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Кафедра Внутрішньої медицини №3
Факультет VI по підготовці іноземних студентів

ЗАТВЕРДЖЕНО

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Зав. кафедри _____ д.мед.н., професор Л.В. Журавльова

**МЕТОДИЧНІ ВКАЗІВКИ
для студентів**

з дисципліни «Внутрішня медицина (в тому числі з ендокринологією)
студенти 4 курсу I, II, III медичних факультетів, V та VI факультетів по підготовці
іноземних студентів

Цукровий діабет тип 1 та тип 2, сучасні методи терапії

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Topic - "Diabetes mellitus - type 1 and type 2, modern methods of therapy"

Number of hours – 4

Topicality

Presently the medicine has a considerable arsenal of preparations with which help probably not only to keep alive patient sick of diabetes, but also to return his work capacity. There are numerous oral hypoglycemic drugs, different preparations of insulin, new perspective directions of treatment are developed. It not a rarity, when patient sick of diabetes become patients of doctors of other specialties (oculists, surgeons, therapists, gynecologists etc.), therefore students of medical high schools should know means and methods of treatment of a diabetes and to be able to apply them in practical activities.

The educational purposes:

- To teach students the main principles of treatment of a diabetes 1 and 2 types;
- To acquaint students with criteria of indemnification of a carbohydrate exchange in patients on a diabetes 1 and 2 types;
- To teach students modern principles dietotherapy of a diabetes;
- To acquaint students with the dosed out physical activity and rules of its appointment;
- To acquaint students with sugar-reducing pharmacotherapy, training the patient self-checking;
- To teach students insulin therapy: its classifications, the indication and contra-indications, to modes, complication;
- To acquaint students with sanator treatment of patients on a diabetes.

What should the student know?

- Main principles of treatment of diabetes, criteria of indemnification of a metabolism, achievement нормоглікемії;
- Modern principles of diet therapy of a diabetes: physiological, power value, restriction of the refined carbohydrates, the use of food fibers, microcells, etc.;
- The dosed out physical activity and rules of its appointment;
- peroral sugar-reducing preparations: derivatives of sulfanile-urea, unureal secretogens, insulin, biguanids, glytazone, their characteristic, the mechanism of action, collateral reactions, the indication and contra-indication;
- insulin therapy: the characteristic of the basic preparations, the indication, contra-indication, classification, dose correction, modes, complications;
- Sanatory treatment of patients with diabetes.

What should the student be able?

- to ground the diagnosis of the patient on a diabetes, to define type, weight of disease, indemnification degree;

- To estimate glycaemic and glucosuric profiles, daily glucosuria, a condition albuminous and lipid exchange, electrolyte balance according to laboratory researches;

- To define by results of biochemical researches degree of indemnification of a diabetes;

To define power value of a diet and to distribute carbohydrates throughout a time depending on level of glycaemia and effect of action of sugar-reducing means;

- Truly to define the indication of application of different sugar-reducing means;

- Dispensing correction sugar-reducing means;

- To estimate efficiency of treatment;

- To warn and treat the complication, connected with application sugar-reducing means;

- To define the indication and contra-indication fo sanatorium treatment;

- To write out recipes on preparations of insulin and peroral sugar-reducing means.

The list of practical habits which the student should acquire:

- to ground the diagnosis of a diabetes of establish type, grade of disease, indemnification degree;.

- To estimate glycaemic and glucosuric profile, round-the-clock glucosuria, a condition albuminous and lipid exchange, electrolyte balance;

- To establish degree of indemnification of a diabetes by results of biochemical researches;

- To appoint the menu to the diabetes patient (to establish power value of a diet on a time, distribution of carbohydrates throughout a time depending on level glycaemia and efficiency of action sugar-reducing means);

- To appoint the dosed out physical activity, to establish its intensity and carrying out term;

- to ground the indication of appointment of sugar-reducing preparations, their dose, efficiency of treatment according to its term to spend possible correction;

- To make the scheme dispensary supervision of the patient on a diabetes, to establish term of dynamic supervision of it by endocrinologist, the internist and other physicians;

- To establish the indication to sanatorium treatment;

- To write out recipes on sugar-reducing preparations.

The theme maintenance

Diabetes of type 1 and 2, modern methods of therapy

Diet-therapy

a diabetes patient receive dietetic therapy within a table №9.

In patients on a diabetes of 1 type the diet should be severely isocaloric (to answer requirements for calories) - starvation, decrease in caloric content of food stimulates lipolyse and ketogenesis.

Patients with a diabetes 2 types in association with adiposity should adhere hypocaloric to a diet as risk ketogenesis in them insignificant, and weight normalisation can provide indemnification of a carbohydrate exchange. In patients on a diabetes 2 types with normal weight the diet can be isocaloric.

The daily diet of the patient should provide all power inputs of an organism and support of "ideal" weight which answers a floor, growth and age of the patient. Calculation of power value of a diet is spent depending on weight of a body of the patient and level of physical activity.

At first it is defined basal power balance (BPB) the patient - daily allowances calorage, necessary for support of the basic exchange. BPB depends on a phenotype of the patient - it is defined taking into account index Kettle.

Index Kettle = weight (kg) / growth in a square (m²)

Phenotype of the patient	Specific energie-nessesity
Thin (index Kettle is less 20)	25 kcal /кг/day
Normal (index Kettle 20-24,9)	20 kcal/kg/day
Obesity I-II grade (index Kettle 25-29,9)	17 kcal/kg/day
Obesity III-IV grade (index Kettle more 30)	15 kcal/kg/day

After phenotype finding-out the specific energy needs (in kcal/kg/day) is multiplied on weight by bodies (kg) - receive certain size BPB.

БЕБ (kcal) = Weight (kg) x Specific energie-nessesity (kcal/kg/day)

For definition of daily power value of a diet to BPB add size of the power inputs caused by character of performed work - very easy work equivalent 1/6 BPB, easy 1/3 BPB, middle-hard 1/2 BPB.

Parity of the basic components of food in a daily diet: 60 % of daily power value are provided with carbohydrates, 25 % - fats (from them of 50 % of a phytogenesis), 15 % - fibers. For definition of necessary daily quantity of fibers, fats and carbohydrates in a weight equivalent, it is necessary daily requirement for each component (in kcal) to divide into factor specific power consumption: 4 for fibers and carbohydrates, 9 for fats.

The rational diet is one of necessary conditions dietetic therapy patients on diabetes. The quantity of food intakes represents 5-6 times. In patients on diabetes 2 types a shot food allows to avoid the big differences glycaemia. The most rational distribution of daily power value throughout a time: breakfast - 25 %, II breakfast - 15 %, a dinner - 30 %, a supper - 20 %, II supper - 10 %.

The basic requirement to a diet of 1 type sick of a diabetes - conformity of a diet and insulin-therapy. The carbohydrate component of food should be at responsible time for the maximum effect of in advance entered insulin and to be adequate on calorage to the entered dose of insulin.

Such adequacy can be carried out only under condition of constant self-checking of the patient on a diabetes of 1 type which consists first of all in the constant control of quantity of carbohydrates in each food intake.

Directly sugar level in blood is influenced only by carbohydrates, their quantity in each food should be supervised by the patient severely. Constant self-checking of a food is an obligatory condition rational dietetic therapy: the patient should count up carbohydrate value of each food.

System of bread units (BU) offered for simplification of self-checking of patients on a diabetes behind carbohydrate value of food. One grain unit - an equivalent of carbohydrate value of carbohydrates of 50 kcal or 12 of "pure" carbohydrates. Convenience of system of grain units consists that allows to define carbohydrate value of products without exact weighing, and being guided on household criteria - 1 glass, 1 spoon, 1 piece. Using to know carbohydrate value of the basic foodstuff, the patient can independently form various, but a constant diet on carbohydrate value.

Calculation of bread units necessary not only for food self-checking, but also for exact definition of a dose of the insulin necessary for mastering of given quantity of carbohydrates. Spending regular self-checking of sugar of blood and carbohydrate value of each food, the patient can precisely estimate the requirement for insulin on 1 grain unit depending on time of a time.

At diabetes of 1 type it is not recommended to eat at one time more than 7-8 BU.

The carbonhydrated products can be divided conditionally on two categories: that contain "fast" carbohydrates that "slow" carbohydrates contain (are easily acquired) also slowly acquired). Foodstuff with "fast" carbohydrates contains mono- and disaccharids in the pure state (jam, sweet, candies, fruit, fruit juice, milk) which cause very fast and considerable increases of level of glucose of blood and demands obligatory quantitative calculation and the control. Patients on a diabetes should count up carbohydrate value of grain and cereal products (bread, bakery products, pasta, groats); fruit and berries; some vegetables (a potato, corn); rare dairy products; products which contain pure sugar.

In patients on diabetes 2 types by which it is not spent insulin-therapy, quickly acquired carbohydrates completely to exclude from a diet. From food are excluded also sugar-content products - candies (sugar candies and chocolate), jelly, confitures, syrups, fruit candy, jam, pies, a cake, fruitcakes, oil creams, sweet chewing gum, ice-cream, jam, chocolate, sweet drinks and other sweet foods as carbohydrates which contain in them, are quickly soaked up and serve as the reason expressed hyperglycaemia.

Using of sugar-substitute (sorbite, xylite, saccharin, fructose, aspartam) is recommended. Some sugar-substitute preparations do not contain some carbohydrates and calories - saccharin, aspartam. Fructose, sorbite, xylite contain as much calories which and table sugar, their quantity it should be considered.

Food fibers reduce appetite, create sensation of saturation, depress digestion, adsorb toxins. Patients on diabetes should consume every day not less than 30 g food fibers in a foodstuff and food additives.

The use of alcohol which assistst ketogenesis, lactate acidose, hypoglycaemia, a fatty dystrophy of a liver is forbidden.

Basis of a diet 2 types of diabetes represent low-calorie vegetables and salads. In 100 g these vegetables contains only 5 g of carbohydrates which are soaked up very slowly through high contents of food fibers. These vegetables can be used in food in any quantity. As flavouring seasonings use an onion, a horse-radish, greens, a lemon juice.

Carbonhydrate-content products which do not require calculation: almost all kinds of vegetables in usual quantities (except a potato and corn) - cabbage, salad, a radish, carrots, a pumpkin, pepper, to a bean in small amounts.

Vegetables with high caloric content need to be weighed before use. 300 g vegetables which contain in 100 g 8 g the carbohydrates, equivalent 1 BU (Brussels sprouts, red cabbage, a red beet, red pepper, an onions, a marinaded

pumpkin, a celery, carrots). Some vegetables contain in 100 g from above 8 g carbohydrates, 1 BU equivalent 150 g products - artichokes, a white beet, carrots, a green peas, corn heads of cabbage.

For the diabetic products with high contents of fiber have special value. Nevertheless it is necessary to consider, that protein-content products of an animal origin very often contain the "latent" fat. Undesirable there are fat grades of meat and dairy products - smoked sausage, a salami, blood sausage, a ham, a humeral part of pork, geese and rolling, fish canned in oil, fat fish (a tuna, the eel, a herring, a salmon, mackerels, sardines), nuts. The recommended grades of meat: low-fat chicken meat, game, low-fat parts of veal, the beef liver and a mutton fillet (on 100 g it is necessary 20-30 g fat). Optimum grades of fish: a tench, a sea flounder, a perch, a haddock, a river flounder, a pike perch, a cod, a pike, cancers (in 1 kg of meat contains to 10 r fat).

0,25 l of whole milk contains 12 g carbohydrates and 10 g fat (160 kcal), 0,25 l of skim milk - 12 g carbohydrates, 9 g the protein and 1 g fat (90 kcal). 200 g low-fat the crude is contained only 4 g carbohydrates, 34 g by the protein and 2 g fat (175 kcal). The egg yolk contains 60 kcal, fiber - 15 kcal. A particle of pure fiber in protein-content products: in eggs 1/7 scales, in fast meat, fish-1/6 a gross weight part, in cheese - 1/4 parts.

It is necessary to give advantage to vegetative fats which contain polynonsaturated fat acids and vitamins which interfere with atherosclerosis development. It is necessary to consider, that 1/3 daily requirements for fats provide the "latent" fat of meat, fish, dairy products and eggs (one egg contains 5 7 g fat).

The recommended drinks: coffee without caffeine, coffee drinks (bean, barley), all grades of tea, natural mineral water, a lemon juice. Alcohol is limited: dry wine, sparkling, transparent hard liquor can be accepted in small amounts, as agreed with the doctor, calculation of calories obligatory (1 g spirit contains 7 kcal). Alcohol can cause hypoglycaemic condition.

Physical activity

Physical activity is the additional medical factor at diabetes and positively influences all kinds of an exchange. At regular physical activity splitting of fats amplifies, cholesterol level in blood is normalised, preconditions to atherosclerosis formation are eliminated. Physical loading has considerable influence and on a carbohydrate exchange. At physical activity sensitivity insulin receptors to insulin which can be accompanied by sugar-reduce effect and reduction of requirement for insulin rises.

Especially the great value high level of physical activity has in patients on diabetes 2 types in association with adiposity. The normalisation of weight reached by hypocaloric of a diet and considerable physical activities (if there are no contra-indications and resolves a condition of cardiovascular system) to some patients allows to reach indemnifications of a carbohydrate exchange.

Physical to loadings any kind of physical activity - walking, run, homework performance can be considered. The patient should supervise level of power inputs at physical activity:

But physical activity can be enough dangerous to patients on a diabetes of 1 type. Uncontrolled physical activity can cause difficult hypoglycaemia. Physical activity rises in healthy and in patients on a diabetes of 1 type sensitivity insulin receptors to insulin. But in patients on diabetes of 1 type, unlike healthy, against physical activity there is no decrease in level of insulin and it creates threat glycaemia both during loading, and after its termination - the hypersensibility to insulin remains throughout several hours.

Physical activity should be adequate to a dose of insulin and a diet, conditions glycaemic profile and to a functional condition of all bodies and systems. It is necessary to consider the factor of physical activity at planning insulin therapy.

Physical activity should be dosed out, with observance of the certain fixed level of loading and during certain fixed time. Optimum distribution of physical activity throughout day: in the morning - improving gymnastics, power exercises - at 16 - 18 o'clock. Optimum intensity of physical activity - physical activity of average intensity. In this case the quantity of glucose which consumes muscles exceeds gluconeogenesis in a liver, and physical activity finds out sugar-reducing action.

Intensive physical activity serves as the reason гипоксии fabrics and stimulates emission контрінсулярних hormones which stimulate gluconeogenesis and lipolyse - against intensive loadings can arise hyperglycaemia and ketoacidosis.

Sugar-reducing preparations for oral use.

Preparations of sulfonylurea

For this time of 60 % of patients for diabetes accept Sugar-reducing preparations for oral use. On early grades 2 types without the expressed complications of disease efficiency preparations does not concede diabetes an insulin therapy.

The mechanism of action of preparations of sulfonylurea

A.Sugar-reducing action of pancreas:

1. Stimulate insulin secretion in pancreas Cages, assist mobilisation and emission endogenic insulin, to its liberation from secretory granules.
2. Raise sensitivity at pancreas cells to hyperglycaemia.

B. Extrapancreatic sugar-reducing action:

1. Improve insulin - receptor interaction.
 - 1.1. Raise quantity of receptors of insulin in tissues.
 - 1.2. Increase sensitivity of insulin receptors to insulin, stimulate insulin with receptors.
 - 1.3. Normalise the post-receptor mechanism of influence of insulin on a metabolism of glucose in a cell and on glucose transport deep into cells.
2. Depress glycogenolyse and gluconeogenesis:
 - 2.1. Potent action of endogenic insulin on a liver, glucose and synthesis glycogen increases formation in it.
 - 2.2. Reduce insulin linkage in a liver.
 - 2.3. Reduce secretion of counter-insular hormones, especially glucagon, depressing its secretion
 - 2.4. Depress secretion of glucagon, block splitting glycogen in a liver, reduce receipt of glucose from a liver.
 - 2.5. Stimulate synthesis glycogen in tissues.
 - 2.6. Strengthen transport of glucose at cells of muscles.
 - 2.7. Block of lipolyse in a fat tissue.

V. Extrapancreatic non-sugar-reducing action.

1. Oppression of the cardioprotective mechanism.
2. Diuretic or antidiuretic action.
3. Angiotrophic effect:
 - 3.1. Decrease of hyperaggregation and hyperadhesion of thrombocytes.
 - 3.2. Synthesis decrease of thromboxan.
 - 3.3. Synthesis strengthening of prostacyclin.

The indication to appointment of preparations of sulfonylurea

Diabetes 2 types in the presence of such conditions:

- 1) the age of the patient exceeds 35 years;
- 2) normal or excessive weight of the patient;
- 3) impossibility to reach diabetes indemnification only by diet therapy;
- 4) duration of disease does not exceed 15 years;
- 5) absence in the anamnesis insulin therapy or the insulin use in a dose > 40 IU;
- 6) an inefficiency of insulin therapy without propensity to ketoacidosis if the dose of insulin does not exceed 40 IU – monotherapy by preparations of sulfonylurea or the combined treatment by preparations sulfonylurea and insulin.

By-effects at treatment by preparations sulfonylurea

Are observed in 5 % of patients. Skin defeat - an allergy, erythema, photosensitivity, porphyria. Seldom develops syndrome of Liell. Allergic reactions can disappear after reception antihistamine preparations. At difficult reactions spend treatment by glucocorticoids.

Toxic influence on a bone brain formed haematological by-effects-leucopenia, granulocytopenia, agranulocytosis, hypochromic anaemia, haemolytic anaemia, aplastic anaemia, pancytopenia.

Toxic influence on a liver can be accompanied by infringement of function of a liver. The necessary control of time for a month of hepatic tests.

Possible toxic influence on kidneys.

Endocrine by-effects- a syndrome of inappropriate secretion of antidiuretic hormone. Secretion increase of antidiuretic hormone leads to a liquid delay in an organism, cultivation of hyposodiumaemia, possible drowsiness, occasionally - a coma. The syndrome can develop at treatment by chlorpropamidum, tolbutamidum.

Hypoglycaemic conditions can develop at uncontrolled use of preparations, dose excess. More often appear in the first 2 weeks from the therapy beginning. Developments of hypoglycaemia assists:

- 1) preparation overdose;

- 2) untimely food;
- 3) the big physical activity;
- 4) alcohol reception;
- 5) simultaneous reception of medical means which potent action of preparations sulfonylurea or independently cause rinopликeмию – acetylsalicylic acids, anticoagulants, sulfaphenozolone;
- 6) infringement of function of a liver and a dive with delay of a road clearance of preparations, then cumulation;
- 7) individual hypersensitivity.

By-effects can be eliminated at dose decrease, replacement with other preparation, difference of a preparation sometimes demands.

Resistance to preparations sulfonylurea - absence of sensitivity to preparations, is shown by absence sugar-reducing actions of optimum doses.

Primary sulfanylamide-resistance – absence of sugar-reducing preparation actions at primary appointment in 2 weeks of regular reception. The reason not clear develops in 20 % of patients. At primary sulfanylamid-resistance increase of a dose or the combined therapy from 2-3 preparations sulfonylurea or biguanids is recommended.

Secondary "late" sulfanylamid-resistance develops gradually, after the certain period of their effective utilisation (as a rule, in 5 years). Secondary resistance develops in 25-40 % of patients that were treated by preparations of sulfonylurea.

Contra-indication to appointment of preparations of sulfonylurea

Absolute contra-indications:

- 1) the Diabetes of 1 type;
- 2) the pregnancy diabetes

At a diabetes 2 types counter-indicative primary appointment or continuations of treatment by preparations sulfonylurea in the presence of following conditions:

- 1) pre-coma or a coma -ketoacidic, hyperosmolar, hypoglycaemic;
- 2) comas another ethiology- uraemic, hepatic;
- 3) ketoacidose or propensities to it, presence in the anamnesis ketosis;
- 4) nephritic or hepatic insufficiency;
- 5) diabetic nephropathy IV-V stages;
- 6) necessity of surgical intervention, a trauma - the patient is translated on insulin or incorporated treatment by preparations sulfonylurea and insulin;
- 7) trophic ulcers, a gangrene;
- 8) difficult infectious diseases;

- 9) an acute heart attack;
- 10) the expressed infringements of function of thyroidal glands, adrenal glands;
- 11) pregnancy, lactation;
- 12) disease of blood and other conditions with leucopenia, anaemia;
- 13) high hyperglycaemia on an empty stomach and glucosuria at diet observance.

Rules of rational application of preparations sulfonylurea

1. Are appointed behind severe indications - at a diabetes 2 types which is not corrected by one diet-therapy.
2. Treatment by preparations sulfonylurea begin from the minimum dose, gradually increasing dispensing to the sufficient. About sensitivity or resistance of the patient to preparations it is necessary to solve in 2 weeks after the reception beginning.
3. Treatment should be spent under the control glycaemic profile and glucosuria.
4. The maximum dose of preparations sulfonylurea – 3 - 4 tablets for 2 receptions. The further increase of a dose does not lead to increase sugar-reducing effect, but sharply increases risk of collateral actions.
5. Preparations sulfonylurea can be applied not only before food, but also during food to reduction dyspeptic phenomena. The food does not reduce their efficiency.
6. After reception sufficient sugar-reducing effect dose of preparations reduce to its minimum effective constant supported dose.
7. At insufficient efficiency of a preparation (primary resistance) appointment of a combination from 2 -3 preparations of sulfonylurea is expedient.
8. In the absence of effect from monotherapy preparations of sulfonylurea or their combinations it is expedient to add to treatment biguanids, at a combination inefficiency resort to monotherapy by insulin.
9. It is necessary to consider interaction of preparations sulfonylurea with other medical means.

Preparations of sulfonylurea of the II generation

Are used in clinical practice since 60-th years, for this time is the most used peroral sugar-reducing preparations.

Glurenorm (glibidonum) Tablets of 30 mg. Begin treatments with 1/2 tablets by a breakfast, if necessary gradually increase a dose, adding on 1/2 tablets on a time. More often the daily dose makes 1, 1-2 tablets. Admissible increase of a daily dose to 4 tablets.

Minidiab- Tablets of 5 mg.

Gliclazidum (diabetonum) Tablets of 80 mg the Preparation is effective at primary appointment as the patient, that did not accept peroral sugar-reducing preparations earlier. Appointment Glyclazidum the patient, those others sugar-reducing preparations earlier accepted preparations, often it appears inefficient.

Glibenclamidum (minimal). Tablets of 1 mg, 1,25 mg, 2,5 mg, 3,5 mg, 5 mg. Effective at primary or secondary resistance to preparations of I generation.

Glybonuridum (glucotril). Tablets of 12, 5 mg and 25 mg. Effective 8-12 hours. At first appoint on 12, 5 mg 1-2 times per day before a breakfast and a supper. If the daily dose does not exceed 50 mg, accept at one time before a breakfast. In the absence of effect a dose gradually increase to 75 mg per day. After achievement sufficient sugar-reducing effect a dose reduce to supported - 12, 5-50 mg per day.

Biguanids.

Effective in 5-10 % of patients with diabetes.

The mechanism of biguanids action

1. Slow down speed of absorbtion in thin intestines of glucose, aminoacids, fibers, fat acids.
2. Improve glucose transport in a cell.
3. Improve peripheral recycling of glucose, especially make active glucose absorption by skeletal muscles, strengthen in them processes of anaerobic glycolyze and anaerobic glycolyze.
4. Reduce inactivation of insulin.
5. Increase quantity of receptors to insulin in peripheral tissues.
6. Potent the effect of insulin on receptory and post-receptory equal, not changing insulin secretion.
7. Depress glyconeogenesis in a liver which reduces production of glucose of liver, especially at night.
8. Reduce lipogenesis in a fat tissue, assist decrease in weight of a body.
9. Raise lipolyse in a fat tissue.
10. Have hypolipidaemic action - reduce level of cholesterol in blood whey.
11. Have anorexigenic action - reduce appetite.
12. Have fibrinolytic action.

The indication to appointment biguanids:

1. A diabetes 2 types of average weight with adiposity at a stable course without propensity to ketoacidosis.
2. An easy diabetes in patients with adiposity and hyperlipidaemia if the diet does not serve as the reason of normalisation of weight and lipid exchange.
3. Primary or secondary sulfanylamid-resistance.
4. A labile course of diabetes of 1 type without ketoacidosis - the combined therapy by insulin and biguanids with sulfanilamids.
5. An allergy to insulin or sulfanilamids.
6. Insulin-resistance, especially in patients with excessive weight - insulin in a combination with biguanids is applied.
7. A diabetes at acromegalia.

By-effects at treatment by biguanids

1. Allergic reactions to a skin (seldom).
2. Metal smack in mouth.
3. Faintness, vomiting, a pain in a stomach, a diarrhea. Dyspeptic phenomena decrease at decrease in a dose of a preparation, sometimes at difference of a preparation for some days then continue reception in smaller doses.
4. Ketonaemia owing to activation lipolyse- the necessary control of urine on acetone once a week. At acetonuria expressed hyperglycaemia can not be. In that case biguanids cancel, in a diet increase quantity of carbohydrates, to some days appoint insulin-therapy. Sometimes it is enough to cancel only biguanids.
5. Lactate-acidosis owing to activation anaerobic glycolyze.. Development lactic acidosis- the heaviest complication of therapy by biguanids, caused to strengthenings anaerobic glycolyze.

Contra-indication to appointment of biguanids:

1. A diabetes of 1 type with propensity to ketoacidosis.
2. Expressed diabetes, ketoacidosis, coma and pre-coma conditions.
3. Acute infections
4. Acute surgical diseases, operative interventions.
5. Acute, chronic diseases of a liver with functional infringements – acute and chronic hepatitis, at diabetic hepatosis without functional infringements biguanids can be applied.
6. Disease of kidneys with decrease of filtrations.
7. The expressed atherosclerosis.
8. a collapse, a shock.
9. Pregnancy, lactation.
10. alcoholism.
11. Old age.
12. Diabetic angiopathy with possible development of incendiary processes, a gangrene of endings.
13. Diabetic neuropathy, independent neuropathy with infringement of a metabolism of vitamin B12.
14. Presence in the anamnesis lactatacidosis.

Biguanids application rules:

1. Before appointment supervise a parity of lactacid and pyrograpes acids -LA: PGA = 10:1.
2. By-effects are better transferred, when accept preparations during food.
3. A mode of selection of optimum doses: from maximum to optimum or from minimum to the optimum.

4. Frequency rate of reception - 3 times per day at efficiency throughout 6-8 hours, or 2 times per day at efficiency of 10-12 hours.

Group of dimethylbiguanids:

Metforminum (glucofag, diphormine, glyformine). Tablets of 250 mg, 500 mg. Accept 2 times on a time, effective 10-12 hours. Treatments begin with 1 tablet during a breakfast and a supper, further the dose is raised to 500-750 mg by 2-3 times per day. The full effect develops in 14 days. After achievement of a desired effect the dose can be lowered to 250-500 mg 2-3 times per day.

Metforminum-Петард. Tablets of 850 mg. Effective 10-12 hours. Accept on 1 tablet 1-2 times per day.

Acarbosa- tablets of 50 mg and 100 mg. An initial dose - 150 mg, a supported dose - 300 mg, the maximum daily dose - 600 mg. Accept 3 times per day directly ahead of the basic food, necessarily not chewing, with a liquid small amount. Each 6 months supervise activity of hepatic enzymes.

Acarbosa does not influence insulin secretion, at monotherapy does not cause hypoglycaemic condition. The requirement for insulin for patients on a diabetes of 1 type against regular reception acarbosa decreases.

Guar Gum- granules 5 g in each bag. An initial daily dose - 7,5 g. the Initial single dose - 2,5 g, the Supported daily dose – 15g, the Maximum daily dose – 30g. Accept 3 times per day during food with a liquid considerable quantity, it is not less 200 ml.

By-effects: a diarrhoea, meteorism, pains in a stomach.

The indications:

1. A diabetes of 1 type and diabetes 2 types in association with adiposity.
2. An allergy to insulin, preparations of biguanids or sulfonylurea.
3. Insulin-resistance.
4. Hypercholesterinaemia

Counter-indication:

1. Pregnancy, lactation.
2. Chronic diseases of intestines, diarrhea

Except traditional groups of sugar-reducing peroral, at present apply such groups, as:

-Preparations, which potent insulin secretion - GLP - 1 (glucagon peptid-1) and GIP- glucose-dependence insulin-trophic peptid; antagonist of alpha-receptors, derivatives of imidazole and MK-912; sulfonylgidantoin (M-16209);

- Insulin – mimetic substances: salts of Vanadium – vadanat and vadanil; vitamin K, diamid, peroxydes; forbol aether, glyoxylates;

- Preparations which strengthen a metabolism of glucose irrespective of insulin: zinc, mangan, magnesium, selenium, mercury, chrome;

Principles of treatment of patients on diabetes 2 types

In the presence of diabetes 2 types in patients with excessive weight are appointed a hypocaloric diet with restriction of "fast" carbohydrates and additional physical activities for the purpose of normalisation of weight of a body. At an inefficiency of the given actions fats are limited, in addition the diet joins food fibers, acarbose.

If diet therapy does not provide sufficient correction of a carbohydrate exchange, in addition appoint peroral sugar-reducing preparations. At the given stage a choice preparation is glurenorm. If in the course of treatment by this preparation it was not possible to reach indemnification of a carbohydrate exchange, it is possible to strengthen action glurenorm additional appointment of other preparation from group of derivatives of sulfonyleurea of II generation (glybenclamidum).

If complex therapy by derivatives sulfonyleurea insufficiently, it is appointed insulin-therapy. For development preventive maintenance insulin-resistance together with insulin continue also daily reception of 1-2 tablets of a preparation sulfonyleurea.

In the presence of primary or secondary resistance to peroral sugar-reducing preparations appoint insulin therapy.

At a diabetes 2 types in patients with normal weight of treatment begin from appointment of the diet close to physiological, but such, that excludes the refined carbohydrates, the mode of the raised physical activity is recommended. At an insufficiency of diet therapy appoint preparations of sulfonyleurea.

The indication to appointment of insulin as the patient to diabetes 2 types:

- 1) decompensation a carbohydrate exchange, despite severe observance of a diet and the maximum dose of peroral sugar-reducing preparations;
- 2) difficult intercurrent disease;
- 3) considerable surgical intervention;
- 4) hyperosmolar coma;
- 5) difficult chronic complications of the diabetes: neuropathy with the expressed painful syndrome, retinopathy, nephropathy with chronic renal insufficiency;

Insulin therapy

The indication to insulin therapy:

1. A diabetes of 1 type.
2. A diabetes of 2 type at:
 - 1) insufficiencies of diet therapy and treatment by peroral sugar-reducing preparations;
 - 2) resistance to peroral sugar-reducing preparations;
 - 3) considerable decompensation a diabetes 2 types - ketoacidosis, pre-coma;
 - 4) in the presence of decompensation risk factors – stress, purulent infections, traumas, operations;
 - 5) during pregnancy

3. A diabetes 2 types or symptomatic with difficult complications:

- 1) diabetic nephropathy IV-V stages or nephritic insufficiency;
- 2) difficult neuropathy with the expressed painful syndrome;
- 3) difficult defeats of the bottom endings with trophic ulcers, necrobiosis;
- 4) difficult dystrophic defeats of a skin;
- 5) a tuberculosis;

Classification of preparations of insulin

1. On duration of action:

Short action (neutral, soluble);

Average durations (intermediate);

Long action;

Mixed (diphasic).

2. On a reception method:

Heterogeneous (from a pancreas of pigs, cows);

Homogeneous (human - semisynthetic, biosynthetic).

3. On clarification degree:

high-pure (HP);

no-pure

Short insulin

Optimum zone for introduction of short insulin - hypodermically a forward wall of a stomach. At such way of introduction short insulin arrives in a liver and its action more comes nearer to effects endogenic insulin faster. At the healthy person all insulin which is synthesised in a pancreas, at first arrives in a liver where to 50 % of its total communicates and stimulates accumulation glycogen in a liver, and only then insulin arrives in delivery of bodies and fabrics.

Optimum time of introduction of short insulin - for 20 minutes to food. Human insulin starts to operate faster, the interval between introduction of insulin and food should be reduced till 10 minutes. At transferring of time of food from these or those reasons (for 30 60 minutes) should be transferred and an injection of short insulin.

Peeping shortly after an injection of short insulin - one of the major rules rational insulin-therapy. Refusal of the next portion of food demands also refusal of introduction of a corresponding dose of short insulin.

Short insulin enters hypodermically, intramuscular or intravenous . At intravenous introduction of simple insulin the preparation pharmacokinetics changes - the action beginning in 15 minutes, the maximum activity throughout 30 60

minutes, action comes to an end in 2 hours. Intravenous introduction practises atketoacidosis. At intravenous drop introduction in isotonic solution of 60-80 % insulin it is lost - contacts a material infusion system or a bottle with a solution.

The most frequent way of introduction of short insulin - hypodermic.

Short insulin is entered only before food - differently possible heavy hypoglycaemia. The dose of short insulin should answer quantity of carbohydrates of food: for mastering of 1 grain unit (GU) carbohydrates it is necessary 1,2-2 IU simple insulin.

In one stage enter it is no more 12 IU short insulin - the more quantity cannot communicate by insulin receptors and circulates in blood, that causes formation of counter-insulin antibodies. The considerable quantity of injections of short insulin (it is not less 3) before the basic food provides the uttermost indemnification of a carbohydrate exchange. Short insulin is choice preparations in situations with fast change by requirement of patients in insulin - after a conclusion with ketoacidosis, during operations.

The prolonged insulin

The prolonged action of insulin is provided with additional introduction of zinc and fiber. Insulin is deposited in connected with zinc or fiber (protamine) to the form, being slowly liberated from this complex.

Preparations of the prolonged action enter only hypodermically. Places of introduction of the extended insulin: a forward surface of a hip, a skin fold over a buttock. As the spare variant can sometimes be used a shoulder outer side between humeral and elbow joints. The subscapular area should not be used for insulin introduction - the preparation is too slowly soaked up.

Places of injections need to be changed regularly. Variants of change of a place of introduction of insulin:

- 1) some weeks enter insulin only into the right and left shoulder; the following some weeks - only in the right and left hip;
- 2) every day insulin enter into all zones - each injection carry out in a certain zone.

Definition of daily requirement for insulin

1. Calculation of a daily dose of insulin on ideal weight of a body (if the real weight of a body does not differ from ideal more than on 20 %).

Ideal weight (kg) x Specific requirement for insulin (IU/KG) = the Daily dose of insulin (IU)

The specific requirement for insulin depends on the experience of disease, a condition of indemnification of carbohydrate exchange, other conditions.

The specific requirement for insulin represents:

- For the first time the revealed diabetes - 0, 5-1 IU/KG;
- The compensated diabetes, after indemnification metabolic infringements - 0,4 IU/KG;
- Long insulin therapy at unsatisfactory indemnification - 0,7 IU/KG;
- The diabetic experience and is more two years - 0, 7-0,9 IU/KG;
- ketoacidosis- 1 IU/KG`;
- 1-20 week of pregnancy - 0,6 IU/KG.

If the patient receives at absence ketoacidosis more than 0,9 IU/KG /h, it can be regarded as overdose, the daily dose is necessary for lowering on 20-25 %.

2. Calculation of a dose of insulin on glycaemia.

- (Glycaemia (mmol/l) - 8,25 (mmol/l)): 0,28 = the Dose of insulin (IU)

- (Glycaemia (mmol/l) - 8,3 (mmol/l)): 0,3 = the Dose of insulin (IU)

- (Glycaemia (mg of %) - 150 (mg of %)): 5 = the Dose of insulin (IU)

3. Calculation of a dose of short insulin by quantity of carbohydrates in food.

The technique can be applied at a mode of 3 4 injections of short insulin throughout day. The technique of situational dispensing of insulin of short action depending on quantity of carbohydrates in a portion of the food accepted directly ahead of this an injection which allows to avoid excessive postalimentary hyperglycaemia is the most adequate.

Calculation stages:

1) Definition of the general daily power value of a diet in kcal.

2) Definition of daily quantity of carbohydrates in a diet in grain units.

3) Distribution of carbohydrates in grain units between food intakes.

4) Calculation of a necessary single dose of the short insulin, adequate quantity consumed BU:

Before a breakfast - on 1 BU it is necessary 2 IU insulin;

Before a dinner - on 1 BU it is necessary 1,5 IU insulin;

Before a supper - on 1 BU it is necessary 1,2 IU insulin.

The factor of calculation of a dose decreases from a breakfast to a supper as occurs summation of sugar-reducing effect before the entered doses of short insulin.

Main principles of insulin therapy

Basal(background) insulinaemia - insulin level in blood in intervals between food and at night, it constant enough and concerning small - the volume of secretion of insulin does not exceed now 1 IU/h. The requirement for insulin between food and is connected with anabolic processes at night.

After eating hyperinsulinaemia - emission of insulin by a pancreas in blood after food intake. Excitation of parasympathic nervous system, level increase in blood gastrointestinal hormones, increase contained in blood of glucose and aminoacids stimulates synthesis and insulin secretion, intensity of secretion increases to 5-8 IU/h. Level of postalimentary hyperinsulinaemia depends on character of a food - quantity and structure of the accepted food, mainly carbohydrates. As a whole requirement for insulin in the afternoon the higher, especially throughout 1-2 hours after food.

Physical activity reduces glucose level, and, so, reduces requirement for insulin.

The mode basis – bolus therapy - a combination of insulin of the short and prolonged action is an optimum variant of insulin therapy. The mode of reusable injections of insulin of short action before food which compensates postalimentary hyperglycaemia is the most physiological. Nevertheless short insulin cannot compensate morning

hyperglycaemia (if not to enter insulin at night), and this function is carried out by the prolonged insulin. Combined insulin therapy (basis-bolus method) provides use of 2 kinds of insulin with different duration of action.

Insulin of the prolonged action provides basal insulinaemia (basic insulin therapy), more all approaches for this purpose preparations with uniform action throughout long time, is desirable without peaks. Basal insulinaemia, that is created by these preparations, more all answers background insulinaemia the healthy person.

Preparations of insulin short, but fast action simulate postalimentary hyperglycaemia, are entered before meal (bolus insulin therapy). It is very important to provide adequacy of a dose of insulin which is entered, calorage and contents of carbohydrates in a portion of food which is eaten directly after that. Optimum, if an insulin dose, calorage and a particle (quota) of carbohydrates in the given portion of food are constants. It is desirable, that the food and insulin introductions before food was carried out during same time. After introduction of short insulin of the patient necessarily should eat.

For simplification reusable insulin therapy develop the syringes of the handle equipped with superthin sterile needles with thermostabile insulin (concentration of insulin 100 IU/ml, volume 1,5-3 ml). Injections syringes - handles not painful, a needle do not demand additional processing before use.

The general rules of insulin therapy:

"The dose of simple insulin in one injection should not exceed 12 IU.

"The total dose of the combined injection should not exceed 70-80 IU.

"The parity of a day and night dose of insulin should come nearer to 2:1.

"The day dose of insulin can be changed no more than on 4 IU /h.

"In one stage daily dose of insulin should not increase or decrease more than on 6-8 IU.

"An insulin dose correct on level of sugar in blood and urine. The necessary account of individual reaction of the patient on a concrete preparation of insulin.

The requirement for insulin depends on a mode and calorage of food, level of physical activity. Insulin therapy, the diet and physical activity should answer each other. Necessary strict conformity, adequacy of insulin therapy (a dose and a mode of introduction of insulin) with calorage both a mode of food and level of physical activity. At change of one factor should change and others.

Typical errors of insulin therapy

1. Use of syringes for insulin injections with the price of division of 0,1 ml. The price of one division of insulin syringe for introduction of insulin with concentration in 1 ml 40 IU. In a not-insulin syringe one volume contains 4IU.
2. The continued insulin before introduction needs to be mixed carefully, rolling a bottle between palms.
3. Introduction of cold insulin slows down action of a preparation and causes formation of difficult complications – hypodermic lipodystrophia.
4. Skin processing directly ahead of an injection spirit the undesirable: spirit segments destroy insulin.
5. Mixing in one syringe insulin of short and long action is inadmissible.

6. Too superficial introduction of insulin (intracutaneous) slows down preparation action. Strong deep introduction of insulin (intramuscular) acute accelerates preparation action. Insulin needs to be entered severely hypodermically. Before an injection the skin is grasped pleated. Not to collect a fold it is possible only at very portly patients. An optimum corner of an inclination of a needle – 45-90 ° to a skin surface, depending on a thickness of a fold of a skin. The skin fold needs to be kept till the end of preparation introduction - differently insulin can be entered into a muscle.

7. It is not necessary to extend sharply at once a needle after preparation introduction - it is desirable to wait for 5-10 seconds. Prevents "expiration" of insulin from an injection place special reception - needle introduction on brake trajectory. The twisting channel prevents from the insulin expiration.

The basic modes of insulin therapy

1. A mode fixed insulin therapy (a mode of standard doses).

The patient enters day by day the same doses of insulin. Also to constants should be and quantity of carbohydrates which are received by the given patient during each food. Level and distribution throughout a time of physical activity of the patient should be fixed also. Change of any from three parametres (a dose of insulin, BU quantity in food, level of physical activity) demands also adequate correction of two other parametres.

The possible reasons of decompensation of a carbohydrate exchange at use of a mode of standard doses:

1. The accepted food contains surplus of carbohydrates: develops hyperglycaemia.
2. The accepted food contains not enough carbohydrates: develops hypoglycaemia.

Rules of correction of a dose of short insulin

The purpose of introduction of short insulin: 1) to discharge hyperglycaemia if such is at the moment of the next injection; 2) to compensate after food (postalimentary) hyperglycaemia which necessarily arises after the planned next food intake. Thus, the optimum dose of short insulin necessary at present for time, consists of two components.

A. Dose of short insulin for indemnification of hyperglycaemia which takes place. If at the control of glycaemia before an insulin injection it is defined normoglycaemia the component and will be equal to zero. The size of a component and depends on size of hyperglycaemia, revealed directly ahead of an insulin injection. The additional dose of short insulin at glycaemia 10 mmol/l makes 1 IU insulin, at glycaemia 11 mmol/l - 2 IU, accordingly at 12 mmol/l - 3 IU, at 13 mmol/l - 4 IU, at 14 mmol/l - 5 IU, at 15 mmol/l - 6 IU, at 16 mmol/l - 7 IU.

B. Doza of short insulin for mastering of carbohydrates of food which will be directly eaten after introduction of the given dose of insulin. If the patient after insulin introduction is not, the component B will be equal to zero. The component size depends on quantity of carbohydrates that portion of food which the patient is going to eat after the given injection of insulin and time of a time.

For approximate definition of size of a component in IU, it is necessary to define carbohydrate value of food in BU and to multiply this value by factor K which for a breakfast makes 2 IU /HO, for a dinner - 1,5 IU /HO, for a supper - 1 IU /HO. The factor K shows how many units of short insulin are necessary for mastering 1 BU food carbohydrates during the given period of a time (for a breakfast, on a dinner, for a supper). Factor reduction K from a breakfast till a supper is connected with sensitivity increase insulin receptors of tissues to insulin throughout day: the same dose of short insulin entered on evening, finds out big sugar-reducing action, than the same dose of the same insulin, but

entered in the morning. And in addition certain value has also effect summation actions of different doses of the insulin entered throughout a time.

Always it is necessary to remember preventive maintenance night hypoglycaemia: before a supper the dose of short insulin should not exceed 6 IU.

For example: to acquire 5 BU carbohydrates for a breakfast, it is necessary 10 IU short insulin ($5 \text{ BU} \times 2 \text{ OT/BU} = 10 \text{ IU}$). The Same quantity of the carbohydrates eaten during a dinner, demands 8 IU short insulin ($5 \text{ BU} \times 1,5 \text{ OT/BU} = 8 \text{ IU}$). A supper in 5 BU carbohydrates it will be compensated 5 IU short insulin ($5 \text{ BU} \times 1 \text{ OT/BU} = 5 \text{ IU}$).

Correction of a dose of short insulin at acetonuria

If blood sugar exceeds 16 mmol/l in urine there is an acetone, a necessary additional dose of short insulin which makes 20 % from a daily dose of the patient. In two hours after an additional injection level glycaemia supervise. If glycaemia has decreased, the insulin therapy spends under the usual scheme. If hyperglycaemia remains, an additional dose enters again.

Rules of correction of a dose of the prolonged insulin

At a mode intensive insulin therapy the dose of the prolonged insulin should be so small that in the middle of action not to cause hypoglycaemia, but also big enough that at the moment of termination of the action not to suppose hyperglycaemia.

Mastering maintenance endogenic glucose, at the basic of a hepatic origin is the purpose of introduction of the prolonged insulin. The dose prolonged insulin is selected, being guided on night гликемию. Optimum time for the control over night indicators of a carbohydrate exchange: 1) before a night sleep; 2) at 3 o'clock in the morning; 3) in the morning on empty stomache.

Level of glucose of blood should be not less than 4 mmol/l at night. At lower values glycaemia high risk of the further falling of level of glucose, after all at night the absent subjective control of the patient over presence of possible symptoms hypoglycaemia, therefore night hypoglycaemia often remain not distinguished. Besides, decrease in level of glucose of the blood, not compensated additional food intake, can activate emission counter-insulinary hormones with the further stimulation of gluconeogenesis, glycogenolyse and uncontrollable inadequate increase of level of glucose of blood (phenomenon Somogee, posthypoglycaemic hyperglycaemia).

Evening dose of the prolonged insulin is insufficient

If the dose of the prolonged insulin which is entered in the evening, too had, insulin will finish the action earlier – hyperglycaemia will be defined and in 3 and to o'clock in the morning, and early in the morning on empty stomach. An exit: to transfer injection time at 2 o'clock, directly ahead of insertion to a bed. If the mode of day of the patient does not allow it to make, the evening dose of the prolonged insulin should be increased by 10 %.

Evening dose of the prolonged insulin is superfluous

If the dose of the prolonged insulin which is entered in the evening, too big, causes surplus of insulin hypoglycaemia in the 2 half of night. Night not compensated hypoglycaemia can cause formation of phenomenon Somogee, and in the morning the patient will wake up with high indicators of glycaemia, thirst, a headache (a consequence night hypoglycaemia). Diagnostics night to a variant of phenomenon Somogee consists in the obligatory control of glycaemia throughout night (before a sleep, in 3 o'clock in the morning and in the morning on empty stomach).

If glycaemia in 3 and hour low, and in the morning натщесерце sharply raised - the evening dose of the prolonged insulin excessive also be reduced by 10-15 %. Thus not always at 3 o'clock in the morning it is fixed absolute hypoglycaemia- it can take place at 4 or at 5 o'clock in the morning when level of glycaemia is not defined more

often. Acute increase of level of glycaemia at normoglycaemia at 3 o'clock in the morning if the difference between glucose level at 3 and at 7 o'clock in the morning exceeds to hour 5 mmol/l is in the morning an authentic sign transferred hidden hypoglycaemia in the second half of night.

Phenomenon of "a morning star" (hyperglycaemia at 6 o'clock in the morning on the empty stomach) caused night an anabolic maximum - increase of level STH, somatomedins, and also glucocorticoids and glucagon. Having counter-insulinary action, these hormones activate processes of gluconeogenesis and glycogenolysis, that is accompanied by level increase endogenous glucose in blood. Time of development morning an anabolic maximum at people individual, and for a choice of an optimum method of its correction is necessary to define precisely time of occurrence morning not food hyperglycaemia. The given phenomenon is defined at children and teenagers more often.

Phenomenon correction "a morning star"

Early morning anabolic (at 5 o'clock in the morning) it is better to compensate a maximum, having transferred an evening injection of the prolonged insulin for as much as possible later time – at 22 or at 23 o'clock, directly ahead of insertion to a bed. Sometimes it is necessary to recommend to the patient to go to bed later.

The late anabolic maximum (at 7 o'clock in the morning) is better for discharging, having displaced at 6 o'clock in the morning a morning injection of short action insulin. For this purpose it is necessary to advise to the patient to rise earlier. Expressed morning anabolic maximum with increase of requirement for insulin at 6 o'clock in the morning and hyperglycaemia early in the morning on empty stomach more characteristic for young patients who actively grow.

Possible other mechanism of a phenomenon of "a morning star" when from as a matter of fact is a night variant to phenomenon Somogjee.

Choice of an optimum mode of insulin therapy (distribution of insulin throughout a time)

A. Regimen of 2 time introductions of insulin, the scheme "2+2".

1. In the morning before a breakfast	2. In the evening before a supper
A. Insulin of short action	C. Insulin of short action
B. Insulin of average duration of action	D. Insulin of average duration of action

The insulin dose is defined by "a rule of thirds"

Total morning dose = 1/3 a total daily dose. $A+B = 1/3 (A+B+C+D)$

Dose of short insulin in the morning = 1/3 of the total morning dose. $A = 1/3 (A+B)$

Dose of short insulin in the evening = 1/3 of the total evening dose. $C = 1/3 (C+D)$

Diet at insulin therapy under the scheme "2+2"		
Breakfast 30 %	the first dinner 10%	the supper 20%
2 breakfast of 15 %	the second dinner 10%	Before a sleep 5%
	the third dinner 10%	

B. Regimen of 3 time introduction of insulin, the scheme "3+2".

1. In the morning before a breakfast	2. In the afternoon before a dinner	3. In the evening before a supper
A. Insulin of short action	C. Insulin of short action	D. Insulin of short action
B. Insulin of average duration		E. Insulin of average duration
Insulin therapy under the scheme "3+2"		
Breakfast 25%	Dinner 30%	Supper 20%
Second breakfast 10%	Lunch 10%	Before a sleep 5%

C. Regimen 4 time introduction of insulin, the scheme "4+1".

1. In the morning before a breakfast	2. In the afternoon before a dinner	3. In the afternoon before a lunch	4. In the evening before a supper
A. Insulin of short action	B. Insulin of short action	C. Insulin of short action	D. Insulin of short action
			E. Insulin of average action

Diet at insulin therapy under the scheme "4+1"		
Breakfast 25%	Dinner 30%	Supper 20%
	Lunch 10%	Before a dream 5%

D. Fractional insulin introduction.

Shot introduction of insulin is applied at for the first time revealed diabetes or at difficult decomposition a carbohydrate exchange against intercurrent diseases when daily requirement of the patient for insulin the unknown

person or quickly changes. The method allows to correct constantly a dose of insulin depending on level glycaemia, to prevent overdose of insulin with occurrence hypoglycaemia.

At this scheme use only short insulin before the basic food intakes (4-5 injections) or against intravenous introduction of a 5 %solution of glucose. The requirement for insulin throughout night can be compensated introductions of small doses of short insulin (4-6 IU) with an interval of 4-6 hours between injections.

Initial dose of each injection – 4-6 IU. The dose can be increased gradually on 4 IU/hour to achievement of the maximum single dose 12-14 IU.

At achievement of indemnification of carbohydrate balance and stabilisation of daily requirement for insulin (elimination of aggravations of incendiary diseases or other stressful factors which increase requirement of the patient for insulin) the patient translate on this or that a mode of insulin therapy with use both short, and the prolonged insulin. It is necessary to remember, that after a while after achievement of indemnification the requirement for insulin can decrease.

E. Additional insulin therapy.

The diabetes of 2 types characteristic infringement of physiological fluctuations level to insulin in blood - discrepancy between glycaemia and insulinaemia. Hyperinsulinaemia exists on empty stomach and in 2-3 hours after food, and first 30 minutes after food there is no necessary, adequate to level of postalimentary hyperglycaemia, an increase of level of insulin in blood.

Additional insulin therapy of diabetes the 2 types which have the indication for insulin appointment are spent to patients on diabetes. In most cases is partial insulin deficite in certain time intervals (or after food, or at night owing to uncontrollable gluconeogenesis), therefore daily requirement in ekzogenic insulin the small.

First of all it is necessary to find out the individual schedule relative insulin insufficiency.

If insufficiency postalimentary formation of insulin which is accompanied expressed hyperglycaemia after the basic food intakes takes place, it is necessary to spend additional insulin therapy the minimum doses of short insulin (2-4-6 IU) before the basic food intakes.

If there is a deficiency night an insulin background which is accompanied expressed proof night and morninghyperglycaemia, it is necessary to enter small doses of the prolonged insulin before a sleep(6-10 IU) for oppression hepatic gluconeogenesis at night.

Preparations of insulin of short, average and prolonged action

Preparations of insulin of firm «Novo -Nordisc» (Denmark)

Name	Form	Concentration	begin of action	period of activity
<i>Actrapid HM</i>	bottle10 ml	40 IU/1 ml	15-20 min	6-7 h
<i>Protaphan HM</i>	bottle10 ml	40 IU/1 ml	30-45 min	12-16 h
<i>Actraphan HM</i>	bottle10 ml	40 IU/1 ml	30-45 min	12-16 h
<i>Monotard HM</i>	bottle10 ml	40 IU/1 ml	45-60 min	10-14 h
<i>Ultratard HM</i>	bottle10 ml	40 IU/1 ml	6-8 min	28 h

Preparations of insulin of firm «Lilly» (USA)

Name	Form	Concentration	begin of action	period of activity
<i>Humulin regular</i>	bottle10 ml	100 IU/1 ml	30 min	5-7 h
<i>Humulin НПХ</i>	bottle10 ml	100 IU/1 ml	1 h	18-20 h
<i>Humulin Л</i>	bottle10 ml	100 IU/1 ml	2-2,5 h	до 24 h

Preparations of insulin of firm «Indar» (Ukraine)

Name	Form	Concentration	begin of action	period of activity
<i>Humodar P</i>	bottle10 ml	40 IU/1 ml	30 min	5-7 h
<i>Humodar P 100</i>	bottle10 ml	100 IU/1 ml	30 min	5-7 h
<i>Monodar</i>	bottle10 ml	40 IU/1 ml	30 min	5-7 h
<i>Monodar P</i>	bottle10 ml	40 IU/1 ml	30 min	5-7 h
<i>Humodar Б</i>	bottle10 ml	40 IU/1 ml	1 h	12-20 h
<i>Humodar Б 100</i>	bottle10 ml	100 IU/1 ml	1 h	12-20 h
<i>Monodar Б</i>	bottle10 ml	40 IU/1 ml	1 h	12-20 h
<i>Monodar -Long</i>	bottle10 ml	40 IU/1 ml	1 – 1,5 h	24 h
<i>Monodar -Ultralong</i>	bottle10 ml	40 IU/1 ml	8-10 h	30-36 h

Gen-engineery preparations of insulin of firm «Фармак» (Ukraine)

Name	Form	Concentration	begin of action	period of activity
<i>Pharmasulin H</i>	bottle10 ml	40 IU/1 ml	30 min	5-7 h
<i>Pharmasulin HNP</i>	bottle10 ml	40 IU/1 ml	1 h	18-20 h
<i>Pharmasulin HL</i>	bottle10 ml	40 IU/1 ml	2,5 h	24 h
<i>Pharmasulin H 30/70</i>	bottle10 ml	40 IU/1 ml	30 min	14-15 h

Combined preparations of insulin of firm «Ely Lilly» (USA)

Name	Form	Concentration	begin of action	period of activity
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<i>Humulin M2 (20/80)</i>	bottle10 ml	100 IU/1 ml	30-60 min.	14-16 h
<i>Humulin M3 (30/70)</i>	bottle10 ml	100 IU/1 ml	30-60 min.	14-16 h

Combined preparations of insulin of firm «Indar» (Ukraine)

Name	Form	Concentration	begin of action	period of activity
<i>Monodar K 15</i>	bottle10 ml	40 IU/1 ml	30-45 min.	14-18 h
<i>Monodar K 30</i>	bottle10 ml	40 IU/1 ml	30-45 min.	12-16 h
<i>Monodar K 50</i>	bottle10 ml	40 IU/1 ml	30 min.	6-10 h
<i>Humodar K 15</i>	bottle10 ml	40 IU/1 ml	30-40 min.	14-18 h
<i>Humodar K 25</i>	bottle10 ml	40 IU/1 ml	30-40 min.	12-16 h
<i>Humodar K 25-100</i>	bottle10 ml	100 IU/1 ml	30-40 min.	12-16 h
<i>Humodar K 50</i>	bottle10 ml	40 IU/1 ml	30 min.	6-10 h

Pen-syringes for insulin injections

Name	Firm	Cartridge	Concentration	IU
<i>B-D-Pen</i>	Eli Lilly, USA	1,5 ml	100 IU/1 ml	1 IU
<i>B-D-Pen Mini</i>	Eli Lilly, USA	1,5 ml	100 IU/1 ml	0,5 IU
<i>Novo Pen 3</i>	Novo Nordisk	3 ml	100 IU/1 ml	1 IU
<i>Novo Pen 3 Demi</i>	Novo Nordisk	3 ml	100 IU/1 ml	0,5 IU
<i>Novo Pen 3 PenMait</i>	Novo Nordisk	3 ml	100 IU/1 ml	1 IU
<i>Opti Pen</i>	Aventis, Germany	3 ml	100 IU/1 ml	1 IU
<i>Autopen</i>	Indar, Ukraine	3 ml	100 IU/1 ml	1 IU

Cartridge forms of insulin preparations of firm «Novo-Norm» (Denmark)

Name	Form	Concentration	begin of action	period of activity
<i>Actrapid HM Penphill</i>	Cartridge 3 ml	100 IU/1 ml	15-20 min	6-7 h
<i>Protaphan HM Penphill</i>	Cartridge 3 ml	100 IU/1 ml	30-45 min	12-16 h.
<i>Mixtard 10 HM Penphill</i>	Cartridge 3 ml	100 IU/1 ml	15-20 min	6-7 h
<i>Mixtard 20 HM Penphill</i>	Cartridge 3 ml	100 IU/1 ml	15-20 min	6-7 h
<i>Mixtard 30 HM Penphill</i>	Cartridge 3 ml	100 IU/1 ml	15-20 min	6-7 h
<i>Mixtard 40 HM Penphill</i>	Cartridge 3 ml	100 IU/1 ml	15-20 min	6-7 h

<i>Mixtard 50 HM Penhill</i>	Cartridge 3 ml	100 IU/1 ml	30-45 min	12-16 h
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Cartridge forms of insulin preparations of firm «Indar» (Ukraine)

Name	Form	Concentration	begin of action	period of activity
<i>Humodar P 100</i>	Cartridge 3 ml	100 IU/1 ml	30-45 min.	1-8 h.
<i>Humodar Б 100</i>	Cartridge 3 ml	100 IU/1 ml	1 hour	1-18 h.
<i>Humodar К 25-100</i>	Cartridge 3 ml	100 IU/1 ml	30min.	1-16 h.

Sign of chronic overdose of insulin

1. Iatrogenic the caused difficult, labile course of a diabetes with changeable daily requirement for insulin. 2. Insulin resistance.
3. The raised appetite, polyphagia, an overeating (against hypoglycaemia).
4. Increase in weight of a body, adiposity.
5. Absence of reduction of weight of a body, quite often weight of a body increases, despite expressed decompensation a carbohydrate exchange and high glucosuria.
6. Propensity to ketoacidosis.
7. Acetonuria without high glucosuria.
8. Acute fluctuations of glycaemia throughout a time from high to low values.
9. Frequent hypoglycaemia different expression, in particular night with a restless sleep, terrible sleep. Throughout day frequent episodes hypoglycaemia, obvious or hidden. Hidden hypoglycaemia it can be shown by headaches, sudden pains in heart, unmotivated sudden change of behaviour and mood.
10. Not compensated night hypoglycaemia or hidden not diagnosed daily hypoglycaemia (which also have not been compensated by food or otherwise) lead to development posthypoglycaemic hyperglycaemia- a "return" phenomenon (syndrome Somogee).
11. Improvement indicators of a carbohydrate exchange is observed on against joining intercurrent diseases: the requirement for insulin increases and comes nearer to a dose of insulin which is entered.
12. Improvement of a condition of the patient at trial decrease in a dose of insulin.

Complication of insulin therapy

1. Hypoglycaemia – a condition which develops at patients on a diabetes at level decrease glycaemia below 2,7 mmol/l.

The reasons of hypoglycaemia:

1) insulin overdose;

2) diet infringement - insufficient caloric content of carbohydrates in food;

3) considerable physical activity, especially right after introductions of short insulin (physical activities are resolved not earlier, than in 1,5-2 hours after insulin introduction);

4) fat infiltration of the liver, at which absent glycogenic the hepatic buffer which provides fast glycogenolyse in case of need;

5) difficult nephropathy, chronic renal insufficiency, that is accompanied by considerable decrease in requirement for insulin.

Neurogenic symptoms of hypoglycaemia: hunger, tremor, excitement.

Neuroglycopenic symptoms of hypoglycaemia: weakness, a headache, behaviour change, fatigue, sight infringement, an indistinct and inadequate pronunciation, slackness, spasms and consciousness loss.

Clinical equivalents hidden гіпоглікемії

Headaches, doubling in eyes.

Unmotivated sudden sharp differences of mood, behaviour change - fear, the irritability inadequate to reaction (aggression, negativism, hysterics, depression, unmotivated euphoria).

Strong sensation of hunger.

Cold sweat.

Palpitation, pains in heart, cardialgia or stenocardia episodes.

Easy (1 degree) hypoglycaemia. Clinical displays: sensation of hunger, pallor, a tremor, weakness, night terrors, irritability. The patient can liquidate an episode of hypoglycaemia independently: to eat 10-20 g "fast" carbohydrates in the form of tablets of glucose, a spoon of the granulated sugar, a several candy or to drink sweet juice, sweet tea.

Average weight (2 degree) of hypoglycaemia. Clinical displays: a headache, pains in a stomach, behaviour changes (aggression, inadequacy), pronunciation and sight infringement, pallor of a skin. To discharge hypoglycaemia it is possible only by means of extraneous persons, but still possible peroral reception of 10-20 g glucosa.

3rd degree of hypoglycaemia. Clinical displays: the patient disoriented or is in an irresponsible condition, spasms. To discharge difficult hypoglycaemia it is possible only with use parenteral introduction of preparations.

The phenomenon of "a morning star" is caused biorhythmological by level changes counter-insulinary hormones, especially STH and glucocorticoids. In an interval between 04.00 and 08.00 develops morning physiological anabolic maximum - sharp lifting of level in blood STH and glucocorticoids, especially this maximum is expressed at children and teenagers. Level increase counter-insulinary hormones cause activation of processes of gluconeogenesis and increase of level of glucose of blood (without any previous food). Mastering of this endogenic glucose demands additional quantity of insulin - in the first half of night, without additional food, the requirement of an organism

for insulin something raises. Development time of anabolic maximum depends on individual biorhythms of the patient.

To discharge a phenomenon of "a morning star" it is difficult enough. The increase in a dose of average insulin which enters in the evening will increase risk hypoglycaemia in first half of night. Regulation of a night profile of insulin demands the control of level of glucose of blood from 01.00 by 03.00 and before a breakfast.

Possible ways of elimination of a phenomenon of "a morning star": to displace an evening injection of insulin with 17 at later o'clock or to increase number of injections of short insulin.

Consequences of hypoglycaemia:

- 1) progressing of microangiopathia;
- 2) retinal hemorrhages;
- 3) fat infiltration of liver (non-alcoholic steatohepatitis);
- 4) organic defeats of CNS, encephalopathia;
- 5) vascular accidents (heart attacks).

2. Phenomenon Somogee (posthypoglycaemic hyperglycaemia)

Diagnostics of phenomenon Somogee:

- 1) control of glycaemia in the evening, at night and in the morning for revealing of differences glycaemia - night hypoglycaemia against morning hyperglycaemia on empty stomach;
- 2) control of glucosuric profile - in night portions of urine aglucosuria.

Treatment of phenomenon Somogee: reduction of an evening dose of insulin by 10-20-30 %.

3. Insulin-resistance

Insulin-resistance - a condition of the lowered sensitivity of tissues to insulin at which the daily requirement for insulin for the patient exceeds 100 IU, that much more exceeds average requirement in endogenic insulin of the healthy person (30-40 IU/H).

Patogenesis of insulin-resistance:

- 1) formation of antibodies to insulin or antibodies to insulin receptors which contact insulin and block its hormonal action; for achievement of therapeutic effect necessary increase in a dose exogenous insulin;
- 2) decrease in quantity of receptors to insulin and their sensitivity;
- 3) insulin destruction by proteolytic enzymes;
- 4) infringement of function of a liver;
- 5) high level of secretion of counter-insulinary hormones - glucagon, STH, ACTH, glucocorticoids, catecholamins, thyroid hormones;

- 6) excessive weight of a body - the fat tissue connects an insulin considerable quantity;
- 7) hypodynamia;
- 8) dehydration;
- 9) hyperlipoproteinaemia;
- 10) pregnancy in the third trimester.

Treatment of insulin-resistance:

- 1) normalisation of function of a liver;
- 2) careful correction of a diet;
- 3) body weight reduction;
- 4) careful sanitation of all cells of infection;
- 5) the part of a daily dose of insulin is entered intravenously, that causes fast linkage circulating counter-insulin antibodies;
- 6) insulin-therapy in a combination to reception of small doses of preparations sulfonylurea and (or) biguanids;
- 7) antihistamin preparations;
- 8) use of haemosorbition for decrease in level of antibodies;
- 9) glucocorticoids (prednizolon 30-40 mg/time) through 10-21 days

4. Allergic reactions to insulin

The reasons of formation of immune reactions to insulin.

1. Application of heterogeneous crude insulin.
2. Use of insulin with sour reaction - insulin with neutral values pH causes immune reactions less often.
3. More immunogenic is insulin – protamine is prolonged and zinc which extend insulin action, potentially can provoke immune reactions.
4. A break in insulin therapy or frequent change of preparations.
5. Hypodermic introduction of a preparation with technical errors.
6. Not specific immune stimulation by a virus or bacterial infection.
7. Genetic propensity, an age.

On the development mechanism allocate an insulin allergy of the immediate and slowed down type.

Reaction of hypersensitivity of immediate type. Reaction can be local and generally. Local reaction develops in a place of an injection. Reaction of hypersensitivity of the slowed down type develops in 6-24 hours after an injection, in most cases in 1-2 weeks after the beginning of insulin therapy or reconducting the patient on other preparation of insulin. Reaction of the slowed down type is caused by immune complexes.

On prevalence allergic reactions to insulin subdivide on local and the general.

Local allergic reactions develop on a place of introduction of insulin.

Treatment of allergic reactions.

1. Difference of the given preparation of insulin.
2. Appointment of polycomponent high-pured insulin preparations, in the absence of such are supposed monocomponent insulin.
3. Antihistamin preparations - dimedrol, pipolphen, tavegil.
4. At an inefficiency of the given actions – prednizolon on 30 60 mg/time in a day throughout 2-3 weeks.
5. If local allergic reactions lasted are not eliminated, spend specific desensibilisation: throughout the first time enter consistently 1:1000 IU insulin, 1:500, 1:250, 1:25 IU, on the second day - 1:100, 1:50, 1:25, 1:12 IU, on the third - 1:5, 1:2, 1 and 2 IU. On the fourth time an insulin dose gradually increase to an optimum individual dose.
6. Possible reconducting the patient on intravenous injections of insulin as at hypodermic introduction of a preparation the most long contact of insulin with sensibilized to it cells and the maximum emission of allergic reaction mediators is observed.

The control of initial level of knowledge

1. Tactics of insulin resistance struggle at patients with diabetes of 1 type, that become prolonged insulin includes:

- A. treatment by high pured insulin;
- B. treatment by half-synthetic insulin;
- C. additional appointing of preparations of sulfonylurea;
- D. all is higher marked.

2. What products are recommended to patients with on diabetes?

- A. soya;
- B. fat free meat
- C. fat-free cheese

3. Collateral action of sugar-reducing sulfonylamids on blood is shown by:

- A. Trombocytopenia;
- B. Leucopenia;
- C. Agranulocytosis;
- D. All of above designated

4. Which of preparations is rational to appoint to the patient with diabetes 2 types in the presence of chronic pyelonephritis?

- A. Chlorpropamid;
- B. Glibenklamid;
- C. Glycvidon;

D.Gliclazid

5. Which of products of the richest on potassium it is possible to recommend to patients for a diabetes?

A.Oats groats;

B. Prune;

C.Raisins;

D.pumpkin;

E.Carrot

6. Whether expedient appointment simultaneously two sugar-reducing sulfanylamide preparations for treatment of a diabetes 2 types?

A.No;

B.Yes

C. Depending on situation

7. Which from listed hypotensive preparations is more expedient for appointing to the patient with diabetes with hypertensive illness at presence at it symptoms vegetative cardial diabetic neuropathia?

A.Prazozin;

V.Rezerpin;

S.Aldomet;

D.Clophelin

8. To which of preparations needs to give advantage for improvement (normalisation) the lipid exchange in the patient with diabetes?

A.Tocopherol acetate;

B.Nicotinamide;

C.Lipostabil;

D.Riboxin

9. Which of insulin can cause allergic reaction more often?

A.cristallic;

B.polycomponent;

C.monocomponent

10. What variants of insulin resistance can be observed at diabetes?

A.Prereceptorial;

B.Receptorial;

C.Postreceptorial;

D.All are above listed

Endocrinology (initial level of knowledge):

1	2	3	4	5	6	7	8	9	10
B	C	D	C	B	A	D	C	A	D

The control of final level of knowledge

1. By transfer the patient who was treated by pork insulin, on human insulin a dose of the last:

A. stay without changes;

B. increase;

C. decrease.

2. What resorts in Ukraine are shown for treatment of patients on a diabetes?

A. Mirgorod;

B. Truskavets;

C. Berezovskie mineral waters;

D. All of them

3. What berries have sugar-reducing action?

A. Wild strawberry;

B. Raspberry;

C. Mountain ash;

D. Bilberry;

E. All of them

4. The most expressed sugar-reducing action have:

A. Rye;

B. Barley;

C. Oats

5. Which of the specified signs is not to indications for insulin appointment:

A. Progressing loss of weight of a body

B. Gravidity

C. Infectious diseases

D. Obesity

E. Diabetic angiopathy of the II - III grade

6. All concern insulin of short action specified, except:

A. Aktrapid

B. Monotard

C. Monosulin

D. Humulin

E. Homorapid

7. At calculation of a dose of insulin all specified indicators are considered, except:

A. Mass of a body of the patient

B. Period disease

C. Type of glycaemia

D. Grade of glycaemia

E.Ketoacidosis

8. By-effects of insulin therapy are all designated, except:

A. Lipodystrophia

B. Vitiligo

S.Insulin hypostases

Д Insulin resistance

E.Fenomenon of Somodjee

9. Preparations of sulfonylurea does not concern:

A.Glibenklamid

B.Maninil

C.Predion

D.Glibutid

E.Chlorpropamid

10. Contra-indications to appointment of biguanids are all specified, except:

A. Diabetes of 1 type with inclination to ketoacidosis

B. Diabetes of 2 type in patients with excessive weight of a body

S.Atherosclerosis

D.Gravidity

E.Surgeon intervention

Endocrinology (final level of knowledge):

1	2	3	4	5	6	7	8	9	10
C	D	E	C	D	B	C	B	D	B

Situational problems

1. The patient 16 years old is ill on diabetes of 1 type of average weight from 6 advanced ages. Complications are not present. Receives in the morning 6 IU of insulin "Actrapid" and 20 IU of "Monotard", in the evening - 4 IU " Actrapid " and 12 IU " Monotard ". Growth - 179 cm, weight of a body - 80 kg. Glycaemic profile: on an empty

stomach 7,6 mmol/l; 13.00 - 8,6 mmol/l; 18.30 - 9 mmol/l; 22.00 - 7,2 mmol/l. Диурез - 1,7 l. Глюкозурия - 5 g/l, a portion - 300 ml, sugar - 0,5 %. What tactics of the further treatment?

- A. Increase the dose of "Monotard" in the evening.
- B. Increase the dose of "Monotard" in the morning.
- C. Appoint short insulin in the dinner time.
- D. Leave the dose without changes.
- E. Increase the dose of "Actrapid" in the morning and in the evening.

2. The patient with sugar diabetes of second type receives insulin "Protaphan" 32 IU before a breakfast and 16 IU before a supper. Last glycaemic profile: 8.00 - 7,5 mmol/l, 13.00 - 12,0 mmol/l, 18.00 - 14.2 mmol/l, 21.00 - 16.0 mmol/l, 3.00 - 9,0 mmol/l. What actions of the doctor expedient in preventive maintenance of further carbohydrate exchange decompensation?

- A. Change a dose of insulin " Protaphan " in the morning on 30 IU, and in the evening on 12 IU.
- B. Decrease quantity of carbohydrates during a supper.
- C. Decrease quantity of carbohydrates during a dinner.
- D. Change a dose of insulin " Protaphan " in the morning on 36 IU, and in the evening on 20 IU.
- E. Appoint to the patient the other insulin.

3. The patient is ill on sugar diabetes of second type, is treated by insulin of the prolonged action. Fluctuation of level of glucose throughout a time - 15,2-22,0 mmol/l, on an empty stomach - 28,6 mmol/l. What further medical tactics?

- A. Preparations of sulfonylurea.
- B. Biguanids.
- C. Insuliny of prolonged action.
- D. Diet.
- E. Insulin of short action

4. The patient 46 years old. Is ill on diabetes 9 years, Receiving insulin Humodar 26 IU in the morning and 18 IU in the evening. Complaints to weakness, slackness in the morning, a headache. Objectively: pulse - 72/minute, arterial blood pressure- 125/70 mm hg. Heart borders in the norm. The liver +4 cm. Glucose of blood: 8.00 - 14 mmol/l; 12.00 - 9 mmol/l; 17.00 - 11 mmol/l; 2.00 - 3,8 mmol/l. The reason of a condition of the patient?

- A. Not enough dose of insulin in the morning
- B. An insufficiency of evening dose of insulin
- C. Presence of hepatitis
- D. A climacteric syndrome
- E. spare dose of insulin in the evening

5. The man of 52 years old, throughout 18 years is ill on diabetes. One year ago has transferred a cystitis. Accepts maninil- 5 mg 3 times on a day. Objectively: growth - 176 cm. Weight - 82 kg. Glycaemia on an empty stomach - 10,3-12,4 mmol/l. Revealed proteinuria- 0,033 g/l. For progressing preventive maintenance of diabetic nephropathia more all is expedient:

- A. Changing the reception of maninil on insulin
- B. Increasing the dose of maninil
- C. Changing the calorage of food
- D. To add therapy by insulin
- E. Appointing the antibacterial therapy

6. The woman 52 years old, receives concerning a diabetes insulin of the short and prolonged action before a breakfast and a supper. Every day before a supper feels a pain behind a breast of compressing character, with irradiation in the left hand, weakness. Growth-168 cm. Weight - 76 kg. How to warn development of the resulted symptoms?

- A.Changing the calorage of food
- B.therapy by nitrates
- C. therapy by Ca-channels blockators
- D. therapy by sufonylurea of II generation
- E. Changing an insulin dose

7. Patient of 13 years old. Thirst, polyuria, weakness, for 2 weeks has grown thin for 4 kg. Objectively: the general condition satisfactory, is not present a smell of acetone. Glucose level: in blood on an empty stomach - 32 mmol/l, in urine - 6 %, acetone (+). Your tactics?

- A.Diet therapy
- B. therapy by sufonylurea of III generation
- C. therapy by metformin
- D. therapy by sufonylurea of II generation
- E. insulin therapy

8. Patient B, 46 years old, has growth of 170 cm, weight of a body of 93 kg. On an extent 2 x months was on diet therapy with calorage restriction, has grown thin for 5 kg. Glycaemia on an empty stomach - 12 mmol/l. Tactics of the further treatment?

- A. therapy by sufonylurea of I generation
- B insulin therapy
- C. therapy by sufonylurea of III generation
- D. metformin

E. therapy by sulfonylurea of II generation

9. The patient 64 years old which suffers type 2 diabetes an extent of the last 2 x years received глібенклamid 15 mg during a time. , Now he is ill on infectious hepatitis, type A. Glycaemia on an empty stomach-13,6 mmol/l. To define tactics of the further treatment:

A.therapy by sulfonylurea of III generation

B.appointing of biguanids

C.increase the dose of glybenclamid to 20 mg

D.In addition appointing of acarbosa

E.insulin therapy

10. The patient 55 years old, a diabetes is revealed casually during medical examination. It was not treated. Objectively: growth - 170 cm, body weight - 106 kg. A skin of usual humidity. Pulse - 76/minute, rhythmic. Tones of heart are muffled. Arterial blood pressure- 160/90 mm. Glycaemia on an empty stomach-7,9 mmol/l. The glucose maintenance in daily urine - 1 %, diuresis- 2,5 l. What prime tactics of treatment?

A.therapy by metformin

B.only diet therapy

C. therapy by glybenclamidum

D. therapy by repaglynid

E. insulin therapy

TRUE ANSWERS

1. Д	5. А	9. Е
2. Д	6. Е	10. В
3. Е	7. Е	
4. Е	8. Д	

Control questions

1. Principles of treatment of the patient on a diabetes.
2. Criteria of indemnification of a diabetes.
3. Methods of treatment of a diabetes.
4. Principles of diet therapy of diabetes.
5. Definition of carbohydrate balance and tolerance of carbohydrates.

6. Sugar-reducing preparations of sulfonylurea, their characteristics, the action mechanism, the indication, contra-indication to the appointment.

9. Sulfanilamide-resistance, treatment.

10. Biguanids, their characteristics, the action mechanism, the indication, contra-indication to appointment, by-effects.

11. Insulin therapy, the indication to appointment.

12. Insulin preparations.

13. Methods of insulin therapy.

14. Complication of insulin therapy, their treatment.

15. Sanatorium treatment of patients on a diabetes, the indication, contra-indication, resorts.

21. Physiotherapy at a diabetes, the indication to the appointment, applied means.

22. A role of physical exercises in diabetes treatment.

23. Self-checking system behind a diabetes.

Practical tasks

- to ground the diagnosis of a diabetes to establish type, weight of disease, indemnification degree;

- To estimate glycaemic and glucosuric a profile, round-the-clock glucosuria, a condition albuminous and lipid exchange, electrolyte balance;

- To establish degree of indemnification of a diabetes by results of biochemical researches;

- To appoint the menu to the patient to a diabetes (to establish power value of a diet on a time, distribution of carbohydrates throughout a time depending on level glycaemia and efficiency of action of the glucosuric preparations);

- To appoint the dosed out physical activity, to establish its intensity and carrying out term;

- to ground the indication to appointment of sugar-reducing preparations, their dose, efficiency of treatment according to its term to spend possible correction;

- To make the scheme of dispancer supervision of the patient on a diabetes, to establish term of dynamic supervision by endocrinologist, internist and other physicians;

- To establish the indication to sanatorium treatment;

- To write out recipes on sugar-reducing preparations.

Protocol of the clinical examination of the patient

Name, surname of the patient _____
Age _____ Profession _____

Complaints of the patient _____

Anamnesis morbi

Last exacerbation _____

Anamnesis morbi

Results of the physical examination:

Preliminary diagnosis:

Plan of investigation:

Results of the additional methods of investigations:

Rationale of the clinical diagnosis:

Clinical diagnosis:

Main disease

Accompanying disease

Complications

Treatment:

1. Regime _____
2. Diet _____
3. _____
4. _____
- 5.....

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Інформаційні ресурси

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Методична вказівка складена:

Методична вказівка переглянута і затверджена на засіданні кафедри:

З доповненнями (змiнами) _____

Завiдувач кафедри

Л.В. Журавльова