, unpublished work.

⁵ Cutler, E. C., and Schlueter, S. A., *Ann. Surg.*, 1926, lxxxi, 256.

⁶ Holman, E., Weidlein, I. F., and Schlueter, S. A., *PROC. SOC. EXP. BIOL. AND MED.*, 1926, xxiii, 266.