

content of the blood to a concentration where convulsions could be produced experimentally, if no additional chloride was administered. (Table III.)

7643 C

Effect of Heavy Administration of Viosterol on Metabolism of the Rat.

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In a previous communication¹ it was shown that when large doses of irradiated ergosterol were administered to normal dogs there was a very great increase in metabolic rate. Since it appears that the rat is relatively insensitive to toxic effects of this substance, it seemed advisable to investigate its effect on the metabolism of the rat. Three rats of each sex were selected and trained for several months in a metabolism chamber. They were kept in separate cages and fed on the Wistar normal diet. The cages were kept in the same room where the apparatus was operated during a period of nearly 10 months, and the rats were handled only by the operator. It is believed, therefore, that extraneous factors were eliminated as completely as possible.

The apparatus used consisted of a closed circuit with a motor-driven hydraulic pump that delivered approximately 90 cc. of air each half minute. The respiration chamber consisted of a glass jar. Volume change was recorded on a kymograph by means of a writing needle attached to the bell of a small spirometer cut into the circuit. There was no new principle introduced into the arrangement.

The surface area was calculated by the formula derived by Lee,² $S = KW^{0.60}$ in which $K = 12.54$, $W =$ weight in gm., and $S =$ surface area in cm^2 . It was mentioned in the earlier publication that one of the difficulties in calculating the surface area in the dog was the varying weight. Since the rat weight also varied it was thought necessary at first to use Lee's modification of Cowgill's formula,³ $S = KW^{0.61} \times \frac{0.31}{\text{Nobs}}$ but comparisons of surface area calcu-

¹ Reed, C. I., Thacker, E. A., Dillman, L. M., and Welch, J. W., *J. Nutrition*, 1933, **6**, 355.

² Lee, M. O., *Am. J. Physiol.*, 1929, **80**, 24.

³ Cowgill, G. H., and Drabkin, D. I., *Am. J. Physiol.*, 1927, **81**, 36.

lated by the 2 formulae on the same animal made it apparent that for purposes of comparison over a period of time there was not enough difference to justify the use of the more complicated formula.

The irradiated ergosterol was in the form of viosterol 10,000X,* which contains 920,000 International Units per cc. Where dilution was necessary a highly purified grade of corn oil was used. The material was administered by mouth by means of a small bore silver tube attached to a hypodermic needle. This, in turn, was fitted onto a 1 cc. tuberculin syringe. In this way accurate administration was insured.

F.1. The average metabolic rate from March 17 to June 6 was 801 ± 39 cal/M²/24 hrs. During this time the weight increased from 166 gm. to 180 gm. Beginning on June 6 a dose of 0.1 cc. of 10,000X viosterol (92,000 I. U.) was administered daily for 6 days. During this time the average rate was 1127 cal/M²/24 hrs., but on June 14 it fell to 676 cal. and continued definitely low but very irregular to August 1, when the original level was attained except for 2 high points on June 27 and July 10. The average for this period was 740 cal.

The weight decreased from 180 gm. to 146 gm. on June 20, then began to increase rather rapidly until on July 3 when the animal weighed 171 gm. During the next month the gain was less rapid. The original weight of 180 gm. was not regained until August 1.

On August 16 was begun the daily administration of 9200 I. U. of viosterol over a period of 12 days, during which time the average rate was 796 ± 15 cal/M²/24. On August 28 the daily dose was increased to 20,000 I. U. for 4 days. There was a progressive increase in the rate to 973 cal. on September 6, after which there was a progressive decline to the end of September to the original level. The weight fluctuated some but the average for the entire period up to September 15 when began a steady increase, was 176 gm.

F.2. Average metabolic rate from April 1 to June 6, 830 ± 23 cal/M²/24 hrs. On the latter date the weight was 185 gm. June 6 to 10 inclusive 0.2 cc. daily of 10,000X viosterol were administered (184,000 I. U.). There was no pronounced alteration until June 14, when the rate suddenly fell to 408 cal/M²/24 hrs. The animal died 6 hours later. The weight had decreased to 142 gm.

F.3. Average rate April 1 to June 6, 834 ± 50 cal/M²/24 hrs. Weight on June 6, 154 gm.

Three daily doses of 0.5 cc. 10,000X viosterol (460,000 I. U.)

*Supplied by Mead Johnson & Company.

were administered beginning on June 6. The weight declined progressively to 126 gm. on June 13. The rate dropped sharply to 700 cal. on June 9, then increased to 907 on June 12. The animal died the following day.

M.1. Average rate, April 1 to June 1, 754 ± 31 cal/M²/24 hrs. Weight on June 6, 252 gm. At this time 0.2 cc. daily of viosterol 10,000X (180,000 I. U.) were administered over 3 days. The weight declined to 214 gm. on June 14, but was restored to 252 gm. on June 21. The animal continued to gain slowly to 264 gm. on August 16, when the second period of administration was begun. This comprised 30,000 I. U. daily over 4 days.

On June 7 the rate was 880 cal/M²/24 hrs., thereafter declining progressively to 580 cal. on June 14 and remaining in this level until June 21 when there was a second increase finally mounting to 1140 cal. on June 27. The average for the second period of increased rate was 958 ± 182 . Up to July 25 there was a second low period averaging 614 ± 106 . Thereafter the original rate was restored.

With the second period of administration the rate increased promptly and progressively to 1010 cal. on August 21 and reached the original level on September 5. The average during this period was 913 ± 103 cal.

M.2. Average rate, April 1 to June 1, 735 ± 41 cal/M²/24 hrs. Weight June 6, 306 gm. June 6 to 8 inclusive 0.6 cc. viosterol 10,000X (552,000 I. U.) daily. The rate declined from 753 cal/M²/24 hrs. on June 6 to 582 on June 12. The weight declined during this period to 248 gm. This animal was found dead the following day.

M.3. Average rate during the entire period from April 1 to September 1 was 780 ± 63 cal/M²/24 hrs. Weight at the termination of the experiment, 244 gm. This animal was retained as a control.

From these experiments it is apparent that the basal metabolic rate of the albino rat may be increased markedly if the dose administered is not too large. Even with a toxic dose there is a transient elevation of the rate followed by a decline below the original level. Three of the 5 animals died. The 2 survivors continued to exhibit an irregular but low average rate for several weeks, followed by a normal period.

This extreme irregularity was displayed by the dogs also, but there was little tendency to depression below the original level. Possibly the inherent errors in calculation of the rate account for the difference but this seems unlikely.

It appears then that vitamin D in the form of viosterol produces an increase in the metabolic rate in the normal rat similar to that previously reported for normal dogs.

7644 P

Acid and Enzyme Content of Postoperative Emesis as Indication of Regurgitation from the Duodenum.

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The lack of knowledge concerning the cause of the nausea and vomiting which follows surgical operation prompted these studies. We have examined 115 specimens of postoperative vomitus from 62 cases chosen at random to include anesthetics and operations of many types. Over half had had ether either alone or in combination with other anesthetics. These factors seemed to bear no relationship to the results tabulated below.

No free acid	95	specimens
0 to 20° free acid	9	"
20 to 40° free acid	4	"
40 to 60° free acid	4	"
80° or more free acid	3	"
Total	115	"

Cushing¹ has recently called attention to a possible nervous mechanism in the production of peptic ulcer. In this connection it is interesting to note that of 11 specimens with an acidity over 20, 7 were obtained following operations for brain tumors. This observation might be explained by Cushing's postulation of a center in the cerebrum which is capable of promoting gastric secretion.

Not only the cases that actually vomit have this anacidity. Postoperative aspiration was done by nasal catheter in 15 patients. In these specimens there was no free acid. This lack of acid is not accompanied by a corresponding lack of enzymes. In all cases where free acid was present peptic activity was present, and in most of the cases (91 of 115) where the acid was absent peptic activity was detected after acidification with 0.4% hydrochloric acid. Rennin was present in 80 of 115 specimens.

¹ Cushing, H. K., *Surg. Gynec. and Obst.*, 1932, 55, 1.