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THE METHODOLOGY OF THE STUDY OF MORPHOFUNCTIONAL CHANGES IN THE INTESTINE AS A RESULT OF GROUNDWATER CONSUMPTION.

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ABSTRAKT

In this article, among the external influences, one of the most common currently is consumed water of various compositions, it has been proven that an excessive amount of salts, macro- and microelements, chemical and biological composition of water negatively affects the organs and systems of the body.

Keywords

compensator-adaptation to seasonal waters, groundwater and interplastic waters, active sulfhydryl.

The process of absorption of fats, the most difficult to digest foods, is upset more often and earlier than other food substances. Fats are absorbed in the small intestine. Disorders of fat absorption occur in diseases of the intestine, pancreas, and in disorders of bile secretion. The patient is given a fat load in the morning on an empty stomach, and at certain intervals the blood is examined for the content of total lipids or their components. In individuals with normal absorption of fats in the intestine, the load causes a more or less significant increase in the level of lipids in the blood.

Butter is most often used for loading, cream, olive oil and other fats are also used, at a dose of 1 g per 1 kg of patient weight. There is no unity in the assessment of the timing of blood tests after a fat load. The maximum increase in blood lipid levels after 4-6 hours. In healthy people, with a load of 1 g of oil per 1 kg of body weight, the average increase in lipid levels is 37.5%. In diseases of the gastrointestinal tract, accompanied by impaired absorption processes, the increase in lipid levels after exercise is significantly less or absent.

There is also a chromatographic method for studying various lipid fractions. Blood is taken from a vein on an empty stomach, then a load of butter is carried out, with repeated blood collection after 4 hours. Lipids are extracted from each portion of blood serum, which are further chromatographically separated into phospholipids, free cholesterol, non-esterified fatty acids, triglycerides, esterified

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cholesterol and free hydrocarbons. Quantitative determination is performed on a spectrophotometer in the ultraviolet spectrum.

This test is used to study the hydrolysis and absorption of lipids with the determination of free fatty acids in the blood. Prosparol is a 50% emulsion of peanut butter in water. 2 and 4 hours after administration of prosparol, blood serum is obtained and the total amount of esterified fatty acids is measured. Test with lipiodol Lipiodol, in addition to oil, contains 40% iodine. During the assimilation process, iodine, which has been linked to the double bonds of fat, is cleaved off and excreted in the urine. The absorption of lipiodol is considered as an indicator of fat absorption. If absorption is impaired, lipiodol is excreted in the feces, and iodine excretion in the urine decreases. The test with lipiodol reveals only severe violations of intestinal absorption.

Tests with lipidemia change not only in disorders of intestinal absorption, but also in digestive disorders associated with pathology of the pancreas, bile secretion, which limits their diagnostic value. Along with the study of the fat content in the blood after exercise, some fat-soluble substances that are absorbed along with fats are also determined. Such substances include vitamin A and carotene.

However, tests designed to assess fat absorption are relatively unreliable, whereas the determination of fat excretion with feces is simple and reliable. Its reliability is explained by the fact that 95% of fat is absorbed and a slight decrease in this percentage is much more noticeable when determining the amount released than when measuring its absorption.

Quantitative determination of fats in feces - Van de Kamer method This is a relatively simple and at the same time accurate method for the quantitative determination of fats in feces. It is recommended to determine the amount of fat in feces when patients are on a standard diet containing 50-100 g of fat. Total fat, fatty acids and neutral fat, determined initially per 100 g of feces, must be recalculated to the daily amount of feces. All data obtained by this method should be based on the daily excretion of fats with feces. It is recommended to collect stools for three days (with constipation for 5 days), conduct consecutive stool studies from each daily serving and output the average values for three days. In healthy individuals taking fat within physiological limits, its daily excretion with feces does not exceed 5 g. The daily excretion of fats with feces amounting to 5-10 g should be considered moderate steatorrhea, over 10 g - pronounced.

To diagnose hidden forms of absorption pathology, it is recommended to determine fats in feces after fatty loads. Transformed infrared Fourier

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spectrometry Sallerin and Schroeder proposed a method for measuring lipids in faeces using infrared spectrometry. Labeled fats are injected into the subjects and blood, urine, feces or exhaled air are examined at known intervals. To determine the degree of resorption, the radioactivity of the substrate under study is measured. Such tests, as well as the chemical determination of fats in feces, do not make it possible to differentiate steatorrhea of various origins. For this purpose, along with the determination of the absorption of labeled triolein, the resorption of labeled oleic acid (triolein-esterglycerin with three oleic acid molecules) is also studied. Oleic acid is absorbed without prior cleavage, disorders of its absorption indicate violations of intestinal absorption function.

The tested fats 131I are marked. A necessary condition is pre-blocking of the thyroid gland (with Lugol's solution). After the introduction of radioactive fats, the blood is examined after 4, 6, 8 and 24 hours. Urine radioactivity is measured for 72 hours in 5 portions. The radioactivity of feces and the "external" radioactivity of the patient are also measured. The radioactivity of the studied substrates is compared with the radioactivity of the injected substance and expressed as a percentage. In case of impaired absorption, the radioactivity of the blood is low. An increase in fecal radioactivity indicates a malabsorption.

The radioactivity of blood 131I is an oscillating value, it reflects not only the accumulation of the isotope in the blood, but also its assimilation by tissues. The disadvantage of the fecal test is the need to collect all feces within a few days, as well as the danger of mixing feces with urine. The parallel use of blood and fecal tests increases their diagnostic capabilities. Urine activity testing is a less reliable method than blood testing.

The essential advantage of the radioisotope method is that it can facilitate the topical diagnosis of absorption disorders. In them, 14CO2 is measured after taking triglycerides labeled 14C. The patient is examined on an empty stomach. A dose of triglyceride-triolein labeled 14C (5 mCu) is mixed with food additives. Exhaled 14CO2 is measured hourly for 6 hours. The disadvantage of the method is its high cost. Respiratory tests can be used in situations where repeated and rapid assessment of absorption is necessary.

When conducting these tests, it should be borne in mind that their results may be influenced by various conditions that slow down the evacuation of gastric contents or respiratory elimination of CO2. In metabolic diseases such as diabetes mellitus and obesity, the conversion of butyric acids into CO2 slows down. Goff proposed a two-step method in which a breath test is performed before and after taking pancreatic enzymes. In patients with pancreatic insufficiency, there was a significant increase in the maximum excretion of

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14CO2 per hour after the introduction of enzymes, while in patients with other causal malabsorption factors, such an increase was not observed.

Methods of carbohydrate absorption research Determination of D-xylose absorption This method is a standard method for evaluating the function of the jejunum. It consists in a simple measurement of the content of xylose in urine and blood serum, which is absorbed almost exclusively in the jejunum. The D-xylose absorption test is cheap and safe, does not require much time, but its diagnostic significance is very limited. The sensitivity of the test for diseases of the jejunum is about 83%, the specificity is 86%. Diagnosis of intestinal disaccharidase deficiency. Assessment of glycemia after taking disaccharidases.

The method is based on the use of loads of disaccharides and monosaccharides with an examination of blood glucose on an empty stomach and within 2 hours after the load. To identify disaccharidase deficiency, loads with sucrose, maltose, lactose, glucose are carried out at the rate of 1 g per 1 kg of body weight. When taking glucose, we get an idea of the state of absorption in the small intestine. The increase in blood glucose concentration after loading with disaccharides allows us to judge the enzymatic activity of the corresponding intestinal disaccharidases. For example, a flat glycemic curve after glucose intake indicates a malabsorption. If the flattened curve is obtained after loading with disaccharide, and after taking glucose, the glycemic curve is not changed, this indicates a decrease in the hydrolysis of the corresponding disaccharide, i.e., a violation of membrane digestion.

Blood-based tests have a number of disadvantages, since blood glucose levels are determined by many factors. The shape of the glycemic curve is determined by the rate of absorption and the rate of glucose deposition. To differentiate all these mechanisms, it is recommended to compare glucose tolerance curves when administered orally and intravenously. The flat curve for the oral version of the sample and the normal curve for intravenous infusion indicate a violation of absorption.

Assessment of diarrheal syndrome after oral disaccharide loading With this method, the minimum amount of disaccharide taken on an empty stomach is determined, which causes a single appearance of liquid stool within 4 hours after taking it. To identify the degree of enzymopathy, you can increase or decrease the dose of disaccharide by 10 g daily, starting from the initial dose of 50 g.

Hydrogen Breath Test Measuring the concentration of exhaled hydrogen is considered a sensitive method for assessing carbohydrate malabsorption. Its difference from the carbohydrate tolerance test is that it measures the amount of unabsorbed carbohydrates. In this regard, this method is the most direct. The

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method is used to determine the absorption of various sugars. Intestinal production of hydrogen is carried out almost entirely in the colon and increases significantly when taking a small amount of carbohydrates. The hydrogen content in the samples is determined by gas chromatography using a heat-conducting detector. This test is unsuccessful in bacterial colonization of the colon if the intestinal flora is unable to release hydrogen during fermentation of the sugar consumed in the sample. The use of laxatives, enemas and antibiotics may be accompanied by false negative results. Measuring the absorption of labeled 14C-lactose An alternative to measuring exhaled hydrogen is to determine the release of 14CO2 during respiration after administration of labeled 14C lactose. The normal values of lactose absorption vary widely, therefore, in each laboratory using this method, it is necessary to set its own normal limits. The described test is the most accurate available method for evaluating lactose absorption, but it requires a lot of time and money. The final diagnosis of hypolactasia is made when evaluating the activity of lactase in jejunum biopsies.

Methods for the study of protein absorption and excretion Proteins are absorbed in the intestine after they are broken down to amino acids. Protein absorption intermediates, peptides, in particular glycyl-glycine, can also be absorbed in small amounts in the intestine. The absorption of proteins in the intestine is studied mainly with the help of samples based on the load of protein or individual amino acids. Radioisotope methods play a leading role in this process.

Absorption of glycine This test is used to evaluate the absorption of peptides. Glycine is absorbed as a di- and tripeptide better than in free form. A two-light probe is used, containing X-ray-proof marks along its entire length. A mercury capsule is attached to it. In the proximal part of the probe there is an opening located in a lumen 30 cm from the end and intended for the introduction of perfusion fluid, and in the other lumen at the distal end there are three aspiration holes. On the evening before perfusion, the patient swallows the probe, after which he fasts for 14 hours, during which he is allowed to drink water in small sips. At the beginning of perfusion, the location of the probe is monitored radiologically to make sure that its proximal opening is located behind the Treitz ligament. The perfusion liquid contains 100 mmol/l of glycine (the solution becomes isotonic at an appropriate concentration of NaCl). The solution contains 0.5 g per 100 ml of polyethylene glycol 4000 as a non-bulk.

The radioisotope method makes it possible to quantify trans-intestinal protein loss. For this purpose, labeled 67Si ceruloplasmin or labeled 51Sg albumin is used. Before the study, the patient takes 10 mg of copper sulfate (10

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mg 3 times a day) for 10 days to reduce intestinal absorption of copper. After that, the patient is injected with 100 mg of ceruloplasmin labeled with 67Si. Plasma samples are taken after 10 minutes and 4 hours, and then daily throughout the study. In addition, during this period, daily urine and stool samples are collected. Gastrointestinal losses of ceruloplasmin are determined by its clearance.

67Si-labeled ceruloplasmin is an ideal drug for research work, but it is too expensive and inconvenient for clinical use due to its short half-life. In clinical practice, labeled 51Sg albumin is more acceptable. To do this, the patient is injected with 10-30 micrograms of labeled albumin. Feces are collected within 4 days in daily portions in glass or tin cans with a capacity of 2.2 liters. Samples are brought to a constant volume, homogenized and gamma measurement is performed in accordance with the standard in a special container. The results are expressed as a percentage of the injected dose of the radioactive substance excreted in the faeces for 4 days. This test is relatively cheap and easy to perform.

Small intestine clearance of a1-antitrypsin This method is an alternative (non-isotopic) method for determining gastrointestinal protein losses. Measurement of a1-antitrypsin clearance has a clear advantage: the use of an endogenous marker reduces both the cost and the invasiveness of the study. a1-antitrypsin is determined by radial immunodiffusion on boards containing monospecific antiserum to a1-antitrypsin.

Zymogenic activation test It is designed to diagnose congenital metabolic disorders due to enterokinase deficiency. The test is based on in vitro activation of duodenal contents when enterokinase is added. The duodenal contents are aspirated using a nasogastric tube. 1 mg of purified human enterokinase is added to 1 ml of duodenal fluid and incubated at pH 7.5 and 37oC. Activation of trypsinogen, chymotrypsinogen and procarboxypeptidase is measured by the Hadorn method.

This test is used both to assess absorption in the small intestine and to determine the ability of the gastric mucosa to produce internal factors. Vitamin B12, which contains radioactive Co, is used as an indicator. The patient empties his bladder on an empty stomach and then drinks a liquid containing 1 mcg of vitamin B12 labeled 58Co. An hour later, the patient receives a light breakfast. 2 hours after taking a dose of radioactive vitamin B12, 1000 mcg of cyancobalamin is subcutaneously injected into the patient. Within 24 hours after the start of testing, all urine is collected to determine the content of 58Co in it. If a normal amount of radioactive vitamin B12 is excreted in the urine, then further investigation is not required. If the excretion is below normal, repeated testing

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should be carried out after a few days. In this case, a concentrated internal factor is orally administered in order to differentiate malabsorption caused by the absence of an internal factor from malabsorption caused by the disease

The Sheeling test has a wide clinical application. Folic acid absorption test In a number of intestinal diseases, especially with sprue, the metabolism of folic acid is disrupted. The method is based on a comparison of urinary excretion of folic acid with oral and parenteral administration of this vitamin. For the study, 5 mg of folic acid is administered parenterally, then urine is collected for 24 hours and the content of folic acid in it is determined by microbiological method. After 48 hours, the same dose of folic acid is administered orally and urine is collected again for 24 hours. The absorption coefficient of folic acid (FC) is determined by the formula: (FC of urine after oral loading / FC of urine after parenteral loading) x 100. Normally, the absorption coefficient is 75-100%.

Methods of salt absorption research When assessing the absorption of salts, it must be remembered that chlorides are absorbed in the small and large intestine, calcium salts - mainly in the small intestine, phosphates - in the upper parts of the small intestine. Absorption of calcium It is investigated by loading with calcium salts or its active isotopes. 20 ml of 5% CaCl2 solution diluted in 200 ml of water is administered orally. Blood calcium is examined on an empty stomach and hourly for 5 hours after exercise. In healthy individuals, calcium levels increase by 10% or more.

Sodium absorption It is investigated using radioactive techniques. Absorption of potassium iodide Since the potassium iodide compound does not hydrolyze in the intestine, after taking it, it appears quite quickly in saliva, urine, and female milk. Since the absorption of potassium iodide largely occurs in the intestine, the sample is used to assess the absorption function of the intestine. To do this, the patient is given 0.25 g of potassium iodide orally on an empty stomach, diluted in 50 ml of water, which he drinks with 200 ml of water, rinsing his mouth thoroughly at this time. After 2 minutes, saliva is collected into a test tube and 2 ml of 10% starch solution is added to it. The presence of iodine in saliva is determined by the blueness of starch in a test tube. If there is no blueness, saliva is collected every 2 minutes until blueness appears. The "iodine-potassium time" in healthy people is 3.4+0.66 minutes. It depends on age, the state of intestinal absorption, the rate of portal blood flow, the overall rate of blood circulation, the state of the salivary glands and the rate of gastric evacuation.

The study of motor function Enterocoloscintigraphy In a radioisotope study, the patient is given standard food labeled with a colloidal solution of Ts99m

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(technefit), and its passage through the intestine is observed. Registration of intestinal electrical potentials directly from the intestinal mucosa Electrical potentials from the intestinal mucosa, usually sigmoid and rectum, are recorded using a non-polarizing differential electrode, which is inserted into the intestine through a rectoscope. Electrointestinography To record potentials from the surface of the body, an electrogastrointestinograph device is used, which is a DC amplifier with a limited frequency bandwidth. It has been established that the electrical activity of the intestine corresponds to mechanical activity. The biopotentials of the intestine with the help of this device are transformed into alternating current and amplified to the required level. Various points of application of the differential electrode are used to record the potentials.

Examination of intestinal motility is most often carried out by the balloon method or by the method of open catheters. All these techniques make it possible to register the "hungry" periodic motor activity of the small intestine, as well as changes in motility during the administration of pharmacological drugs or during the action of other stimuli. Contractions of the small intestine are recorded on kimograms in the form of pointed slightly rounded waves (teeth) of various sizes, duration and shape.

In clinical practice, diagnosis of duodenal dyskinesia (hypo- or hypermotor), as well as duodenal patency disorders, is of great importance. Duodenal patency disorders in duodenal ulcers occur in 17% of patients. In the diagnosis of these disorders, their nature and stage of development, a comprehensive examination of patients is important. Clinical manifestations, data from X-ray and ionomanometric examinations, make it possible to determine the functional or organic nature and degree of decompensation of intestinal motor activity. In the study of motor function, with violations of duodenal patency, changes in tone, dyskinesia of the duodenum, a decrease in the rhythm of contractions and their complexes, pathological bowel movements, antiperistalsis are revealed, the duration and intensity of duodenal reflux are determined.

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