

Schilling R F. Intrinsic factor studies. II. The effect of gastric juice on the urinary excretion of radioactivity after the oral administration of radioactive vitamin B₁₂. *J. Lab. Clin. Med.* 42:860-6, 1953.
[Dept. Medicine, Univ. Wisconsin Medical School, Madison, WI]

This paper describes a urinary excretion test for estimating a patient's ability to absorb vitamin B₁₂. The most common cause of failure to absorb vitamin B₁₂ is pernicious anemia, but several other conditions also cause B₁₂ malabsorption and can be diagnosed or suspected on the basis of studies of vitamin B₁₂ absorption. [The SCI® indicates that this paper has been cited in over 740 publications since 1955.]

Robert F. Schilling
Department of Medicine
University of Wisconsin
Madison, WI 53792

May 22, 1984

"After spending two thoroughly stimulating years in Harvard's Thorndike Laboratory at the Boston City Hospital, I returned to the University of Wisconsin in 1951 and was given time and space to pursue my research interest in nutritional anemia. The use of radioisotopes as tracers in the study of biology, including human physiology, was relatively new but obviously capable of answering many questions. Rosenblum and Woodbury¹ had recently prepared radioactive vitamin B₁₂ by providing ⁶⁰Co in the biosynthetic process. Heinle and his colleagues² had shown that the absorption of vitamin B₁₂, estimated by measuring fecal radioactivity for seven

days, was greatly below normal in patients with pernicious anemia.

"I was attempting to measure absorption of the vitamin by determining radioactivity in plasma or urine in normal subjects, but no radioactivity was detected with the relatively insensitive apparatus available to me. I had been reading about cold carrier techniques in a radiochemistry text and decided to use what might be called an *in vivo* cold carrier technique: I injected a large amount of nonradioactive B₁₂ after having drunk a physiologic quantity of radioactive B₁₂. The urine collected over the next 24 hours contained easily detectable and quantifiable radioactivity indicating that the orally ingested material had been absorbed. A trial of the technique on a patient known to have pernicious anemia produced no detectable urine radioactivity.

"The urine radioactivity test has been widely used as a test for vitamin B₁₂ absorption because of its simplicity and utility. It has been carefully compared with fecal excretion and whole body counting methods, and the correlation of results is good. Vitamin B₁₂ absorption tests have enabled studies which have significantly increased our understanding of gastrointestinal physiology.

"Physicians and patients are always hopeful that the patient's symptoms are due to a curable disorder. This urine radioactivity test is useful in sorting out the mechanisms of conditions leading to vitamin B₁₂ deficiency, an ideally treatable or even preventable illness. For a recent review, see reference 3."

1. Rosenblum C & Woodbury D T. Cobalt 60 labeled vitamin B₁₂ of high specific activity. *Science* 113:215. 1951.
2. Heinle R W, Welch A D, Scharf V, Meacham G C & Prusoff W H. Studies of excretion (and absorption) of Co⁶⁰-labeled vitamin B₁₂ in pernicious anemia. *Trans. Assn. Am. Physician.* 65:214-22. 1952. (Cited 235 times since 1955.)
3. Chanarin I. *The megaloblastic anaemias*. Oxford: Blackwell Scientific. 1979. 800 p.