

Absorption of Vitamin B₁₂

K. OKUDA

Department of Medicine, Kurume University School of Medicine, Kyushu

Quantitative absorption measurement of B₁₂ became possible after the production of ⁶⁰Co-labeled B₁₂ in 1950. Later, labeling with ⁵⁶Co, ⁵⁷Co and ⁵⁸Co has been achieved and coenzyme B₁₂ are available. Because of its low radiation hazard and high gamma counting efficiency, ⁵⁷Co labeled B₁₂ is being used more frequently. In this paper are presented our studies on B₁₂ absorption in humans and animals using both ⁶⁰Co and ⁵⁷Co labeled B₁₂, particularly on the evaluation of available methods for B₁₂, particularly on the evaluation of available methods for B₁₂ absorption and on the specific mechanism of absorption involving intrinsic factor, a gastric mucoprotein.

It was shown that double tracer study for ⁶⁰Co and ⁵⁷Co is feasible if one uses more of the latter relative to the former with correction for ⁶⁰Co in the counting of ⁵⁷Co. In view of the long biological half life of this vitamin the liver, it is desirable to minimize the dosage for human tests. To this end, we have modified the well-type scintillation counter in such a way that aliquots of 100 cc or more can be used in bottles of suitable size. Though with low efficiency, more counts are obtained in this way, especially if urine is condensed to smaller volumes. Among the four reported methods for radio-B₁₂ absorption, the Schilling's urinary excretion test has been the most popular, the fecal test being less popular because of the cumbersome

handling of the material and continued excretion of radioactivity in feces after 3 days, and the serum (plasma) counting method by Doscherholmen is best recommended because of the lack of unwanted flushing which saturates tissue with cold B₁₂. The correlation between the fecal and urinary excretion tests is fairly good.

The effect of the flushing is the same whether one uses one or four mg of cold B₁₂, and whether the flushing is given at 2 hours or 0 hour after the test dose.

For the study of B₁₂ absorption mechanism, the rat intestinal loop technique (Okuda, *Am. J. Physiol.*, 199:84, 1960) is suitable. It has been shown with this technique and by human studies that there are two different absorption mechanisms one being the physiological which involves IF, and the other nonphysiological. The former is inhibited by chelating agents and the latter not influenced by them. The absorption with the aid of IF involves divalent ions and the process of absorption is rather slow. Small doses of B₁₂-⁵⁷Co are well absorbed from the small bowel following injection into the gut via the serosa or via a jejunal tube, suggesting the presence of IF activity in the lumen which probably comes from the stomach. The main absorptive area is the ileum, while the colon absorbs only supraphysiological amounts of B₁₂, being unable to carry out IF mediated type of absorption.

Studies on Castle's Gastric Intrinsic Factor as Made with the Aid of Radioactive Vitamin B₁₂

S. UKYO

*The First Division, Internal Medicine, Medical Faculty,
Kyoto University, Kyoto*

It is widely accepted that the intestinal absorption of a physiologic dose of vitamin B₁₂ (B₁₂) is mediated by Castle's intrinsic factor⁽¹⁾. However, purification of IF in pure

form has not yet been achieved so far, so that the mode of action, or chemical formula of IF etc., remain unclarified, and this is, in a sense, one of the biggest barriers to the