

and the urine was always negative for albumen. The 24-hour urine volumes of the control period averaged only 590 cc., as compared with 1435 cc. for the experimental period, an effect which we notice with human subjects also.

Owing to the obvious impossibility of proving descent from similarity I do not propose these data in relation to any theory on human descent; however, I do think that they reveal an interesting point in intermediary metabolism which I hope to investigate further.

I wish to acknowledge with gratitude the very generous cooperation of the authorities at the Bronx Zoo, especially that of Dr. Charles V. Noback and his assistant.

8466 C

Effect of Iodine on Absorption of Cholesterol.*

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It is now an established and unequivocal fact that cholesterol is readily absorbed from the gastro-intestinal tract and that an increase may be demonstrated in the thoracic duct chyle after feeding. Relatively little is known, however, about the factors influencing this absorption. Thus, when a rise in the blood cholesterol of rabbits was prevented for several months by feeding potassium iodide with the cholesterol,¹ it was considered possible that the iodide in some way prevented the absorption of the sterol, but no information bearing on this point was available.

It seemed possible to approach the problem by feeding cholesterol to normal and iodized animals and determining the level of the cholesterol in the chyle. Unfortunately the small size of the thoracic duct in rabbits made it infeasible to use them for this purpose although it would have been desirable to carry out the work on the same species of animal used in the previous experiments. Dogs seemed to offer the least technical difficulty and accordingly were used with the realization that, while results obtained in omnivores could not be applied directly to herbivorous animals such as rab-

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¹ Turner, K. B., and Khayat, G. B., *J. Exp. Med.*, 1933, **58**, 127.

bits, nevertheless it might be possible to answer the question as to whether the iodide influenced the absorption of the sterol.

The dogs chosen for experimental subjects were long-necked hounds about one year old, weighing 9 to 13 kg. Pentobarbital sodium (Nembutal, Abbott) on the average of 40 mg. per kg. body weight given intraperitoneally induced deep anesthesia for about one hour. This was usually sufficient for the operative procedure. After obliterating all visible lymphatics on the right side of the neck which might possibly transport chyle, as suggested by Drinker and Field,² a thoracic duct fistula was made on the left side. With minor variations the method used was one described by Krupping and Kummell.³ The chyle was shunted into an isolated segment of the left external jugular vein, into which a paraffined glass cannula had been tied. In common with other investigators, we experienced difficulty in collecting chyle for more than 6 or 8 hours. The collection of chyle was stopped when delivery from the cannula became slow or intermittent, or if the resulting specimen became thin or contaminated with blood. The animal was allowed to recover at the end of the operation, but was usually still dazed or sleeping when the flow of chyle ceased.

The chyle was allowed to clot in the collecting bottles. The clot was then ground up thoroughly and the cholesterol determined as in blood by the method of Bloor, Pelkan and Allen.⁴

As a control group, 9 dogs were used. These animals were fasting excepting for the fact that they were given 250 cc. of 40% cream at a variable time before operation in order to assure visualization of the thoracic duct. The seemingly long interval that elapsed between the feeding of the cream and the collection of specimens was intentional as it was desirable to have the process of absorption well under way before subjecting the animal to the anesthetic and the trauma attendant upon the operative procedures. After operation when the flow of chyle was established 2-hour samples were collected as long as the flow remained free and profuse. Sixteen samples from the 9 animals were secured. The results are given in Table I. The cholesterol content of the chyle varied from 69 to 152 mg. per 100 cc. with an average of 121 mg.

In a second group were 6 dogs. These were given cream as in the control group except for the fact that 10 gm. of cholesterol were

² Drinker, C. K., and Field, M. E., *Lymphatics, Lymph and Tissue Fluid*, Williams and Wilkins Company, 1933, 175.

³ Krupping, H. W., and Kummell, H., Jr., *Beitr. z. Klin. Chir.*, 1924, **132**, 123.

⁴ Bloor, W. R., Pelkan, K. F., and Allen, D. M., *J. Biol. Chem.*, 1922, **52**, 191.

CHOLESTEROL ABSORPTION

TABLE I.
Chyle Cholesterol of Dogs Fed Cream.

Dog No.	Hr. after feeding	Chyle cholesterol mg./100 cc.
151	6-8	128
162	4-6	69
163	4-6	131
185	2-4	152
214	7-9	114
	9-11	105
	11-13	136
303	14-16	116
	16-18	127
304	7-9	136
	9-11	134
	11-13	136
420	13-15	120
	15-17	112
	17-19	88
424	12-13	127
	Aver.	121

mixed with the cream. There was one exception to this procedure. One dog (No. 185) was given cream alone and a fistula produced. After a sample of chyle had been taken (Table I), cream and cholesterol were given by stomach tube and additional specimens obtained for analysis. A total of 12 samples was secured from the 6 dogs after the cholesterol feeding. The results are given in Table II. The range of the chyle cholesterol was from 108 to 258 mg. with an average of 169 mg.

TABLE II.
Chyle Cholesterol of Normal Dogs Fed Cream and Cholesterol.

Dog No.	Hr. after feeding	Chyle cholesterol mg./100 cc.
176	6-8	180
	8-10	180
185	0-2	142
	2-4	162
	4-5	175
224	3-5	114
	5-7	108
	7-8	142
285	15-17	208
421	13-15	174
422	13-15	258
	15-17	182
	Aver.	169

In the final group were 4 dogs. For one week before operation each animal was given daily 1 cc. of a saturated solution of potassium iodide by mouth. Cream with an added 10 gm. of cholesterol

was given preoperatively as in the preceding group. Ten specimens were secured in the usual manner from the 4 dogs. The results are given in Table III. The chyle cholesterol varied from 164 to 221 mg., with an average of 193 mg.

TABLE III.
Chyle Cholesterol of Iodized Dogs Fed Cream and Cholesterol.

Dog No.	Hr. after feeding	Chyle cholesterol mg./100 cc.
323	15-17	213
	17-19	171
370	13-15	170
	15-17	164
	17-19	180
	13-15	208
371	11-13	221
406	13-15	190
	15-17	208
	17-19	206
	Aver.	193

From the foregoing it is evident that cholesterol absorption from the gastro-intestinal tract is not prevented by the previous administration of potassium iodide. The average chyle cholesterol for the dogs receiving cream alone was 121 mg. compared to 169 mg. for the normal animals fed cholesterol and cream, and 193 mg. for the iodized group. The results are further summarized in Fig. 1. The figures given perhaps suggest that the iodide may even augment

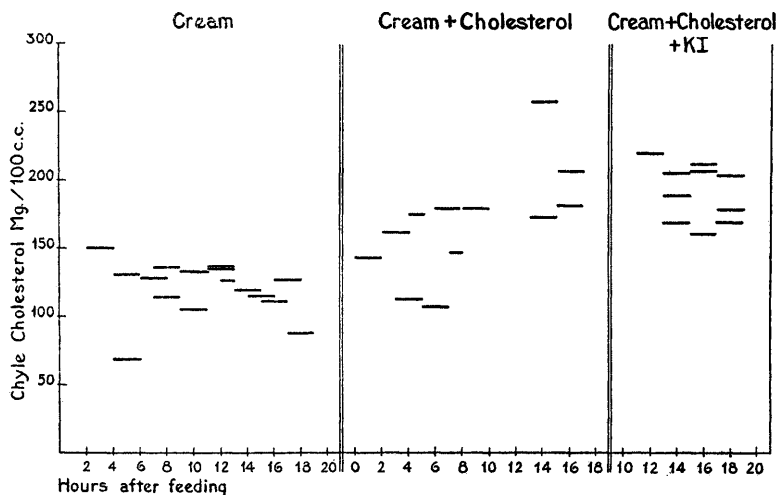


FIG. 1.
Chyle cholesterol values for the 3 groups of dogs. Each horizontal line represents one determination.

the absorption of cholesterol. However, when only the specimens obtained 11 hours or more after the feedings are considered this apparent discrepancy disappears. For the control group the average chyle cholesterol then becomes 120 mg.; for the normal dogs given cream and cholesterol, 206 mg.; and for the iodized animals, 193 mg.

Conclusion. Potassium iodide does not prevent the absorption of cholesterol from the gastro-intestinal tract of dogs.

8467 P

Vaccination of Human Subjects with Virus of Human Influenza.

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The immunization of ferrets and mice^{1, 2} with human influenza virus has been reported. When injected into these animals by the subcutaneous or the intraperitoneal routes the virus elicits no evidence of infection, but the animals so treated develop circulating antibodies against the virus and become actively resistant to the infectious agent introduced by the intranasal route. More recently it has been possible to demonstrate the same effects with virus grown outside the animal body in tissue culture medium.^{3, 4}

The successful cultivation of the virus in artificial medium immediately eliminated many of the undesirable features, such as the possibility of bacterial contaminants, extraneous viruses, etc., which constantly attend the use of virus from infected animals for studies in human individuals. After preliminary tests upon 3 human subjects which demonstrated that the artificially cultivated virus injected subcutaneously produced no serious reactions, a group of adult human volunteers was selected to determine the immunizing capacity of culture virus.

From among the subjects available, those individuals were selected whose serum beforehand exhibited the least protective power against the human influenza virus, as measured by its capacity to protect white mice against a high concentration (10% suspension)

¹ Francis, T., Jr., and Magill, T. P., *J. Exp. Med.*, 1935, **62**, 505.

² Smith, W., Andrewes, C. H., and Laidlaw, P. P., *Brit. J. Exp. Path.*, 1935, **16**, 291.

³ Francis, T., Jr., and Magill, T. P., *Science*, 1935, **82**, 353.

⁴ Magill, T. P., and Francis, T., Jr., *J. Exp. Med.*, in press.