

The Effects of Test Meals on the PFD Test

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The effects of test meals on the PFD (pancreatic function diagnostant) test, which was introduced as "the B.T.PABA test" in the previous reports, were studied.

The higher the protein in the test meal, the lower the urinary excretion value of p-aminobenzoic acid (PABA) and the first 3-h of PABA excretion. By using a test meal containing protein, the differences in digestion-absorption disorders between gastrectomy procedures (Billroth I and Billroth II) were clarified. Therefore, a test meal which contains a suitable amount of protein should be used in the PFD test to improve diagnostic accuracy.

(Key Words: The PFD test, Postgastrectomy Malabsorption, Absorption Test, Pancreatic Exocrine Function)

The PFD (pancreatic function diagnostant) test is now beginning to become popular as a simple exocrine pancreatic function test in Japan. In this paper, the effects of test meals on this test are discussed.

MATERIALS

Tests were performed on patients, 18 to 68 years old, who had no history of gastrointestinal surgery and on patients, 20 to 57 years old, 10 to 14 days after gastrectomy. None of them showed any abnormalities in blood-chemical examinations or in urinalysis, and they were thought to have no hepatic, pancreatic and renal disease.

METHODS

The PFD test was introduced as "the B.T.PABA test" in the previous report. In this study, tests were performed in the same way described in our previous paper as follows. All drugs were discontinued at least 12 hours before the investigation. After overnight fasting, test material with test meal was administered orally at 9:00 a.m. Urine was collected for 6 hours after ingestion of the test meal and test material. Patients were allowed to drink water at will after 10:00 a.m. to ensure sufficient diuresis. P-aminobenzoic acid (PABA) in the collected urine was determined by the Bratton—Marshall method as modified by Smith et al (7). Composition of the test material and test meal is shown in Table 1. The OKUNOS test meal used in Test

1 and 3 contained 9.6g of protein in 200ml of pasty meal and the OTSUKA test meal used in Test 4 contained 43.3g of protein in 200ml of pasty meal.

Table 1 Composition of test material and test meal.
The OKUNOS test meal contained 9.6g of protein and the OTSUKA test meal 43.3g of protein.

	Test Material	Test Meal
Test 1	Pure PABA 250mg	OKUNOS test meal 200ml
Test 2	B.T.PABA 500mg	Water 200ml
Test 3	B.T.PABA 1,000mg	OKUNOS test meal 200ml
Test 4	B.T.PABA 1,000mg	OTSUKA test meal 200ml

RESULTS

I The PABA excretion values of urine collected for six hours are shown in Fig. 1.

- 1) Mean values of Test 1 were $83 \pm 4\%$ ($M \pm S.D.$) ($n = 7$).
- 2) Mean values of Test 2 were $81 \pm 7\%$ ($M \pm S.D.$) ($n = 27$).
- 3) Those of Test 3 were $79 \pm 6\%$ ($M \pm S.D.$) ($n = 30$).
- 4) Those of Test 4 were $74 \pm 9\%$ ($M \pm S.D.$) ($n = 21$).

Statistically significant differences ($p < 0.05$) were seen between Test 1 and Test 3, Test 1 and Test 4 and between Test 3 and Test 4 by Student's *t* test.

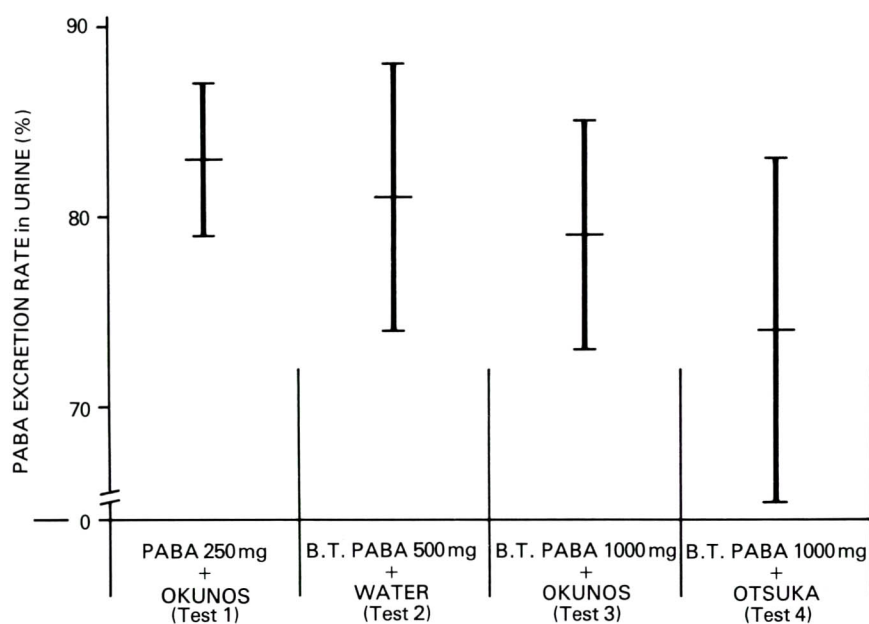


Fig. 1 PABA excretion rate in urine
The higher the protein density in the test meal, the lower the PABA excretion value.

II The percentage of the first-3-h of PABA excretion with respect to the total 6-h PABA excretion in urine is shown in Fig. 2.

- 1) Mean percentage of Test 1 was $86 \pm 5\%$ ($M \pm S.D.$) ($n = 7$).
- 2) Mean percentage of Test 2 was $68 \pm 18\%$ ($M \pm S.D.$) ($n = 27$).
- 3) That of Test 3 was $62 \pm 9\%$ ($M \pm S.D.$) ($n = 30$).
- 4) That of Test 4 was $55 \pm 12\%$ ($M \pm S.D.$) ($n = 21$).

There were significant differences ($p < 0.05$) between Test 1 and Test 2, Test 1 and Test 3, Test 1 and Test 4, Test 2 and Test 4 and between Test 3 and Test 4 by Student's t test.

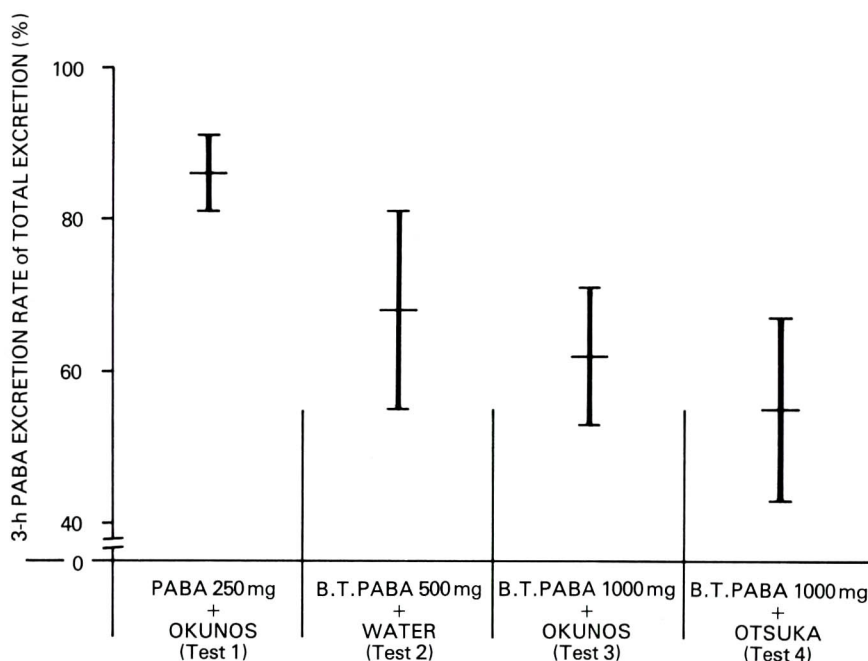


Fig. 2 The percentage of the first 3-h of PABA excretion with respect to the total PABA excretion
The delay of PABA excretion in Tests 2, 3 and 4 in comparison with Test 1 was thought to result from the time required for digesting the test material and test meal.

III Results for postgastrectomy patients are shown in Fig. 3.

Test 2 and Test 3 were performed on six Billroth I postgastrectomy patients, 31 to 53 years old, and on nine Billroth II postgastrectomy patients, 32 to 59 years old, at intervals of 2 days.

- 1) PABA excretion values of Billroth I patients in Test 2 were $70 \pm 20\%$ ($M \pm S.D.$).
- 2) Those of Billroth II patients in Test 2 were $69 \pm 21\%$ ($M \pm S.D.$). Statistically, there was no significant difference between the two tests by Student's t test.
- 3) PABA excretion rate of Billroth I patients in Test 3 was $66 \pm 12\%$ ($M \pm S.D.$).
- 4) That of Billroth II patients in Test 3 was $41 \pm 18\%$ ($M \pm S.D.$).

A significant difference ($p < 0.05$) was observed between the two tests by Student's *t* test.

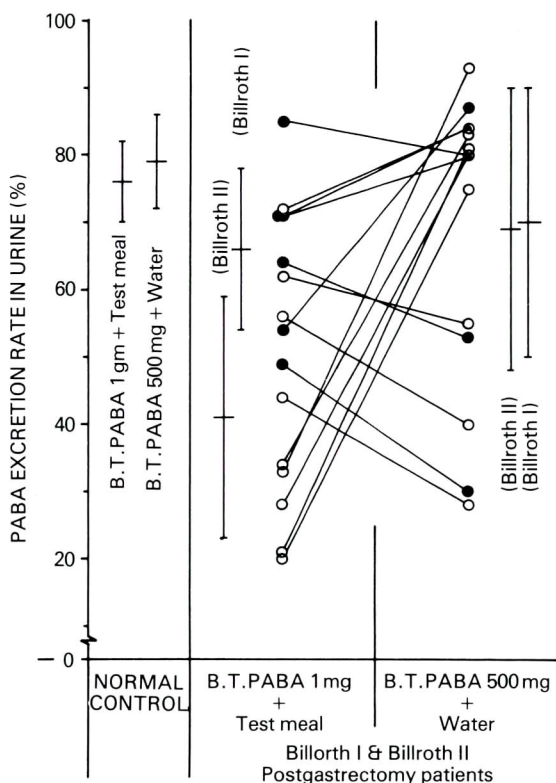


Fig. 3 PFD tests in postgastrectomy patients
By using a protein-containing test meal, differences in digestion-absorption disorders between Billroth I and Billroth II patients were clarified.
Open circles: Billroth II postgastrectomy patients
Closed circles: Billroth I postgastrectomy patients

COMMENT

The ^{131}I -labeled triolein absorption test and the ^{131}I -labeled albumin absorption test are now widely used throughout the world. The triolein method measures lipid digestion-absorption activity, while the albumin method expresses protein digestion-absorption activity. In these tests, peanut oil in the triolein method or gelatin in the albumin method is used as a cold meal with the ^{131}I -labeled test materials because the accuracy of these tests can be obtained by using a suitable amount of these cold meals (6, 8).

The PFD is a chymotrypsin-labile peptide and it measures protein-digestion activity. Today, it is beginning to become common as a new pancreatic exocrine function test. The authors tried to apply this peptide to an absorption test and have reported that the PFD test can be used as a simple absorption test. (7)

In this study, the best kind of test meal for improving the accuracy of this test was studied. According to result I, the higher the protein density in the test meal, the lower the PABA excretion value. This was probably due to the fact that part of the secreted chymotrypsin was used to digest the protein in the test meal. According to result II, it was assumed that free PABA was absorbed rapidly. The PABA excretion in Tests 2, 3 and 4 were delayed in comparison with the PABA excretion in Test 1. This delay was thought to result from the time required for digesting the test material and test meal.

On the basis of result III, the differences of digestion - absorption disorders between Billroth I and Billroth II postgastrectomy patients were clarified by using a protein-containing test meal. This result agreed with similar results obtained in many studies on postgastrectomy malabsorption using conventional methods. (1, 2, 3, 9) Therefore, it is considered that using a test meal which contains a suitable amount of protein is better for improving the diagnostic accuracy of the PFD test than using only water as a test meal which is the usual method for the PFD test in Japan. (4, 5)

In conclusion, a slight decrease of chymotrypsin activity, i.e., protein digestion activity, can be detected if a test meal which contains a physiologically maximum amount of protein is used in the PFD test.

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