Evaluation of 200 D(+)-Xylose Blood Level Time Curves as an Index of Intestinal Absorption

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The absorption of xylose by mammalian intestine was first studied by Cori in 1925. Its rate of absorption was first employed as a clinical test by Fourman in 1948. Recently xylose absorption became the subject of renewed interest as a diagnostic tool in the study of the malabsorption syndrome.

A simplified method for the estimation of the D(+)-xylose level in blood was recently described in detail by our group. Preliminary evaluation had suggested that the xylose blood level time curve could be a useful tool in the investigation of intestinal malabsorptive syndromes. Since the publication of this report the test has been used routinely. To date we have performed 200 xylose tests on a total of 180 individuals. The present communication deals with an evaluation of the clinical usefulness of the test on the basis of this experience.

METHODS

The chemical method is based on the following principle. The enzyme, glucose oxidase, oxidizes glucose to the nonreducing gluconic acid. This enzyme has little or no action on other sugars. Xylose is very slowly oxidized, at 0.98\% of the rate for glucose. The blood-xylose estimation consists first of the removal of glucose by the use of glucose oxidase, and then the determination of the reducing power of the glucose-free deproteinized blood. The difference in the reducing power of glucose-oxidase-treated blood before and after ingestion of xylose is taken as a measure of the blood-xylose content. Blood levels are obtained one-half, 1, and 2 hours after the ingestion of 25 gm. of xylose.
A total of 200 xylose-absorption tests were carried out on 180 individuals in the routine hospital-laboratory. The established diagnoses were all well-documented except in 6 cases which were discarded because the xylose test alone had been ordered for detection of a possible malabsorption syndrome, or because the diagnosis stated on discharge was not substantiated by review of the patient's record.

The test subjects included a control group of normal subjects and patients without gastrointestinal diseases. Patients with gastrointestinal abnormalities comprised 3 major categories. The first, those with malabsorption syndromes, had either (1) an absorption defect due to abnormality of the intestinal absorptive surface and/or other nonsurgical conditions of the small intestine: idiopathic nontropical sprue, both treated and untreated; scleroderma; Whipple's disease; Hodgkin's disease; diverticula of proximal small intestine; diabetic diarrheas with steatorrhea; regional enteritis; or giardiasis, (2) an absorption defect from surgical causes: resection of small bowel; gastrectomy; gastroenterostomy; or duodenocolecystostomy; or (3) maldigestion from pancreatic disease: chronic pancreatitis or carcinoma of the pancreas. Patients in the second category had malnutrition, and in the third, other gastrointestinal diseases: biliary and portal cirrhosis of the liver; parasitic infestation; organic diarrheas without malabsorption; functional diarrheas; rapid transit through the small bowel; gastric and duodenal ulcerations; megaloblastic anemias; gastric carcinoma; and miscellaneous disorders.

A diagnosis of idiopathic nontropical sprue was accepted when supported by fat balance studies, $I_{131}$ triolein uptake, Vitamin-A absorption, small bowel X-ray and, in many cases, small-bowel biopsy. Regional enteritis was diagnosed by X-ray findings. Diagnosis of the 1 case of scleroderma was confirmed by autopsy. One of the 2 cases of Whipple's disease was diagnosed by small-intestinal biopsy. In the other the diagnosis was not established with certainty, since the patient refused biopsy studies; results of fat absorption tests were abnormal, and there was flocculation of the barium and dilatation of the small bowel; lymphadenopathy was present.

The diagnosis of Hodgkin's disease of the mesenteric lymph nodes and obstruction of lymphatic channels was established by biopsy of the nodes and later confirmed by autopsy. Diverticulosis of the small intestine was diagnosed by X-ray. One of 2 patients with diabetic diarrhea had gross steatorrhea. This patient died recently from urinary failure. The small bowel was removed within a half-hour after death. Only nonspecific jejunitis was seen, without clubbing of the villi. The other patient showed borderline results on fat studies and the vitamin-A absorption test.

Absorptive defects from surgical causes were classified on the basis of