Indirect tests of pancreatic exocrine function

Indirect functional tests are based on the principle that a chromogenic (or fluorogenic) substrate is administered orally, which is cleaved by pancreatic enzymes (chymotrypsin in faeces, lipase). The NBT-PABA test (Bentiromide, Roche; no longer manufactured) contained the substrate N-benzoyl-L-tyrosyl-4-aminobenzoic acid (Bz-Tyr-PAB), the ALTAB test (Spofa-Gnost Pankenzan, Drugs) was produced in Czech republic. N-acetyl-L-tyrosyl-4-aminobenzoic acid substrate (Ac-Tyr-PAB), which provided better discrimination between the pancreatic insufficiency group and the control group. The fluorogenic variant is the preparation Pancreolauryl (the substrate is fluorescein di-lauryl ester). Concentration of chromogen (fluorogen) excreted in urine, or rather its serum concentration is a measure of the enzyme 's activity in duodenum. Indirect tests include the determination of chymotrypsin or elastase-1 in faeces. Recently, other new functional tests have appeared - breath tests (signpost), where the orally administered substrate is labeled with the carbon isotope ^{13}C (older tests with the isotope ^{14}C). The measure of pancreatic enzyme activity is a concentration of ^{13}C (or ^{14}C) in exhaled air.

Embodiment of PABA test

The patient arrives on an empty stomach and a serum and urine sample is taken. This is followed by the administration of the substrate (Ac-Tyr-PAB in 4 tablets) and a stimulating meal (modification of Lund's breakfast - casein hydrolyzate with olive oil). We saturate the patient with fluids (at least 3 × 250 ml of tea) for a period of 6 hours. After 3 hours another blood sample is taken, after 6 hours the last portion of urine, the total urine volume in 6 hours is measured and a sample of about 10 ml of urine is taken for analysis. Laboratory processing involves measuring the volume of urine at 6 hours and determining the concentration of HPAB in serum and urine samples after hydrolysis. HPAB is determined by the Bratton-Marshall diazotization reaction with photometric measurement.

The clinical significance

Indirect functional tests are important as screening tests for pancreatic insufficiency, differential diagnosis of malabsorption syndrome and chronic pancreatitis. Normal urinary output values of 6 hours> 30.7% of the administered amount rule out pancreatic insufficiency. The auxiliary value is the serum level at the 3rd hour of the test with a limit of normal values> 25 µmol / l. Pancreatic insufficiency can be ruled out even with reduced urinary output in 6 hours, ie <30.7%, if normal serum levels are demonstrated. The PABA test (ALTAB test) is also preferably used to determine the effectiveness of pancreatic substitution by enzyme preparations (eg Pancreolan, Panzynorm, Panpur, Creon, etc.). When interpreting the results of the PABA test, it is necessary to comprehensively consider the possibilities of false reduced values due to impaired function of other organs, which are applied to the test result. False positive results have been demonstrated with lower substrate tablets (eg due to the presence of a racemate, i.e. the D, L-form of tyrosine). Due to the difficulties in interpreting the results of the PABA test and the relatively high number of false positive results, a number of modifications have already been described. It is mainly the determination of the so-called PABA-index, the determination of PABA together with another marker, eg PAS or radioisotope ^{14}C from labeled substrate. A modern variant of the PABA test is a breath test with a stable isotope ^{13}C in a labeled dipeptide - benzoyl-L-tyrosyl- [1- (13) C] alanine (Bz-Tyr-Ala), which is cleaved similarly to the substrate Bz-Tyr-PAB in the PABA test.

Links

Related articles

- Acute pancreatitis (diagnostic tests)
- Chronic pancreatitis (diagnostic tests)
- breath tests (signpost)

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