

Measurement of Intestinal Absorption of ^{14}C -Compounds (^{14}C -lactose and ^{14}C -glycine-cholate) Using a Convenient Breath-Analysis Technique

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A ^{14}C -lactose absorption test, with the use of a simple CO_2 collection apparatus, was previously reported as a new useful diagnostic test for lactose deficiency among Japanese. The method consists of measurement of the specific activity of $^{14}\text{CO}_2$ in the exhaled air after oral administration of $5\mu\text{Ci}$ lactose- ^{14}C together with carrier lactose (50 g). The $^{14}\text{CO}_2$ -specific activity in the breath 0 to 4 hours after ingestion of ^{14}C -lactose relates to the adequacy of lactose digestion. For the further validation of the technique comparative study with Tolbert's Respiration Pattern Analyzer was performed. The difference between these two methods was revealed to be less than 10%.

Typical milk tolerant Caucasians (11 subjects) with normal L.T.T. and intestinal lactase and typical milk intolerant Negroes (7 subjects) with abnormal L.T.T. and low lactase activity were studied. The mean of the area under the curve relating $^{14}\text{CO}_2$ specific activity to time in milk tolerant group was

22.77 ± 7.22 (1 S.D.), whereas that of milk intolerant group was 9.86 ± 3.17 . The $^{14}\text{CO}_2$ results correlated well with jejunal lactase activity ($r=0.74$) and the lactose tolerance tests ($r=0.87$).

The same breath-analysis technique was used for the diagnosis of malabsorption syndromes caused by abnormal bacterial deconjugation of bile salts. Glycine- ^{14}C -cholate ($5\mu\text{Ci}$) was administered orally and $^{14}\text{CO}_2$ in the breath measured for 6 hours. The results clearly separated patients with either ileal resection or bacterial overgrowth syndromes from subjects without abnormalities of bile-salt metabolism. The normal subjects and the patients with steatorrhea unrelated to abnormal metabolism of bile-salts had no appreciable rise in $^{14}\text{CO}_2$ excretion (2.2 ± 0.6 S.E.); and $1.3 \pm 0.3\%$ administered dose respectively) whereas subjects with ileal resection and bacterial-overgrowth syndromes had a rapid appearance of $^{14}\text{CO}_2$ in expired breath (31.4 ± 4.6 and $23.4 \pm 6.8\%$, respectively).