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Diet, DS for Patients with Cardiovascular disorders

Kharkov 2020

Plan

- Cardiovascular disorders
- Atherosclerosis
- Cholesterol, types, metabolism
- Diet for Atherosclerosis
- Diet for Hypertension
- Diet for Cardiovascular insufficiency
- Diet for Cardiovascular infarction
- Dietary supplements for Cardiovascular disorders

Ccardiovascular disorders

- Atherosclerosis
- Hypertension
- Heart failure
- Coronary heart disease (angina),
- Heart attack,
- Cerebral stroke

Atherosclerosis

Atherosclerosis - a chronic, progressive disease in which the artery affected **atherosclerotic plaque**.

Set the process contribute to:

- **diabetes,**
- **hypertension,**
- **hypercholesterolemia**

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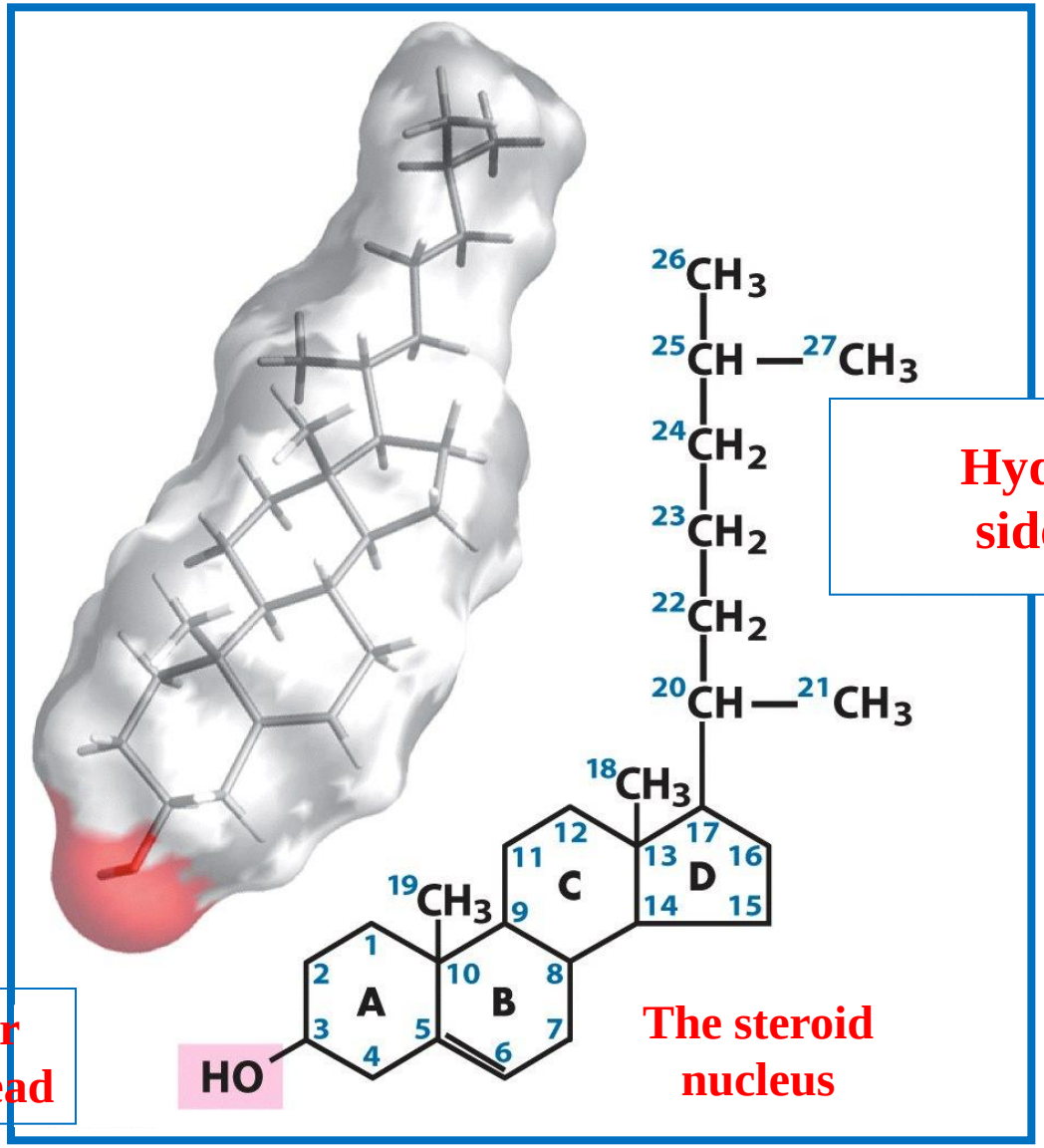
Atherosclerosis

- ***Arteriosclerosis may initially does not manifest itself, be asymptomatic,***
- ***- But the progression of atherosclerosis vessels lose their elasticity,***
- ***- Educate them narrows,***
- ***- Tissues and organs do not get enough oxygen and nutrients.***

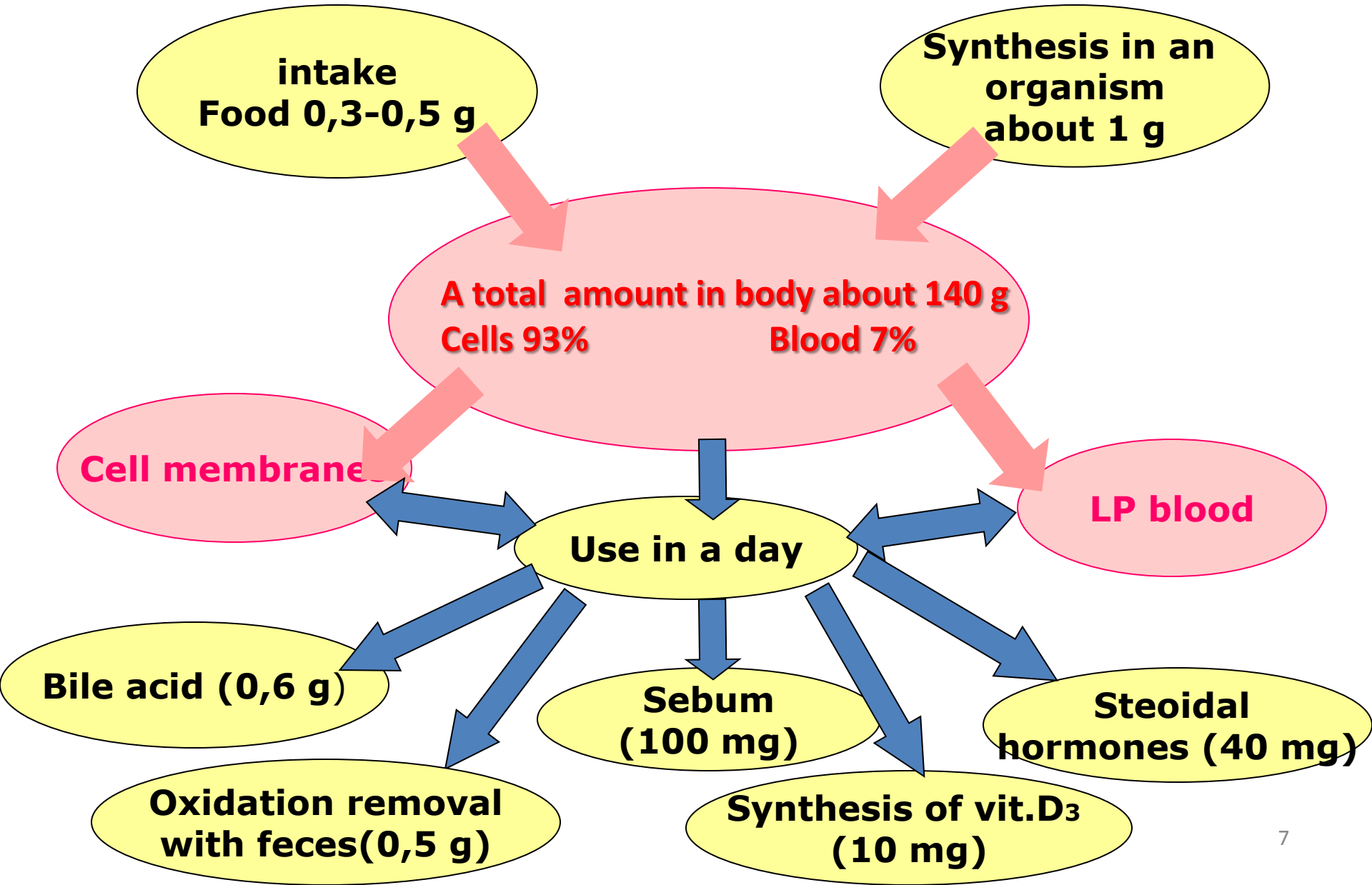
This can cause serious complications such as:

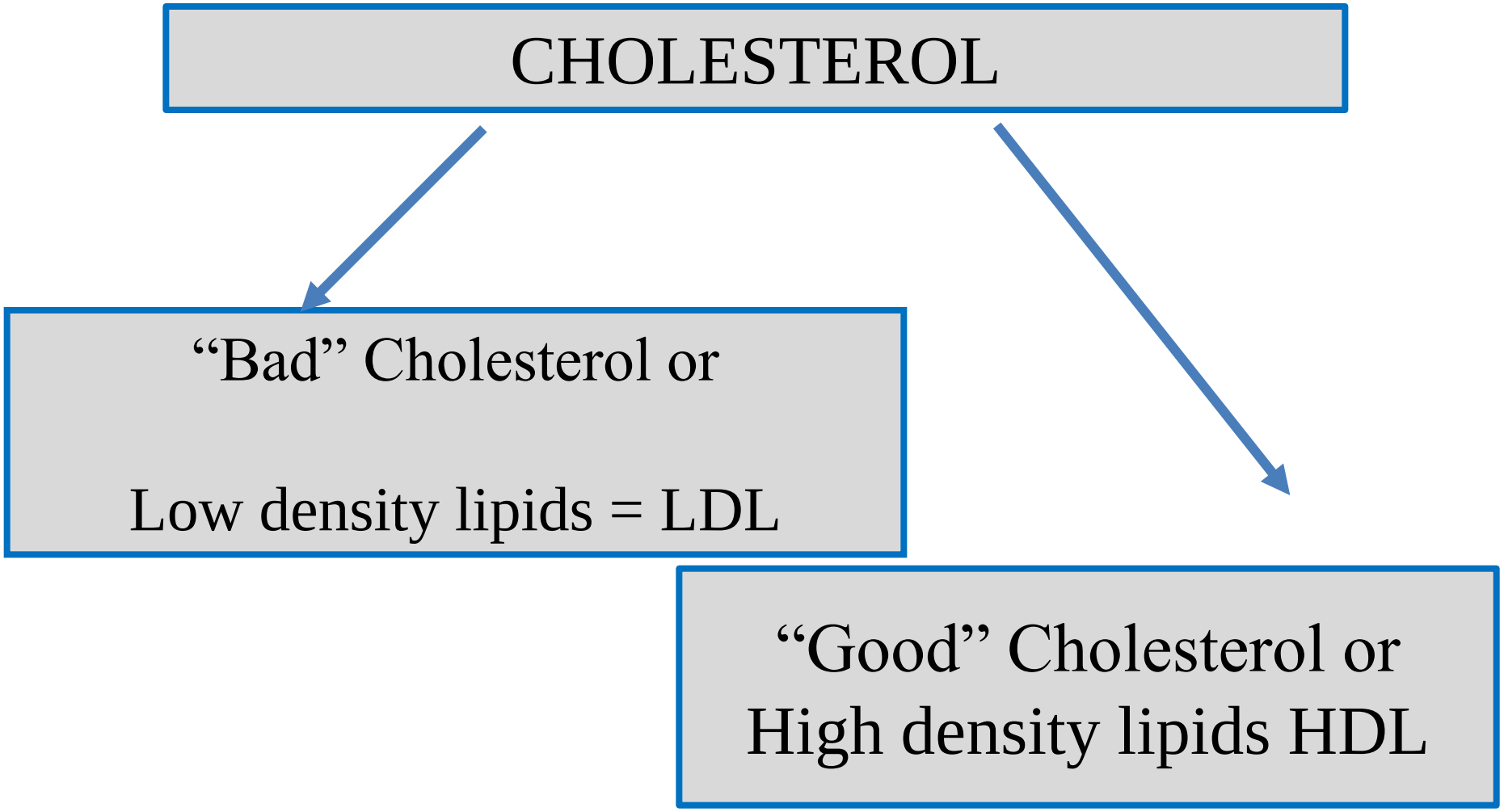
- ***Coronary heart disease (angina), heart attack,***
- ***cerebral stroke,***
- ***sores and others.***

The structure of cholesterol molecules



Cholesterol balance in humans




CHOLESTEROL
"Bad" Cholesterol or
Low density lipids = LDL
"Good" Cholesterol or
High density lipids HDL

LIPOPROTEINS: LDL HDL

Low density lipoprotein (LDL) - the class of blood lipoproteins, which is the most **atherogenic**. LDL formed from VLDL during lipolysis.

This class of lipoproteins is a major transporter of cholesterol in the blood.

LDL cholesterol is often called "bad cholesterol" because of its association with the risk of atherosclerosis.

LDL particle contains as one component of the protein molecule of apolipoprotein B-100 (apoB-100), which stabilizes the particle structure and is a ligand for the LDL receptor (LDL-R). Dimensions LDL varies from 18 to 26 nm.

LIPOPROTEINS: LDL HDL

High density lipoproteins (HDL, HDL, English. High-density lipoproteins, HDL) - the class of lipoproteins of blood.

HDL possess **anti-atherogenic properties**. Since a high concentration of HDL substantially **reduces the risk of atherosclerosis and cardiovascular diseases**, cholesterol HDL sometimes called "**good cholesterol**" (alpha-cholesterol) in contrast to the "bad" cholesterol in LDL, which, conversely, increases the risk of developing atherosclerosis.

HDL have a maximum density lipoproteins from among the high level of protein relative to lipids.

HDL particles - the smallest among lipoproteins, 8-11 nm in diameter.

Atherosclerosis

The level of total cholesterol in plasma should not exceed **200 mg / dl (5.2 mmol / L).**

Mild hypercholesterolemia is diagnosed when the level of 200 to 250 mg / dl (**5,2-6,5 mmol / l**)

moderate - at 250-300 mg / dl (6,5-7,8 mmol / l)

Expression - at 300 mg / dl (7.8 mmol / l) and above.

Diet: The norm consumption of cholesterol < 300 mg daily

Reason of atherosclerosis

- Main reason of atherosclerosis - the imbalance between the intake of cholesterol (from food and by the synthesis of cholesterol molecules in the body) and its excretion from the body.
- It can be completely abandon the products of cholesterol?

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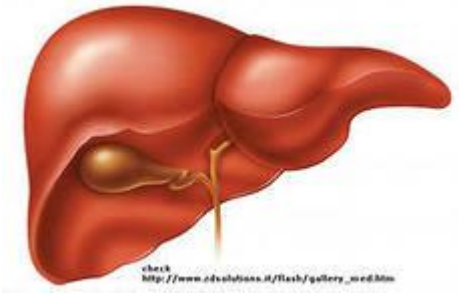
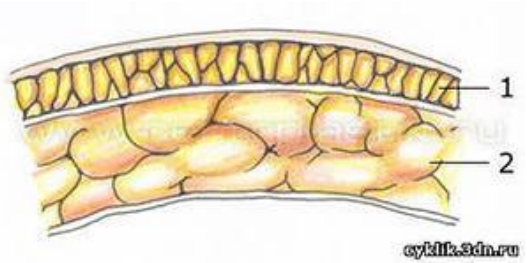
The synthesis of cholesterol

- Synthesis of cholesterol in humans may be from **fats** and **carbohydrates**, so excess of calorie food, and lack of physical activity leads to an increase in blood cholesterol levels.



FAT


СУЖЕНИЕ ПРОСВЕТА СОСУДОВ
АТЕРОСКЛЕРОТИЧЕСКАЯ БЛЯШКА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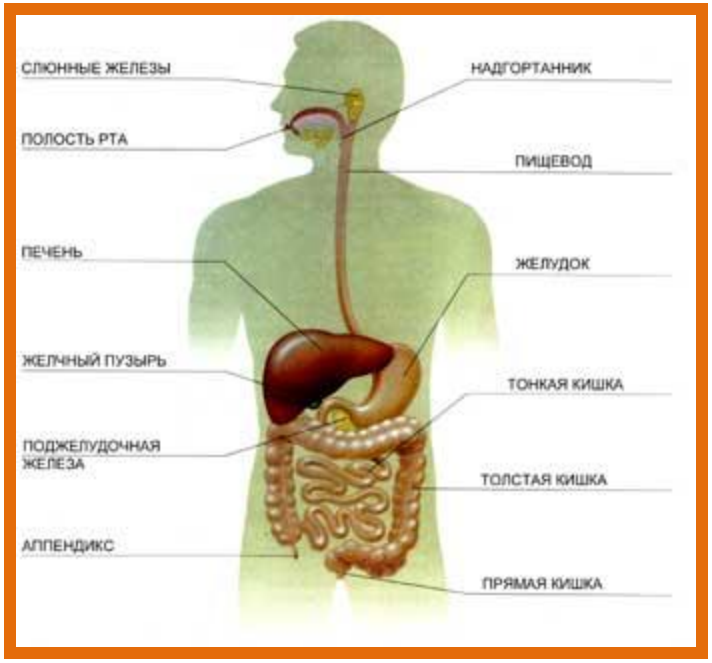
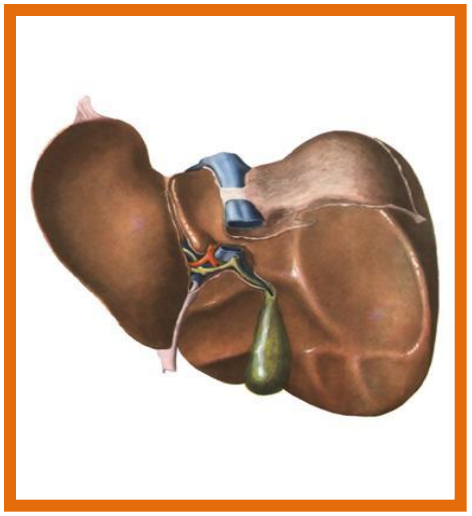
Excretion of cholesterol from the body

- Excretion of cholesterol is carried out only by converting cholesterol in the liver **to bile acids** which accumulate there are allocated to the digestive tract and **leave the organism from faeces**. This is the main route of elimination of cholesterol from the body.





Diet for Cardio-Vascular Diseases

With the help of diet can affect the basic mechanisms underlying the pathogenesis of coronary heart disease (CHD).

The **chemical composition of the diet** has a significant effect on the functional state of the higher parts of the central nervous system.

Deficiency of protein in the diet reduces the body's resistance to stressful situations,

and **lack of polyunsaturated fatty acids reduces** the excitability of the cerebral cortex and, on the contrary, an excess dietary fatty acids increases its excitability.

Diet for Cardio-Vascular Diseases

A diet with restriction of **SALT** has a positive effect on the dynamics of cortical activity and reactivity of peripheral vasoconstrictor nerve devices.

The positive influence of **MAGNESIUM SALT**, enhancing inhibitory processes in the cerebral cortex.

Introduction to the diet of **ANIMAL FATS, REFINED CARBOHYDRATES, EXCESSIVE CALORIC** adversely affect metabolism, rendering expressed ***hyperlipidemic*** action.

Diet for Cardio-Vascular Diseases

Contained in the **cell walls of plant** products that increase intestinal motor function and enhancing the excretion of cholesterol from the body, have a positive effect on **lipid metabolism.**

To ensure the effectiveness of diet therapy of patients with ischemic heart disease, you need a balanced energy diet. Patients with normal weight or some of its deficit prescribed diet, caloric which **is 1000 kcal**.

When **overweight** caloric intake should be reduced by limiting animal fats and carbohydrates, mainly refined bread.

Characteristics of the anti-atherosclerotic diet

Indications for appointment. IHD, atherosclerosis of coronary, cerebral, peripheral vessels, hypertension of the II-III stage.
Special purpose. Contribute to the improvement of metabolic processes,
blood circulation, restoration of the metabolism of the vascular wall and heart muscle, a decrease in blood coagulation, normalization of the nervous processes that regulate various functions of the body.

General characteristic of diet
- restriction of salt and animal fat,
- with the replacement of a significant amount of the latter with plant and the inclusion of products rich in cell membranes, lipotropic substances, ascorbic acid, vitamins P, group B, B6, potassium and magnesium salts.

The diet includes seafood, marine invertebrates, seaweed, which have high biological value, due to the rich content of organic compounds of iodine, manganese, zinc, methionine and B vitamins.

Two diet options are recommended: the first for people with overweight, the second for people with normal or reduced body weight.

Culinary processing. All meals are cooked without salt.

Ways to reduce the level of cholesterol in the blood

- 1. **Low-calorie diet** with low in cholesterol, solid fat and high content of **antioxidants** and plant **steroids** (lots of fruits and vegetables).
- 2. Increasing **mobility** leads to "burning" calories
- 3. Reducing the **bile acids** due to their adsorption in the intestine with subsequent excretion
- 4. Increasing the level of **antioxidants** (fruits and vegetables in the diet)
- 5. Replacement of **solid fat by liquid** (sunflower and olive oil), as well as **the replacement of meat** (especially pork), fish and seafood.

Dietetic therapy at CVD

Eliminated products and dishes:

- ***Fresh bread and pastry products;***
- ***- Legume soups, meat, fish and mushroom broth;***
- ***Fatty meats, fish, poultry;***
- ***Kidney, meats, sausages;***
- ***Salted fish, salted and fatty cheeses;***
- ***Legumes;***
- ***Salted, marinated and pickled vegetables;***
- ***Fruit with coarse fiber;***
- ***Chocolate, strong tea, coffee and cocoa.***

Nutritional care for hypertension

Arterial hypertension - a disease, a key feature of which is a **persistent increase in blood pressure**, and consequences - disruption of vital organs: heart, blood vessels, as well as kidney and brain.

Today hypertension and its complications such as heart attack, stroke, kidney damage - one of the main causes of death.

Hypertension - one of the most common diseases of the cardiovascular system. It was found that hypertension affects 20-30% of the adult population. With age, the prevalence of the disease increases and reaches 50-65% in persons over 65 years.

Hypertension = 130/80 - 140/80 (90) mmHg

Nutritional care for hypertension

- **Rule one: food should be oversalted.** So if the diet of healthy human daily present about **10 grams of salt,** when it is necessary to reduce blood pressure not less than twice the recommended daily intake should **be 4-5 g.**

- At the same time is somewhat **limited fluid intake** (no more than **1.3 liters per day,** including the first courses).

Nutritional care for hypertension

Rule two: eliminate from the diet all the foods that can contribute to the rise in blood pressure: This strong tea, coffee, spicy and smoked foods, alcohol (regular intake of alcoholic beverages causes a spasm of blood vessels).

Rule three: high blood pressure can not afford to smoke, because smoking contributes to persistent constriction blood vessels and, therefore, rise in blood pressure.

Nutritional care for hypertension

- ***Rule Four:*** people with high blood pressure should monitor their weight and prevent its increase.
- To do this, should be excluded from the food carbohydrate (muffins, cakes, candy, etc.) and replace them with useful carbohydrates vegetables, fruits and cereals.
- It should also limit animal fats, replacing them with vegetable 1/3.
- It is useful to fasting (periodic switching to a vegetarian diet).

Nutritional care for hypertension

Rule Five: *As congestion contributes to increased production of acid in the body decay products (acidotic shift), in patients with hypertension diet should contain a sufficient amount of alkalizing foods. This milk, vegetables, wholemeal bread, rice, eggs, cod.*

Potassium *is found in bananas, cabbage, dried apricots.*

Magnesium *- walnuts, carrots, beets, cereals.*

Nutritional care for hypertension

Rule Six: *Eat more foods rich in potassium (it especially needs the heart muscle) and magnesium.*

CHD patients with symptoms of heart failure recommended diet with high content of foods rich in potassium salts:

dried apricots, dried apricots, raisins, prunes, apricots, bananas, figs, peaches, parsley,

has a diuretic effect,

as well as a positive effect on the contractile function of the myocardium and cardiac conduction system.

Diet for patients with myocardial infarction

The purpose of the diet:

Create favorable conditions for a successful course

- reparative processes
- restoration of the functional ability of the heart muscle,
- contribute to the improvement of metabolic, nervous processes,
- circulatory conditions
- prevention of thromboembolic complications,
- reduce the load on the cardiovascular system,
- normalization of intestinal motor function.

Myocardial infarction. General characteristics of the diet

- Excluded from the diet are **foods rich in animal fats and cholesterol**, the internal organs of animals, brains, fatty meats, egg yolk, caviar, animal fats, pastry and foods causing flatulence, brown bread, cabbage, legumes, milk.
- A diet with a **limitation of calorie content and volume** of food with a gradual increase in it.
- The diet includes foods rich in lipotropic substances cod, oatmeal, vitamins C and P, potassium salts.
- **Salt and liquid are limited.**
- The diet is prescribed in the form of three diets.
- The first diet is given in the acute period of myocardial infarction for the first 7-8 days,
- the second in the subacute period 2-3 weeks,
- the third - in the scarring period starting from the 4th week.
- On the 1-2 day, patients receive only a drink of 1/4 - 1/2 cup of weak tea, fruit juices, vegetable decoctions 8 times a day.

Diet for chronic cardiovascular failure

- Diet therapy in patients with circulatory failure should be aimed at increasing the contractile function of the myocardium, as well as to combat tissue edema.
- With heart failure, **sodium** is delayed in the body, which depends on improving the quality of extracellular fluid, but also on increasing the sodium content inside the cell.
- An excess of salt in the diet leads to an increase in heart failure, while a diet with sodium chloride restriction provides a beneficial therapeutic effect.

The limited intake of sodium chloride in the body is one of the main conditions ensuring the successful treatment of patients with heart failure.

Diet for chronic cardiovascular failure

- In chronic cardiovascular failure, a decrease in the level of metabolizable potassium was detected, depending on the loss of intracellular potassium.
- It is proved that intracellular **potassium deficiency leads to significant dystrophic changes in the myocardium**.
- At the same time, **sodium ions accumulate in the heart muscle, which have a toxic effect** on the activity of intracellular enzymes.
- The **diuretic effect of potassium**, as well as its positive effect on the contractility of the myocardium are the basis for the appointment of patients with heart failure diets with a high content of potassium.

Diet for chronic cardiovascular failure

Great importance in ensuring the vital functions of the body, including the functions of the cardiovascular system, and **magnesium salts**.

Magnesium is a component of tissues affecting metabolism, enzyme activity, acid-base balance and colloidal state of blood plasma. The main sources of magnesium are cereals, wheat bran, cereals, as well as nuts and almonds. Less magnesium is found in vegetables and fruits.

In patients with circulatory disorders, **calcium metabolism is often impaired**. Lowering blood levels can lead to conical and tonic seizures. Calcium is an essential component of the blood **coagulation system**. It enters the body with products in dried fruits of tut, parsley, apricot, dried apricots, horseradish, raisins, prunes, green onions, cabbage, dates, cornel, peas contain a lot of calcium.

Diet for chronic cardiovascular failure

- Great importance of **phosphorus** for the body. Sources of phosphorus are carrots, cauliflower, apricots, and peaches.
- It is necessary to introduce food ingredients of mainly alkaline valencies into the diet of patients with circulatory failure, since these patients have a tendency to acidosis.
- Food products that affect the urine reaction in the direction of alkalosis include fruits and vegetables apples, bananas, beans, beets, cabbage, carrots, lemons, melons, potatoes, oranges, peaches, peas, radishes, raisins, turnips, and bread, cod rice
- The normal activity of the intestine can be ensured by including vegetable and fruit juices, prunes, and compote on the menu.
- The patient should eat at least 5 times a day, so that at one time
- eat a little bit. Eat the last time you need no later than 4-5 hours before bedtime.
- Diet N 10.

Diet for chronic cardiovascular failure

- Of considerable importance is the **volume of food**, especially eaten in 1 dose. Abundant food leads to an overflow of the stomach and an increase in the diaphragm, which negatively affects the work of the heart.
- The patient should, therefore, eat at least **5 times a day**.
- Normal intestinal activity can be ensured by including in the menu vegetable and fruit juices, prunes, compote, yogurt.
- You need to take food for the last time no later than 4-5 hours before bedtime. Daytime rest is allowed before lunch.

DS for cardiovascular disorders

DIET	DS
decrease in the content ❑animal fats ❑simple carbohydrates ❑extractives ❑sodium ❑water ❑cholesterol -containing food **increase in the content** ➢vegetable fats ➢vegetable proteins ➢fiber ➢simple carbohydrates ➢potassium, magnesium, calcium, iodine-containing products	**DS ingridients** ✓PUFA ✓Food fibers ✓Essential phospholipids ✓Phytosterins ✓vitamins-elements complex ✓Flavonoids (rutin, quercetin and cathechins) ✓Carnithin ✓Indols ✓Coensymens ✓Organic acids ✓Saponins ✓Triterpenoids ✓iridoids

Onioin

Quercetin
Phytoncides
Enzimes
Inulin
Vit. A,B,PP

Garlic

Allicin (volatile oil)
Ascorbic acid

Vit.B., C, D, PP

Antioxidants

Normalization of cholesterine metabolism

Anti-inflammatory agent

Elimination of bacterial toxins

normalizing tone cardiovascular wall

Important: prevention and treatment of atherosclerosis, hypertension, coronary heart disease, spasms and inflammation of blood vessels, neuroses of the heart

Sweet pepper

Rich in Vit .P + VIT.C
(1st place)
Antioxidants
Improve vessel
elasticity and fragility

ПЕРЕЦ

References

•Фармацевтическая броматология / под. ред. Георгиянц В.А. - Х.: Изд-во НФаУ, 2014. – 375 с.
•Pharmaceutical bromatology/ под. ред. Георгиянц В.А. - Х.: Golden Pages, 2015. – 368 р.
•Тексты лекций по фармацевтической броматологии / Авторы-составители: Попова Н.В., Безуглый П.А., Георгиянц В.А., Головченко О,С., Северина А.И., Казаков Г.П., Ковалёв С.В., Алфёрова Д.А., Очкур А. В.. - Х.: Изд-во НФаУ, 2014.– 160 с.
•Конспект лекций по нутрициологии для студентов фармацетических Вузов / Попова Н.В., Очкур А. В., Казаков Г.П., Ковалёв С.В., Алфёрова Д.А. – Харьков, 2014. – 140 с.
•Нутриціологія:навч.посібник/ Н.В.Дуденко [та ін.]; під ред. Н.В.Дуденко. – Х.: Світ книг, 2013– 560с.
•Аналітична хімія/ навч. посіб. Для ВНЗ/ В.В. Болотов, О.М. Свєчнікова, С.В. Колісник та ін. – Х.: Вид-но НФаУ. – 2004.
•Базаров В. И. Исследование продовольственных товаров: учебное пособие. – М.: Экономика, 1986.
•Бутейкис Н.Г. Организация производства предприятий общественного питания. – М., 1985.
•Герасимова В.А., Белокурова Е.С., Вытовтов А.А.. Товароведение и экспертиза вкусовых товаров. – СПб: Питер Принт, 2003
•Гернатовская В.В. Дпнейдер Б.Л. Основы организации и экономики производства предприятий общественного питания. – М., 2001.
•Дубов Г. Г. "Производство национальных хлебных изделий" Москва ВО "Агропромиздат" 1997г.
•Егоров Г.А. Технология переработки зерна. – М.: Колос, 1997.
•Елисеева Л. Г. Товароведение и экспертиза продовольственных товаров: Учебник. - М.: МЦФЭР, 2006.
•Жук Ю.Т., Журавлёва М.Н., Руш В.А., Федотова Т.К. Товароведение продовольственных товаров: Зерномучные, сахар, кондитерские, молочные, вкусовые товары. – М.: Экономика, 1990.
• Казанцева Н. С. Товароведение продовольственных товаров. Учебник. - М.: Дашков и К, 2007.
•Ковальов В.М., Павлій О.І., Ісакова Т.І Фармакогнозія з основами біохімії рослин – Х.: Прапор, Видавництво НФАУ.– 2000.
•Козьмина Е.П. Технологические свойства крупяных и зернообразных культур. – М.: Прогресс, 2001.
•Козьмина Н.П. Биохимии зерна и продуктов его переработки. – М.: Колос, 2000.
•Козьмина Н.П. Зерно. – М.: Колос, 2003.
•Колесник А.А. и др. Товароведение продовольственных товаров. – М.: Экономика, 2007.
•Кондрашова Е.А., Коник Н.В., Пешкова Т.А. Товароведение продовольственных товаров: Учебное пособие. - М.: Альфа-М: ИНФРА-М, 2007.
•Коровин Ф.Н. Зерно хлебных, бобовых и масличных культур. – М.: Пищевая промышленность, 1998.
•Кругляков Г.Н., Круглякова Г.В.Товароведение продовольственных товаров. 2008
•Л.А. Боровикова “Товароведение продовольственных товаров”. М.: Экономика 1988 г.
•Любарский Л.Н., Попова Е.П., Моисеева А.И. Товароведение сельскохозяйственных продуктов. – М.: Колос, 2000.
• Неверова Н. А. Товароведение и организация торговли продовольственными товарами. - М., 2005.
•Никифорова Н. С., Новикова А. М., Прокофьева С. А. Справочник по товароведению продовольственных товаров. - М., 2007.