

## X. Gastrointestinal tract and Pancreas

### A Study on Intestinal Absorption of Supraphysiologically Large Doses of Hydroxocobalamin with an Aid $^{57}\text{Co}$ -Labeled Hydroxocobalamin

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Intestinal absorption of supraphysiologically large dose of hydroxocobalamin ( $\text{OH-B}_{12}$ ), especially that of repeatedly given doses, has not yet fully clarified. An attempt was made to study this problem in albino rats of Wistar strain (250-300 gr.b.w.), in which 2500 ng ( $2.5 \mu\text{g}$ ) was found to correspond to a large dose of 1000  $\mu\text{g}$  in humans. Under light ether anesthesia, 2500 ng. of cold  $\text{OH-B}_{12}$  containing 50 ng. of  $^{57}\text{Co-OH-B}_{12}$  was ingested 1, 2, 3, and 15 times through a polyvinyl tube into the stomach of overnight fasted rats. When repeatedly given more than 2 times, the dose was ingested every other day. Seven days after the final dose, the animals were exsanguinated to death, and the liver and the kidneys were removed. All the feces excreted by the time of the sacrifice was also collected. These materials were then counted for  $^{57}\text{Co}$  radioactivity by a well type scintillation counter, in order to evaluate the absorption. A similar observation was made in a order to evaluate the absorption. A similar observation was made in a control group of rats which received a single dose of 50 ng of  $^{57}\text{Co-OH-B}_{12}$  alone.

Results obtained are as follows:

#### (1) Percent Absorption of Hydroxocobalamin

With a single dose of 50 ng of  $\text{OH-B}_{12}$ , liver and kidney distributions of absorbed  $\text{OH-B}_{12}$  were found 9.34% and 9.86% of the dose, respectively, and the % absorption calculated from fecal excretions of  $^{57}\text{Co-OH-B}_{12}$  was approximately 56.0%. Meanwhile, when large dose (s) of 2500 ng were ingested, liver and kidney distributions were found only 1/3 to 1/10 of those in a single 50 ng given control group. As to the % absorption as cal-

culated from fecal excretions, it was in the vicinity of 56% in the control group, whereas it was less than 1/2 of the absorption of the control group in large dose group.

#### (2) Absolute Amounts of Absorbed $\text{OH-B}_{12}$ and Its Tissue Distributions

The absorption was expressed as ng to determine the absolute amounts absorbed.

##### a) Absolute Amounts of Absorbed $^{57}\text{Co-OH-B}_{12}$

Absolute amounts of absorbed  $^{57}\text{Co-OH-B}_{12}$  as calculated from fecal excretions and its liver and kidney distributions were 28 ng, 4.7 ng, and 9.9 ng, respectively, in control group. In contrast to the % absorption, however, absolute amounts of  $\text{B}_{12}$  absorbed were found to be increased with the doses in large dose group, showing a good parallel to the increase of the dose. This was true of  $\text{B}_{12}$  distributions per gram wet weight of the liver and the kidney.

##### b) Absolute Amounts of $\text{OH-B}_{12}$ from Oral Large Doses

Calculation was made to get ideas how much of the large doses of  $\text{OH-B}_{12}$  was in fact absorbed and distributed in rat tissues. As a result, it was again shown that although the percent absorption was almost the same as in control group, absolute amounts of  $\text{OH-B}_{12}$  absorbed from the large doses and of its tissue distributions were increased with the increment of the dose, indicating an almost geometrical increase in proportion to the dose.

From these observations, it may reasonably be concluded that the oral large doses of hydroxocobalamin can be absorbed enough as well, although the efficiency of the absorption

is poor. However, further investigations are required before definite conclusions are drawn about the fate of the vitamin thus absorbed,

its metabolism, transfer, storage, utilization or excretion.

ng. = nanogram = millimicrogram.

### On the Dose of the Cold Meal in $^{131}\text{I}$ -triolein Test and $^{131}\text{I}$ -oleic Acid Test

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The influence of the dose of the cold meal on fecal excretion was examined in 428 cases of  $^{131}\text{I}$ -triolein test and 190 cases of  $^{131}\text{I}$ -oleic acid test. Abnormal group (secondary malabsorption) was compared with the control group (other than malabsorption).

Method A represents without cold meal; method B, 0.5 ml/kg and method C, 1.0 ml/kg body weight of cold meal, which consists of pea-nut oil 40 : water 40 : tween-80 3.

Statistical analyses revealed the following. The more the dose of cold meal the higher the fecal excretion in the abnormal group,

while no increase was observed in the control group. Therefore, the abnormality was more definitely detected by method C in triolein test, and by method B in oleic acid test. The authors never tried 1.0 ml/kg body weight of cold meal, which consists of oleic acid 40 : water 40 : tween-80 3, because of its rancid dysodorousness and laxativeness.

The authors' criterion of the range of fecal excretion; that is, normal, under 2.0%; border-line, 2.1-4.0%; abnormal, over 4.1%; was reconfirmed by this study.

### Clinical and Basic Studies of Radioiodinated Lipids Absorption Test

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This study was performed to reevaluate the radioiodinated lipids absorption test. Canules were placed in the thoracic duct, portal vein and femoral vein of adult dogs and radioiodinated lipids were administered into the stomach or duodenum. The results are as follows:

Transportation phase of radioiodinated triolein is divided into two shapes. One is the elevation of radioactivity in portal plasma as

well as the extent of the elevation of lymph-activity and 10 to 70% of radioactivity of portal plasma and lymph were precipitated by TCA. In another cases the radioactivity appeared predominantly in thoracic duct in comparison with the slight elevation in portal plasma. In these cases more than 90% of radioactivity of thoracic lymph was precipitated by TCA, but only less than 60% of radioactivity was precipitated from femoral