LECTURE:

ONCOLOGY

By A. Drevetnyak

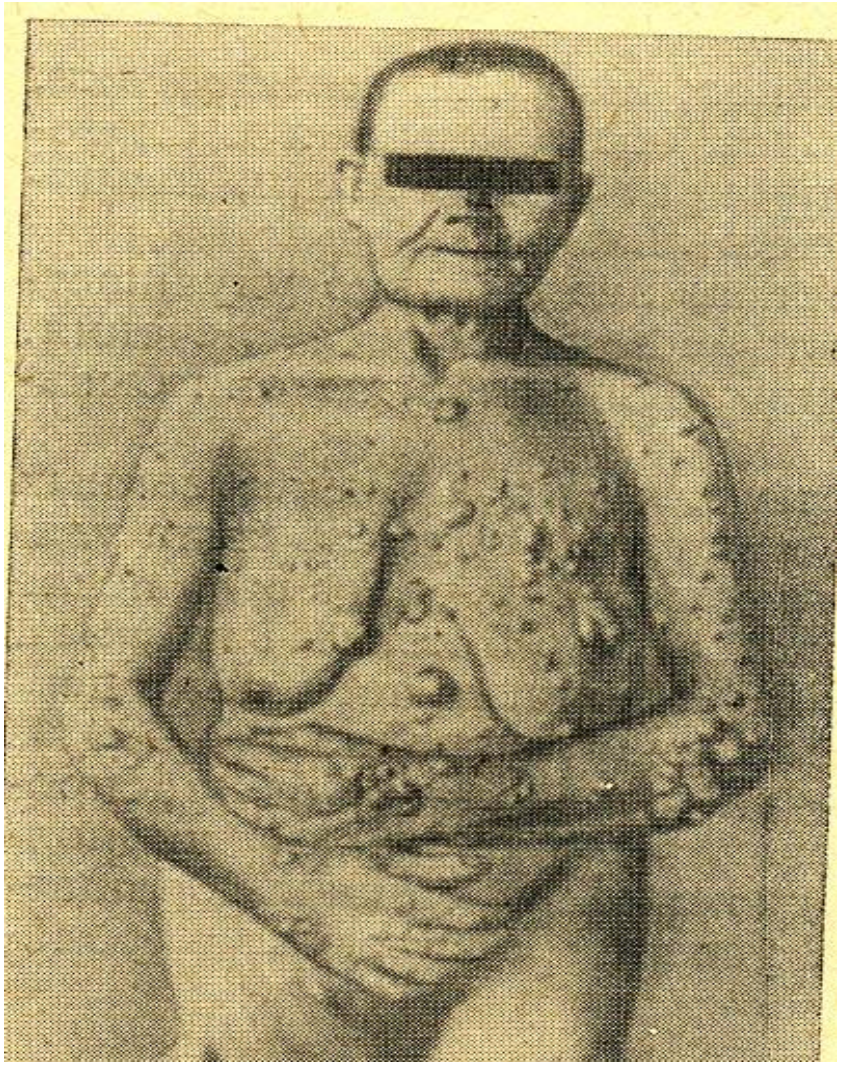
Tumor(s). /Lat., neoplasm, new growth/, pathological blastoma formation, spontaneously originating in the different organs, differing by polymorphism of the structure, atipicity (that is difference of tumor from initial tissues by the structure, location and interrelation of the cells), isolation (autonomy) and progressive limitless growth.

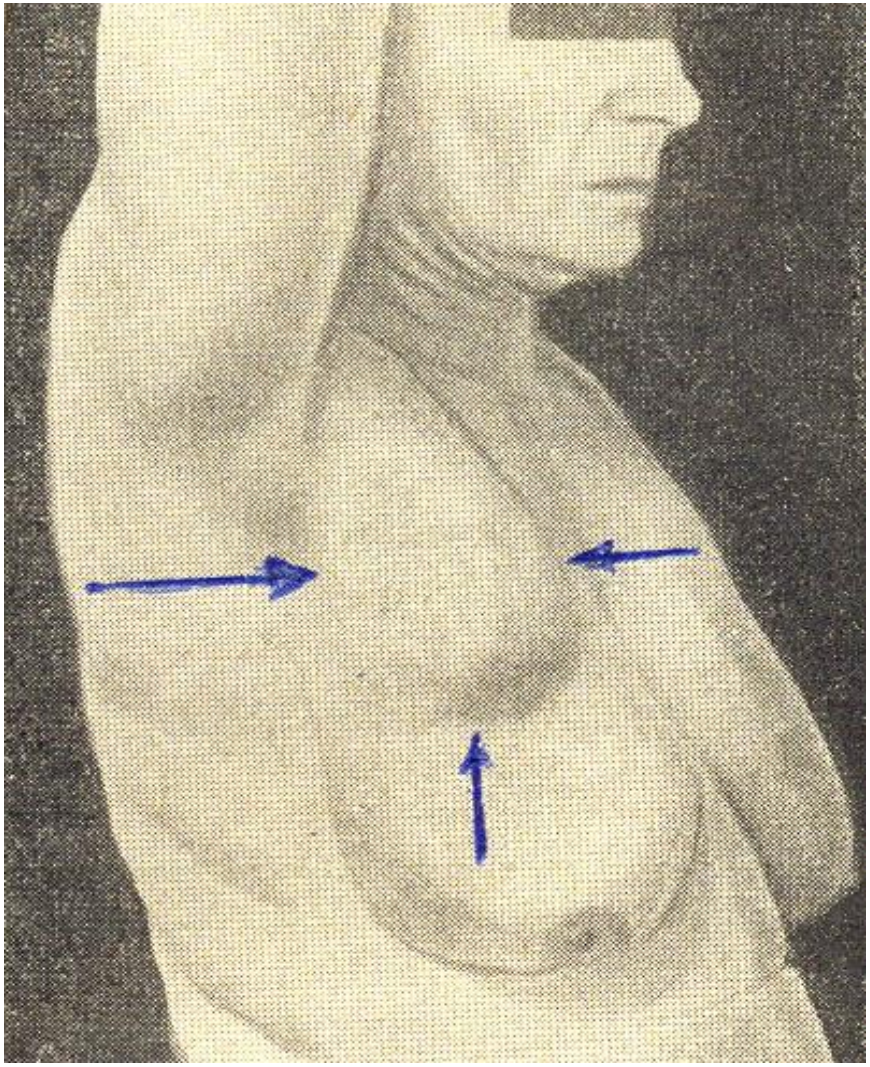
- Tumors may be:
- a) **benign** and; b) **malignant**.

Benign tumors

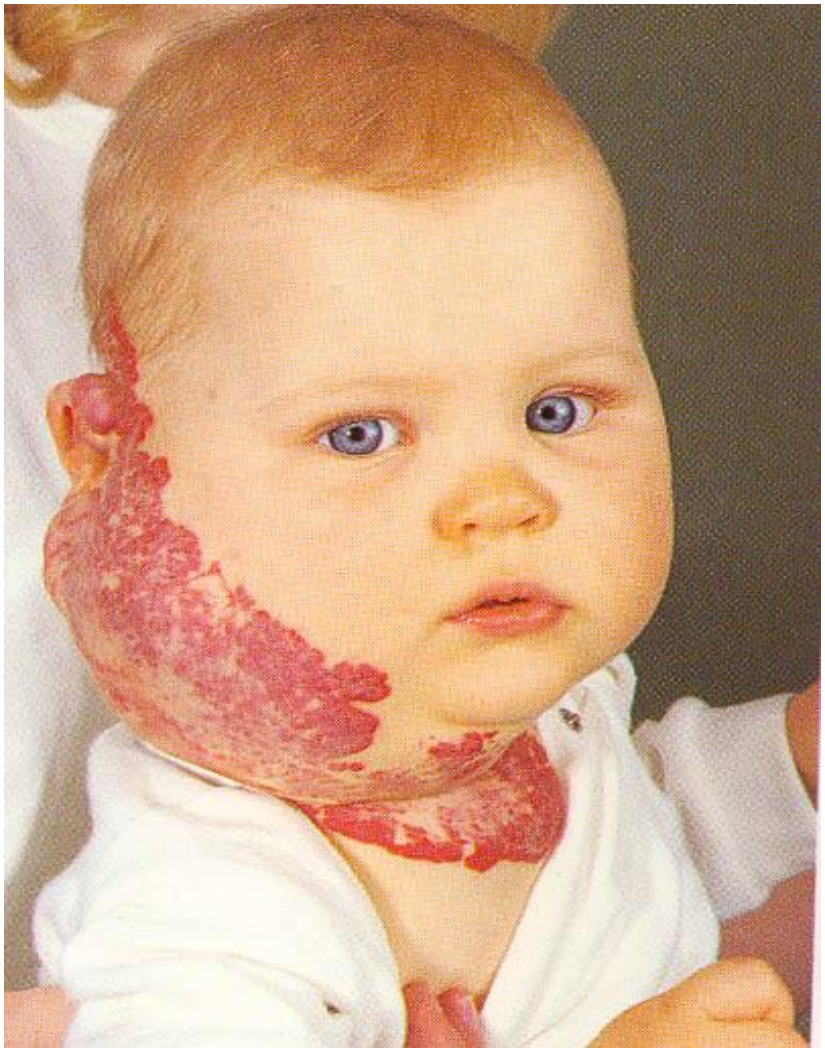
- possess ***expensive*** growth, resulting at that surrounding tissues ***move apart***, sometimes are ***compressed*** and ***undergo atrophic changes***. Clear borders between the tumor and surrounding it tissues in expansive growth imitate the formation of capsule, though it has no true capsules resembling inner organs.

Benign tumors (example); neurofibromatosis & lipoma.





Benign tumors (example); cavernous hemangioma & rectal polyps.



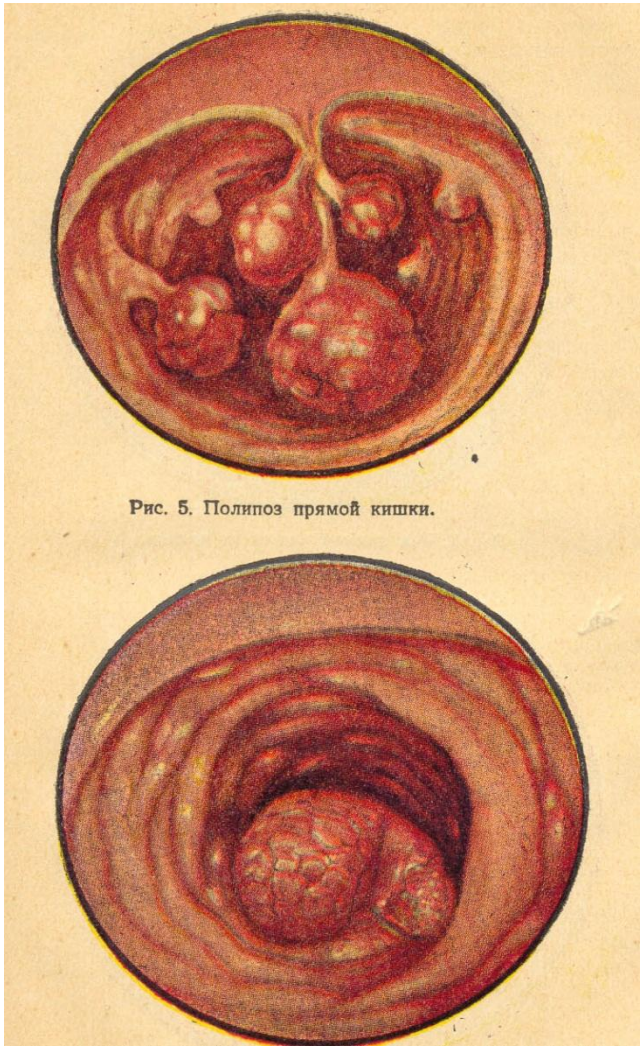
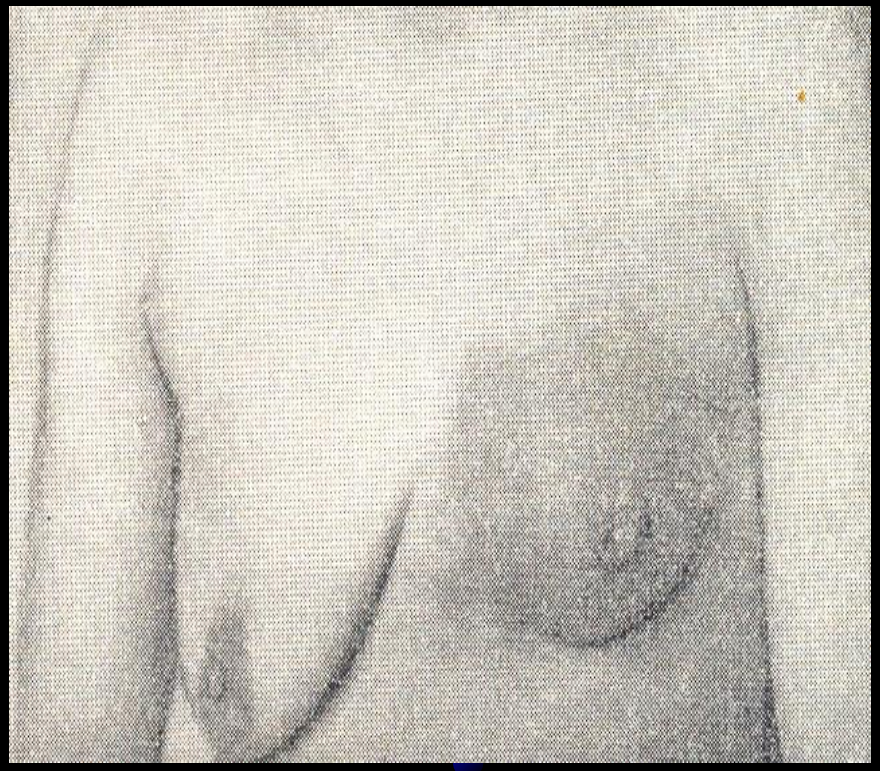


Рис. 5. Полипоз прямой кишки.

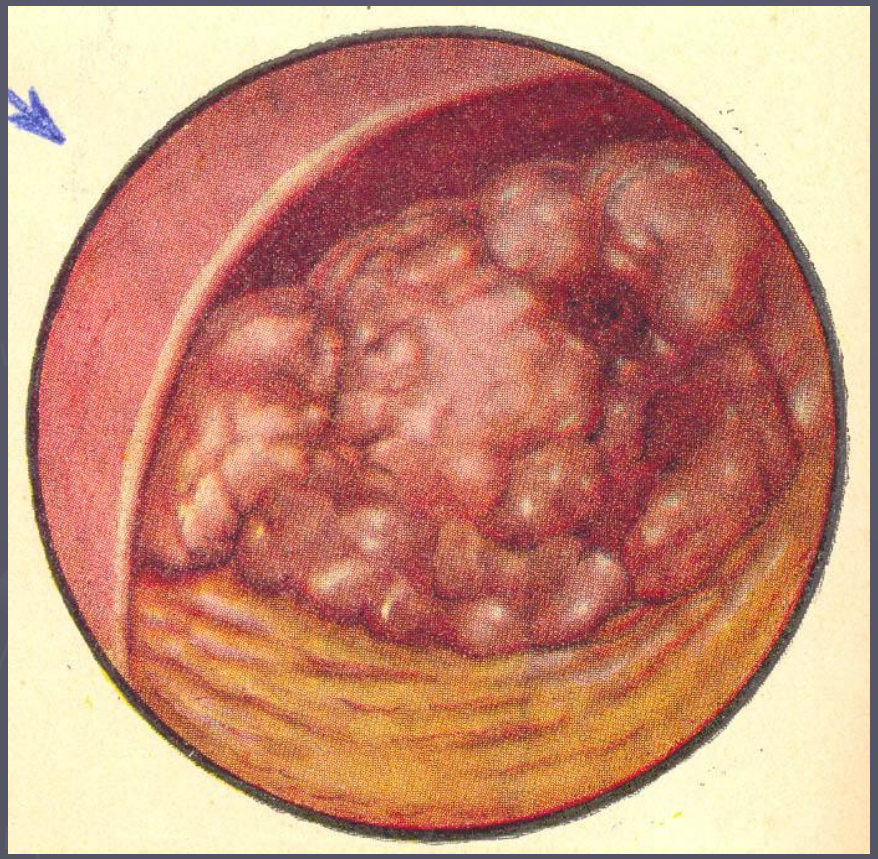
Malignant tumors

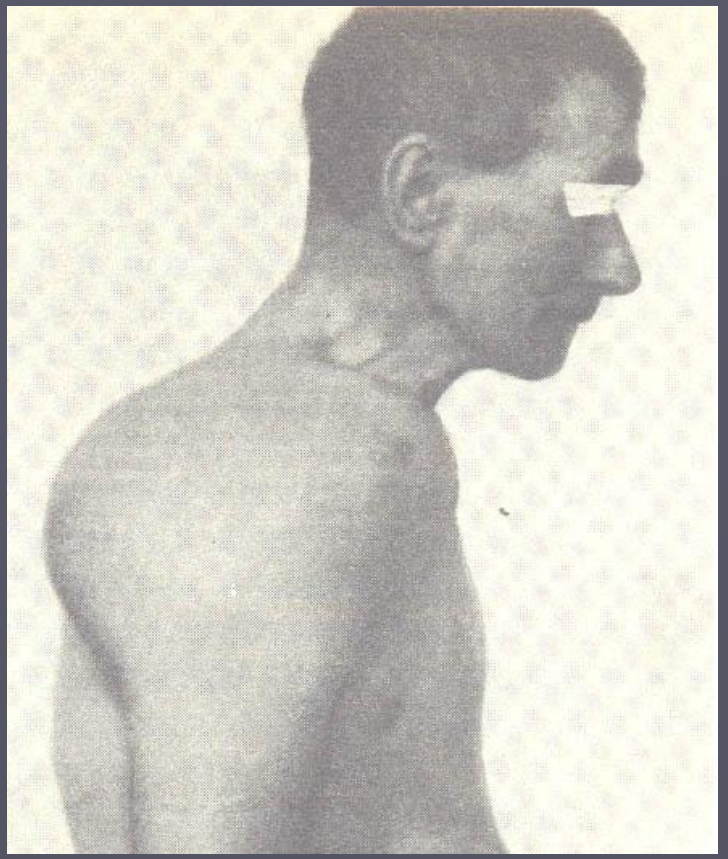
- ***infiltrate*** and ***destroy surrounding*** tissues. ***Infiltrative (invasive)*** growth is the main criterion discriminating malignant tumors from benign ones. ***Ability to metastatic apeading*** is characteristic feature of malignant tumors as well.

Malignant tumors (example); different forms of breast cancer.



Malignant tumors (example); rectal cancer & sarcoma of scapule.





Annually

- 6 mln people fall ill with tumors and 5 mln die from them. In the developed countries among the causes of death malignant neoplasms take the 2nd place after cardio-vascular pathology.

- **In males** the most part from all cases of malignant tumors makes cancer of the lung, stomach, prostate, colon and rectum, skin.
- **In females** the most part of all malignant tumors takes cancer of mammary gland, stomach, uterus, large and small intestine. Males fall ill with tumors 2 times as frequently, as females.

ETIOLOGY

- 1) Vihrov's theory of irritation.
- 2) Kangeim's theory of embryonic germs.
- 3) Fisher-Vazels' regeneration-mutation theory.
- 4) Zilber's viral theory.
- 5) Immunological theory.

At present tumors are considered to be *polyetiologic diseases.*

In the base of their development is:

- a) chemical carcinogen substance**s** (asbestos, polycyclic aromatic carbohydrates – benzipiren, benzidin and others);
- b) physical (radiation: ionizing radiation, UV-radiation);
- c) biological (certain viruses);
- c) frequent, repeated traumatism of tissues with subsequent regeneration.

For the origin of tumor it is of necessity the presence of internal causes: ***genetic predisposition*** and definite condition of ***immune*** and ***neuro-humoral* systems**.

- At that, oncogenic effect may be reinforced by non- oncogenic agents and modified by different factors**.**
- Practically **all *chemical oncogenic* substances in the organism are undergo different intricate transformations** before they gain the ability to excite oncogenic effect.

Various etiological factors predominate in tumours ethiology with different localization-I.

- One of the main causes of ***skin*** cancer is ***UV radiation.***
- Among the causes of cancer of the ***larynx*** and cancer of the ***lung*** the most importance is given to ***inhalation of oncogenic substances /***smoking/ & ***chronic bronchitis*** play an important role.

Various etiological factors predominate in tumours ethiology with different localization-II.

- ***Tumors of the body of uterus, mammary, prostate, thyroid glands, hypophysis, adrenals*** **-** occur during **dishormonal shifts** in the organism.
- **Immunodepressive factors** **/**in the usage of powerful immunodepressants with the aim to suppress the reaction of tearing away during transplantation of organs and tissues/ the frequency of tumor (e.g., ***skin cancer, cancer of the cervix of the uterus***) is 10-100 as higher than in the same age group of population.

PATHOGENESIS-I.

Arise of cancer is always separated from the moment of etiological factor action, so-called "latent period", during which clinical signs of tumor are entirely absent.

- Mechanisms of reorganization of the normal cell into the tumor one have been not yet clear.

PATHOGENESIS-II.

- At that, the cell as a result of the genome modification gains new heritable features:
- **- steady reproduction**;
- **- incomplete maturing**;
- **- loss of the normal contact with surrounding cells and issues**;
- **- biological and biochemical cell organization is changing**;
- **- tumor cell excretes specific antigens** and the organism as a whole begins to take it in as a foreign one, dangerous for the organism.

PATHOGENESIS-III.

The increase of immune exertion is a result of the process mentioned above. In sufficient mobilization of immune protection this "dangerous" cell dies, tumors do not arise. **Such a process in the organism takes place continuously!**

- Occasionally it happened, that cancer cell occurs in the place, inaccessible for the action of immunity mechanisms (in the focus of chronic inflammation), where the lymphocytes, antibodies can't penetrate. **In such a case malignant cell becomes viable and begins to reproduce.**

PATHOGENESIS-IV.

The main components, predetermining the origin of tumor are:

- a) **local preparedness of tissues**;
- b) **general predisposition in the organism to the occurrence of malignant tumorous process**;
- c) **“starting mechanism”** /that is **etiological source, impulsing the development of the process** in the definite place in predisposed to tumor individual/.

PATHOGENESIS-V.

PATHOGENESIS-VI.

Influence of benign tumors on the organism.

- Despite of the fact that benign tumors grow relatively slowly & don't arise (after radical excision), don't metastise, they may result in severe destructions in the organism **due to the compression of the vitally impor-tant organs and structures**, as:

1) compression of the brain by a benign tumor of the meningeal tunic; 2) compres-sion of large vessels; 3) compression of the bronchus, and so on.

Influence of malignant tumors on the organism (in common).

- 1) competition with the organism tissues for the vitally significant metabolites, &
- 2) the influence on the biological features of

Influence of malignant tumors on the organism-I.

- from the blood. Reserve recourses of glycogen from the liver and mussels are mobilized and spent. The main process, that allows to exceed /compensate/

Influence of malignant tumors on the organism-II

- **In aminoacide metabolism**.
- Tumor tissue is a peculiar trap for nitrogen, as entering by the alimentary path as released in the decay of proteins and nucleonic acids.
- Introduction of glucose into the organism saves nitrogen, prevents arise of negative nitrogenous balance, weakens catabolism of tissue, specifically muscular proteins.

Influence of malignant tumors on the organism-III.

- This process is accompanied by hyperlipidemia. Some portion of lipids assimilates by tumor to form membranes of the growing tumor cells.
- Mobilization of lipids is considered as a

Nomenclature, structure & classification of tumors-I.

- **Histogenetic** and **histological** principles are in the base of the nomenclature and classification of tumors. Their cellular and tissue characteristic is reflected in the names of tumors.
- **The names of the most tumors consist of two parts**; the 1st part includes indication on the source of the tumor development (cells, organ, tissue), the second part is suffix "*oma*", denoting "tumor". E.g., tumor developing from the fatty tissue is called "lipoma", from cartilaginous tissue – "chondroma", from muscular tissue – "myoma", and so on.

Nomenclature, structure & classification of tumors-II.

- In the name of tumor besides its histological features, there is indication on its connection with one or another organ (e.g., adenoma of thyroid gland), or anatomical area (e.g., lipoma of the thigh).
- In the building of some tumors' names we meat deviations from the indicated principle: e.g., epithelial tumor of the liver is called hepatoma, tumor of the brain membranes – meningeoma, tumor of the thymus gland – thymoma, etc.

Nomenclature, structure & classification of tumors-III.

Nomenclature, structure & classification of tumors-IV.

Nomenclature, structure & classification of tumors-V.

- ***Malignant connective (-tissue)*** tumors have got the common name **sarcomae.** This term is applied also for determining malignant tumors of the muscular, vascular and nerve tissues.
- The term "sarcoma" is as a rule added by the indication on its tissue source (**liposarcoma**, **chondrosarcoma**). If a tissue source of sarcoma is muscular tissue**,** depending on its character (smooth, cross-striated (cross-striped), it is spoken about **leuomyosacroca** or **rabdomyosarcoma**.

Nomenclature, structure & classification of tumors-VI.

- Technologically various is indication of tumor originating from epithelium. So, in the names of ***benign epithelial tumors*** not only initial epithelium, but especially peculiarities of tumor tissue are taken into consideration. For example, tumors originating from multi-layer pavement or transitional epithelium are called **papillomae**; tumors forming glandular-like structures, originating from cylindrical epithelium - **adenomae** (polyps). ***Malignant*** tumors developing from ***epithelium,*** are called **cancer (carcinoma);** for example, "**adenocarcinoma**" (malignant tumor from gland-like glandular-like structures).

Nomenclature, structure & classification of tumors-VII.

- **CANCER /**from Lat.**/ -** malignant tumor, developing from epithelial tissue.
- Cancer –is possessing autonomous progressive irreversible character pathological overgrowth of atypical epithelial cells, replacing and infiltrating normal tissues.

Nomenclature, structure & classification of tumors-VIII.

- However not all mentioned features of cancer may be considered as absolute ones. So, there are forms of cancer, the growth of which is not autonomous, but depends on the definite hormones or the other factors of the organism. The notion "progressive" also doesn't spread on all cases of cancer. Some kinds and stages of cancer may exist for a long time at the level, that has been registered in the primary diagnostic examination without manifestating any signs of local growth and without giving metastases. Even "irreversibility" can't be considered as an absolute feature of cancer, since occasionally in animals and human beeings cancer may spontaneously regress.

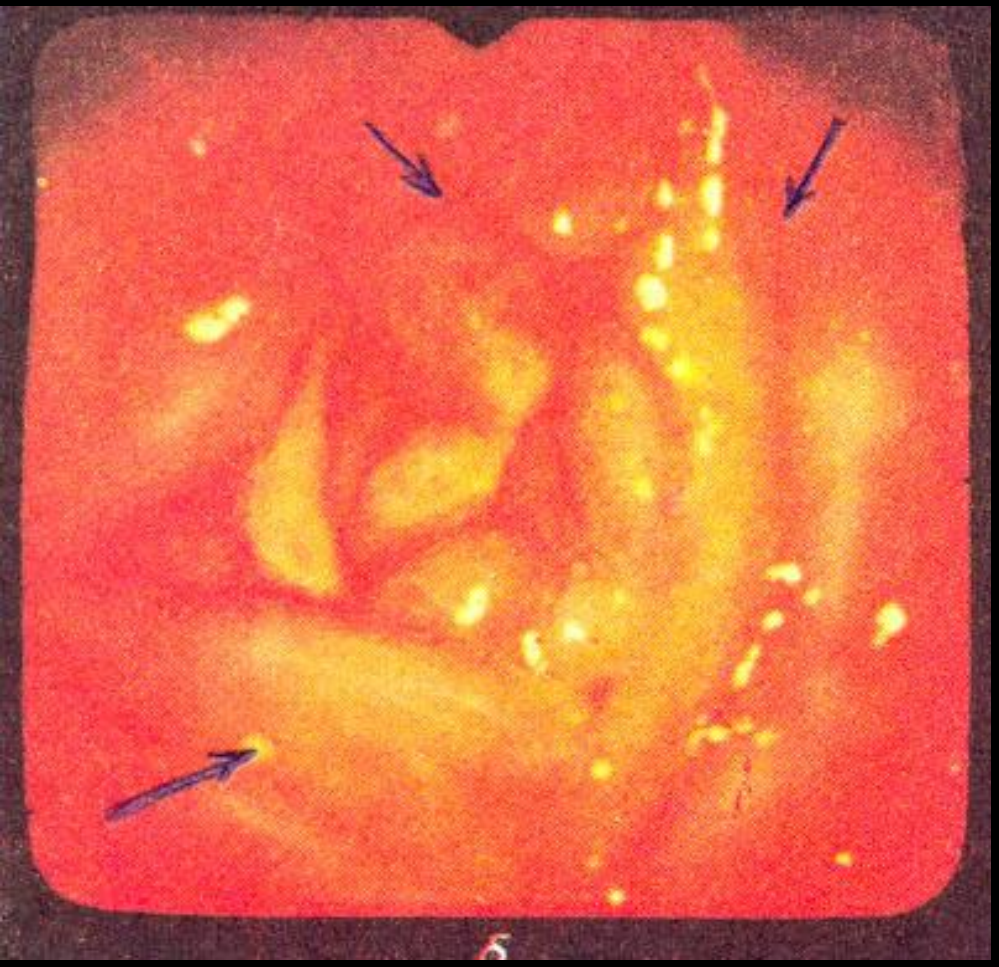
Nomenclature, structure & classification of tumors-IX.

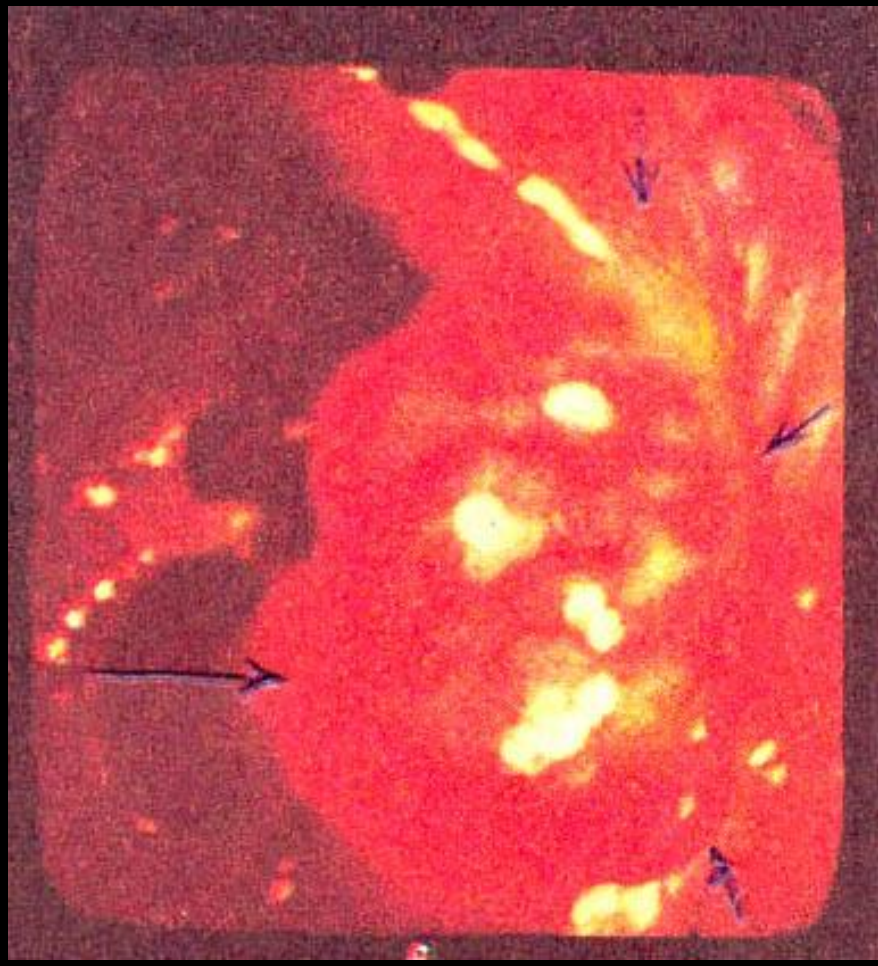
- Macroscopic view of tumor is various one. Tumor may be have a shape of a rounded or oval node, and may resemble mushroom or cauliflower. Tumor surface may be smooth, or hilly, or rough.

Nomenclature, structure & classification of tumors-X.

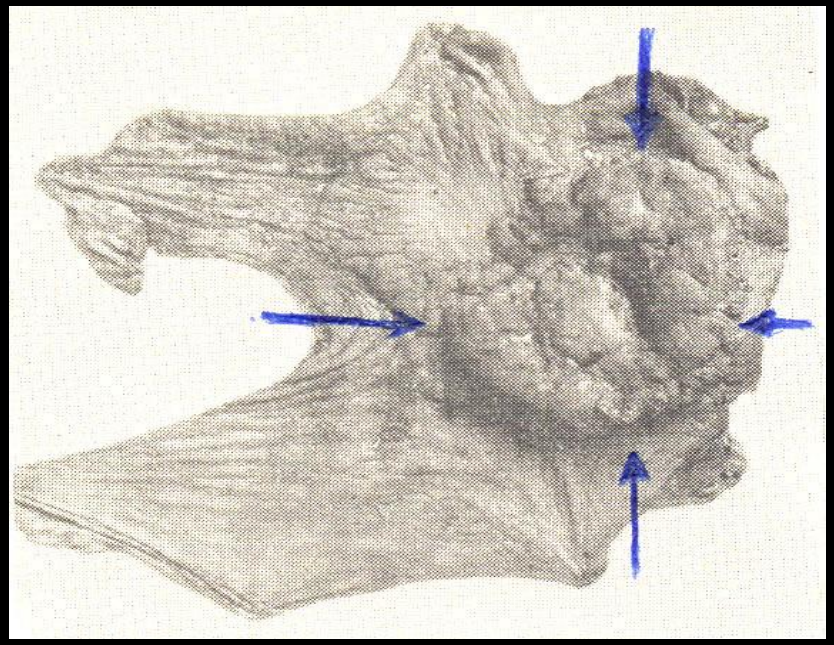
- Relating to the lumen of the organ, tumor may be:
- a) endophytic (tumor is growing through the wall, has in great extent infiltrative, “prostrate” character); or
- b) exophytic (is growing through, the lumen of the cavity, as of the stomach, intestine, pharynx, urinary bladder and so on).

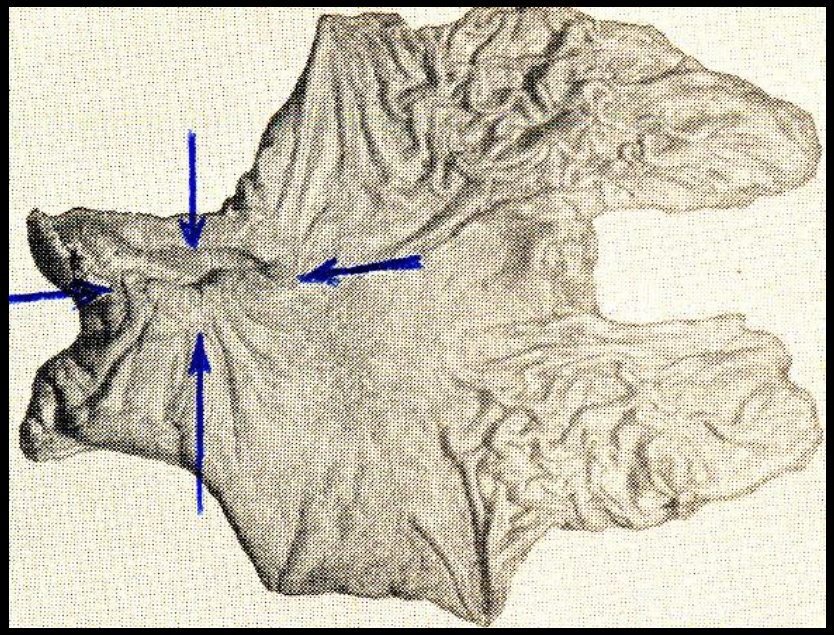
Different types of growth of rectal cancer (example);endophyte & exophyte.

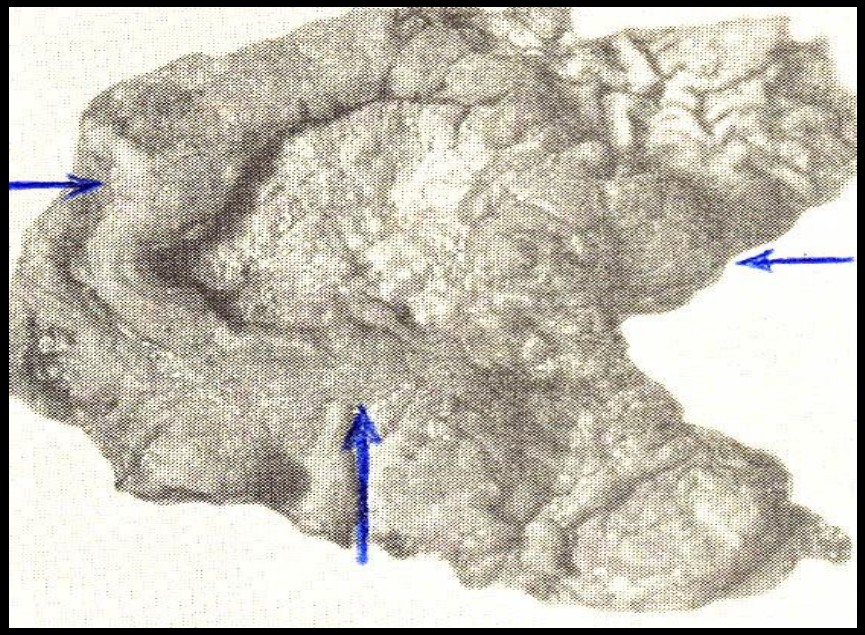




Different types of growth of gastric cancer (example); exophyte, endophyte & mixted.







Nomenclature, structure & classification of tumors-XI.

- Sometimes the tumor as if infiltrates the whole organ diffuse-like. Macroscopically the border between the tumor and normal tissue is not always distinguishable.
- In the cases, when the border is distinctly distinguishable, they say about presence of tumor "capsule» though tumors do not possess true capsules.

Nomenclature, structure & classification of tumors-XII.

- The base for diagnosis of tumor in histological investigation is the **presence of structural atypicity of forming it cells**. Normal cells and tissues serve as the standard for determining the degree of atypicity for comparison.
- One of the main signs of atypicity tumor tissue is the absence of completeness of cycles of cells and tissues development.

Nomenclature, structure & classification of tumors-XIII.

- Microscopic investigation of tumor displays the degree of their differences from initial tissues, gives the concept of the degree of their differentiation.
- The criterion of their malignance is also ability to metastize. Usually metastases have the structure of initial tumor, but may considerably differ from it by the degree of differentiation (may be less differentiated). Therefore, recognition of the primary focus in morphological investigation of metastases is not always possible.

Nomenclature, structure & classification of tumors-XIV.

- Structural atipicity of tumor spreads over all its components – and the main cellular one (**parenchyma** of tumor), and **stroma** /base of tumor/ (connective tissue, including interstitial substance, vessels and even nerve elements). On the assumption of relationships between stroma and parenchyma conceptions of the "encephaloid cancer" /soft cancer/ (poor with stroma) and scirrhus (with sharp prevalence of connective tissues over parenchyma).

Nomenclature, structure & classification of tumors-XV.

- **Structure and classification of cancer**.
- The variety of macroscopic kinds of cancer is conditioned by the tumor character, type of its growth, as well as by the peculiarities of the structure of tissues and organs in which this growth takesplace.

Nomenclature, structure & classification of tumors-XVI.

- In benign tumors of epithelial nature the character of tumor is usually as follows:
- 1) **expansive** (that is with pressing back and compression of surrounding tissues) and
- 2) **exophytic** (that is with eminence over epithelial covering or pavement of the hollow organ).

Nomenclature, structure & classification of tumors-XVII.

- For the cancer in which tumor complexes or individual tumor cells may infinitely penetrate surrounding tissues, various layers and zones (as of the initially affected organ as of the adjusting organs and tissues) **invasive** or **infiltrative** growth are of character. Tumor roots itself into lymph and blood vessels, its cells spread over the whole organism, giving the origin of the secondary tumor nodes /or metastases/.

Nomenclature, structure & classification of tumors-XVIII.

- Cancer, having endophytic growth spreads mainly in the thickness of the hollow organ wall, without projecting into its lumen. Quite often these both types of cancer growth (exo- and endophytic) are combined; at that tumor has hemispherical or mushroom shape.

- In some kinds of cancer due to the lack of correspondence between the amount of tumor mass and the level of its blood supply pronounced secondary changes as inflammatory-necrotic processes develop. This leads to ulceration of tumor, and consequently it gets the shape of so-called “saucer-shaped cancer”.

Nomenclature, structure & classification of tumors-XX.

- Quite often the base for indication the tumor kind is the presence of the substance or structure, producing by its cells, e.g.: **mucous**, **colloid**, **cricoid-cellular**, **pseudomucinous cancer** and so on. *All of them belong to the glandular cancers, most of occur in the stomach or large intestine, and differ in a high intra- or extra-cellular production of mucus*. This kind of cancer may lose glandular structure, and tumor cells are located in mucous masses

Nomenclature, structure & classification of tumors-XXI.

- In intracellular production of mucus cancer cells, overfull with mucoid substance lie separately in fibrous stroma (cricoid-cellular cancer).
- Mucous cancer is one of the most malignant form and apt to the early metastatic spread.

Nomenclature, structure & classification of tumors-XXII.

- Some kinds of cancer have the tendency to produce specific structures characteristic for tissues with which they are connected histogenetically. So, in squamous cell carcinoma corneous substance in the kind of so-called "cancer pearls", producing by

Nomenclature, structure & classification of tumors-XXIII.

- At the same time epithelium of some organs, in norm not forming corneous masses, acquires similarity with skin epithelium and begin to produce keratin after the tumor transformation. In this connection such forms of cancer, arising in trachea, brochi, stomach, and ovaries are called **epidermoid cancer**. Epidermoid cancer of the stomach is often indicated by the term "**cancroid**".

Nomenclature, structure & classification of tumors-XXIV.

- Stromal component /besides epithelial component/ is the important element of tumor. It is represented by connective tissue, vessels and nerves. The amount and character of this component also finds its reflection in the names of cancer forms. F. e., some forms of adenocarcinomas are characterized by a *considerable* prevalence of tumor parenchyma over the stroma. The latter gives them very soft consistence and macroscopic similarity with the brain tissue (**medullary** or **encephaloid cancer**).

- On the ground of histological structure, by the extent of deviation from the normal tissue structures there are distinguished: **highly-, moderately-, low-differentiated forms** of cancer.
- There are also distinguished **non-keratinizing** and more differentiated **keratinizing** cancer. The latter represents histogenetically more mature tumor and contains laminated formations consisting of corneous scales.

Nomenclature, structure & classification of tumors-XXVIII.

- Spread of the primary tumor node is indicated by symbol **T (tumor):** T1 – tumor of small sizes, occupying a portion of the organ; T2 – tumor of great sizes, but not exceeding the bounds of the organ, T3 – tumor exceeding the bounds of the organ and involving into the process adjusting organs and tissues. Sometimes there is distinguished the stage To (primary tumor is not defines, but there are metastases) and stage T is (to determine cancer *in situ*, that is intraepithelial cancer). For some locations of cancer stage T4 is provided (tumor exceeds the bounds of the organ, causing destruction of adjusting organs).

Nomenclature, structure & classification of tumors-XXVIX.

- For mammary gland tumor the gradation is fulfilled by the sizes of tumor (in cm), for cancer of the stomach – by the extent of growing through the wall and spread on its portions (cardia, body, output unit) and so on. Special attention is paid to **cancer *in situ*** (cancer in place). At this stage the tumor is located in epithelium only, doesn't grow through basal membrane (so doesn't grow through blood and lymph vessels). At this stage malignant tumor is not yet lacking in infiltrative growth and can't give hematogenic and lymphogenic metastatic spreading.

Nomenclature, structure & classification of tumors-XXX.

- Symbol **N** (nodulus) is used to designate metastases into the **regional lymph nodes**: Nx – there is no information about the presence or absence of metastases in the regional lymph nodes (the patient has been observed incompletely, has not been operated on); N0 – absence of metastases; N1 – presence of metastases (in lymph nodes – collectors of the first order). In some tumor locations depending on the group of lymph nodes designations may vary from N1 to N3 : N2 - there are metastases in lymph nodes – collectors of the second order; N3 - there are metastases in lymph nodes – collectors of the third order).

Nomenclature, structure & classification of tumors-XXXI.

- Symbol M (metastases) indicates the presence (M1 or M+) or absence (M0) of metastases in the distant organs and tissues.

Nomenclature, structure & classification of tumors-XXXII.

- Index G (grade) – defines the degree of malignancy (degree of cells differentiation) and is introduced into diagnosis only after histological estimation of tumor. Three groups of new formations are distinguished: G1 – tumors with low degree of malignancy (high-differentiated tumors); G2 – tumor with middle degree of malignancy (low-differentiated); G3 – tumors with high degree of malignancy (nondifferentiated).

Nomenclature, structure & classification of tumors-XXXIII.

- Index P (penetration) is introduced only for tumors of the hollow organs and indicates te degree of growing through their walls: P1 – tumors in the limits of mucous membrane only; P2 – tumors growths into submucous layer; P3 – tumor growths through the muscular layer; P4 – tumor exceeds the bounds of the organ.

Nomenclature, structure & classification of tumors-XXXIV.

- Classification by TNM system is considered to be convenient one, since it characterizes in detail all sides of malignant process. It allows to compare the results, obtained by specialists of different countries. At the same time it doesn't give generalized information about the process severity and opportunity to cure from tumor. With this purpose **clinical classification of tumors is used.**

Nomenclature, structure & classification of tumors-XXXV.

- According to **clinical classification** four stages of tumors are distinguished:
- **stage I**– the tumor is localized one, takes a restricted portion, doesn't grow through, the organ wall, metastases (as into regional as into distal lymph nodes) are absent;
- **stage II**– tumor has moderate sizes, doesn't exceed the bounds of the organ, may be presence of individual metastases into regional lymph nodes;

Nomenclature, structure & classification of tumors-XXXVI.

- stage III– tumor has great sizes, with resolution, grows through the whole wall of the organ / or tumor of less sizes with multiply metastases into regional lymph nodes/;
- stage IV – growth of tumor through surrounding organs, including those, unremovable (aorta, vena cava, and soon), or any tumor with distant metastases.
- Stage 0 – cancer *in situ* also exists.

Nomenclature, structure & classification of tumors-XXXVII.

- **For every location of malignant tumor correspondence of clinical stages with the stages by TNM system has been worked out**.
- So, for cancer of the large intestine it looks as follows:

  stage 0 – Tis N0 M0; **stage I** – 1-2 N0 M0;

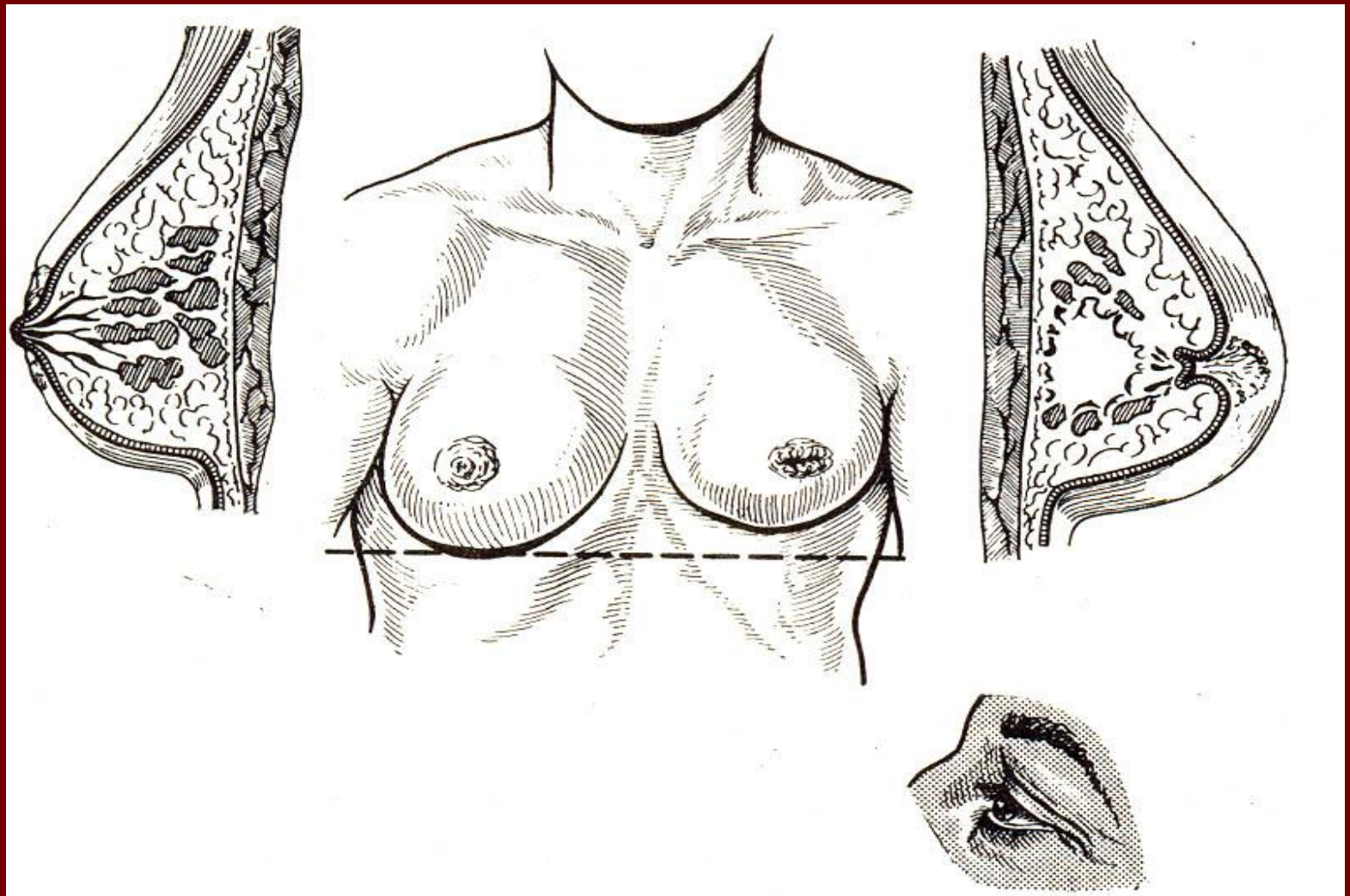
  stage II – T 3-4 N0 M0; **stage III** – any T, N 1-2 M0; **stage IV** – any T, any N, M1.

Clinical picture & diagnosis of tumors-I.

- Diagnosis of benign tumors is based only on the local symptoms, signs of the presence of the tumor itself. At that tumor increase slowly in size do not hurt, have a rounded shape, smooth /more rarely – lobate/ surface, distinct border with surrounding organs. Mainly there is prevalence of cosmetic aspect of the disease (the presence of the tumor itself).

- Occasionally the signs of the organ's functional disorder appear (polyp of the intestine results in obturative intestinal obstruction; benign tumor of the brain, compressing surrounding portions leads to the appearance of neurological symptomatology and so on).

Clinical picture & diagnosis of tumors. (EXAMPLE).ELEVATED POSITION & RETRACTION OF NIPPLE IN BREAST CANCER.



Clinical picture & diagnosis of tumors-II.

- - syndrome "plus-tissue";
- - syndrome of pathological excretions;

Clinical picture of malignant tumors-I

- **Syndrome "plus-tissue".** Tumor may be founded directly in the area of its location as the additional tissue ("plus-tissue"). This syndrome is revealed during examination and palpation of superficial tumors (in the skin, subcutaneous cellular tissue, muscles), as well as on the extremities. Sometimes they succeed in definition by palpation of the tumor, located in the abdominal cavity. In addition to it syndrome "plus-tissue" is revealed by means of additional methods of investigation: endoscopic, USI, rentgenography and others.

Clinical picture of malignant tumors-II

- **Syndrome of pathological discharge.** In the presence of malignant tumor due to its growth through blood vessels a blood-stained discharge and bleedings are often observed. So, cancer of the stomach may cause stomach bleeding; cancer of the lung - blood-spitting (*haemoptysis;)* mammary gland cancer – serous-blood-stained discharge from the mammilla; cancer of the rectum – intestinal bleedings; cancer of the kidney – hematuria; cancer of uterus - blood-stained discharge from genital ducts. If inflammation develops around the tumor or **mucous-making** shape of cancer is revealed, mucous (pyo-mucous) discharge /as in cancer of large intestine/ appears.

Clinical picture of malignant tumors-III

- **Syndrome of the functional disorder.** Manifestations of this syndrome are various ones and depend on the tumor location and functions of the organ, in which the tumor is located. So, in tumor of the intestine (especially of the lest sections of the colon) the signs of intestinal obstruction are of character. Dyspeptic disorders (nausea, heartburn, vomiting) are peculiar for cancer of the stomach. In patients with cancer of esophagus the leading symptom is disorder of the act of food swallowing (dysphagia), and so on.

Clinical picture of malignant tumors-IV

- **Syndrome of small signs.** The patients with malignant new formations frequently report not quite explainable /"groundless"/ complaints. There are mentioned weakness, fatigability, increase of the body temperature, loss of weight and appetite (aversion of meet food), anemia, increased ESR. All mentioned above signs have been described by A.I.Savitsky and are named "syndrome of small signs". In some cases this syndrome appears at the early stages of tumor and may be its only manifestation. Sometimes it appears later on and is the evidence of a manifest cancerous intoxication. At that the patients have a specific "oncological" appearance they are thinning, the turgor of tissues is reduced, the skin - pale with grayish or icteric shade, the hair dull, the eyes – sunken. Such an appearance of the patient says about presence in their organism of neglected oncological process.

Diagnostics of tumors-I

- **The base of tumor diagnosis is their timely identification at the early stages of disease**
- (**1st principle: early diagnosis**) when applying of radical methods of treatment is the most effective. Great importance in the early definition of tumor belongs to **oncological vigilance of the doctor**
- (**2nd principle).** It includes: 1) knowledge of tumor symptoms /especially at the early stages); 2) careful examination of patients /even in minimum complaints/; 3) collective decision of questions in difficult for diagnostics cases. In threatening of malignant tumors in all doubtful cases it is usual to make the most threatening diagnosis and undertake more radical methods of treatment
- (**3rd principle: hyperdiagnostics**).

Diagnostics of tumors-II

- **Diagnostics of tumors** are subdivided into:
- 1) *primary* diagnostics, carried out under conditions of policlinic or during prophylactic examinations; &
- 2) *clarifying* diagnostics, usually carried out in the hospital. During the primary diagnostics clinical methods (anamnesis & objective examination) allow to suspect tumor & to draw a rational plan of applica-tion instrumental methods of investigation. To define early forms of cancer of the lung fluorography of the organs chest organs is used; cancer of the stomach & cancer of the colon – fibrogastroxcopy & fibrocolono-scopy with aiming biopsy; cancer of the uterus cervix – cytological investigation; mammary gland cancer – mammography & puncture biopsy & s.o.

Diagnostics of tumors-III

- **Clarifying diagnostics** in patients with already revealed malignant tumor or suspicion on it is aimed to estimate individual features of the disease and the patient's state in order to choose the most rational method of treatment.
- At that **it is necessary to reveal:**
- **a) local & b) common criteria of the disease.**

Diagnostics of tumors-IV

- ***Local criteria include:*** **1**) adjusted location of the primary tumor; **2**) anatomical peculiarities of tumor gowth; **3**) histological structure of tumor; **4**) degree of differentiation of tumor issue;**5**) stage of the disease.
- ***Common criteria include:*** **1**) genetic predisposition of the patient to one or another tumor; **2**) immunological status of the patient; **3**) state of metabolism; **4**) hormonal profile.

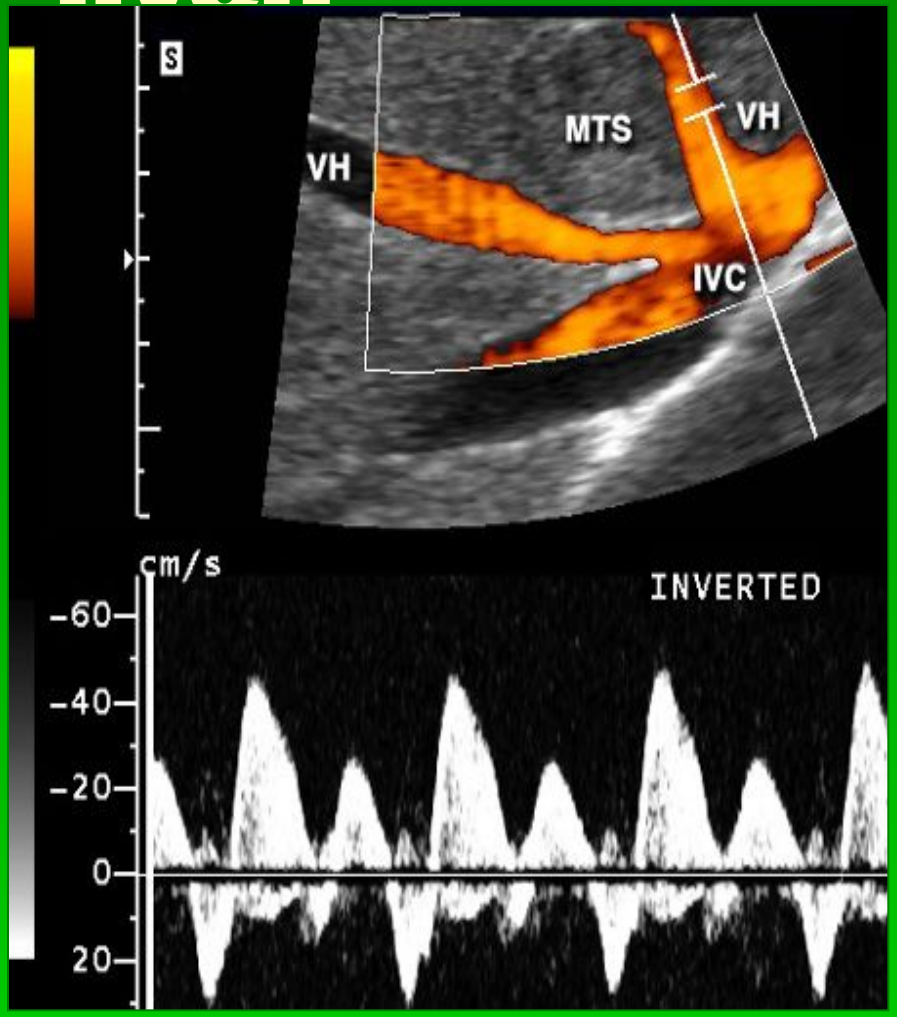
- Along with estimation of the local and common criteria in the hospital **individual features of the disease are cleared up and the degree of operation risk are clarified.** At that accompanying diseases, functional indexes and the patient's age are taken into consideration. To reveal individual features of the disease **various diagnostic methods are used.**

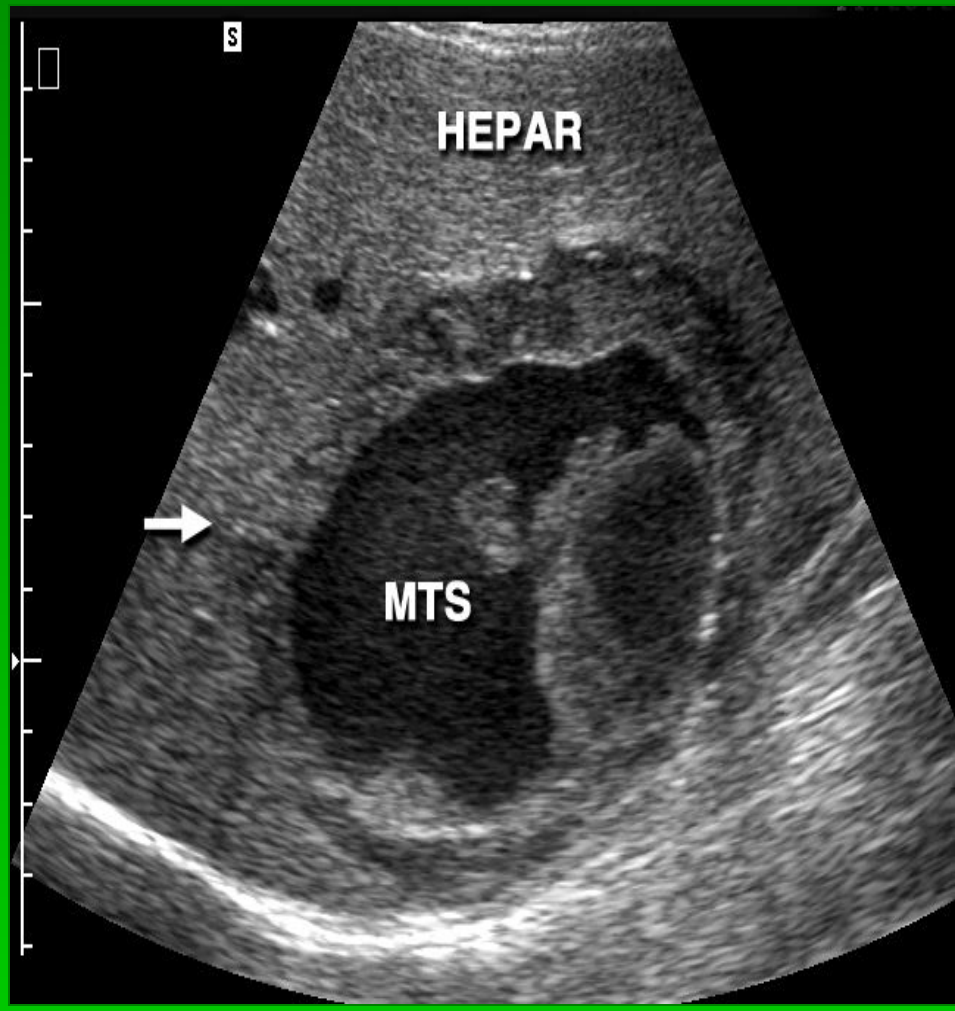
Diagnostics of tumors-VI

- X-ray investigation includes: 1) uncontrast & contrast methods. Uncontrast methods /roentgenoscopy/ /graphy/, tomography) are used to estimate the state of the organs of the thoracic cavity, extremities, neck. Contrast methods (with natural contrast – air, more often specific contrasts) are used by the specific indications, more often to diagnose GIT organs. Wide spread have got methods, allowing to obtain detailed highly-exact visualization of “slices” of the human body organs & tissues at any depth & any level,- computer X-ray tomography (CT) & nuclear-magnetic & nuclear-resonance investigation (MRI), as well as ultrasound investigation (USI).

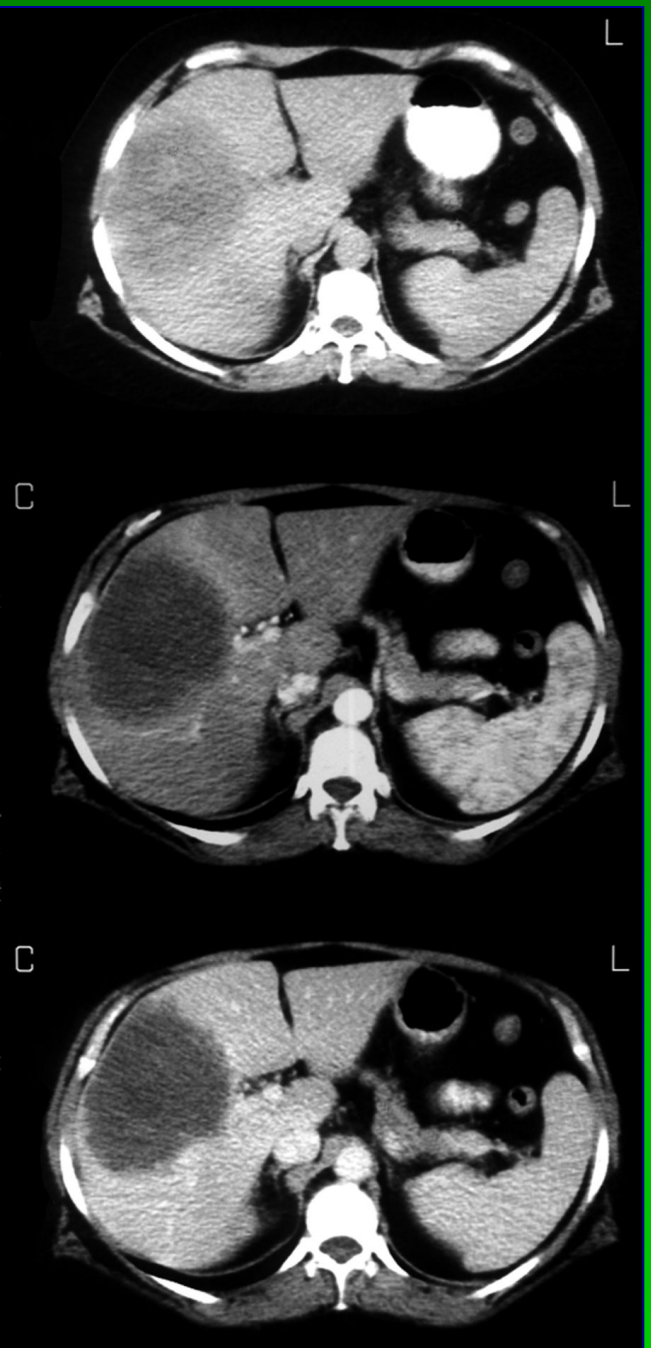
Roentgenologic method in diagnostics of cancer (stomach & esophageus)

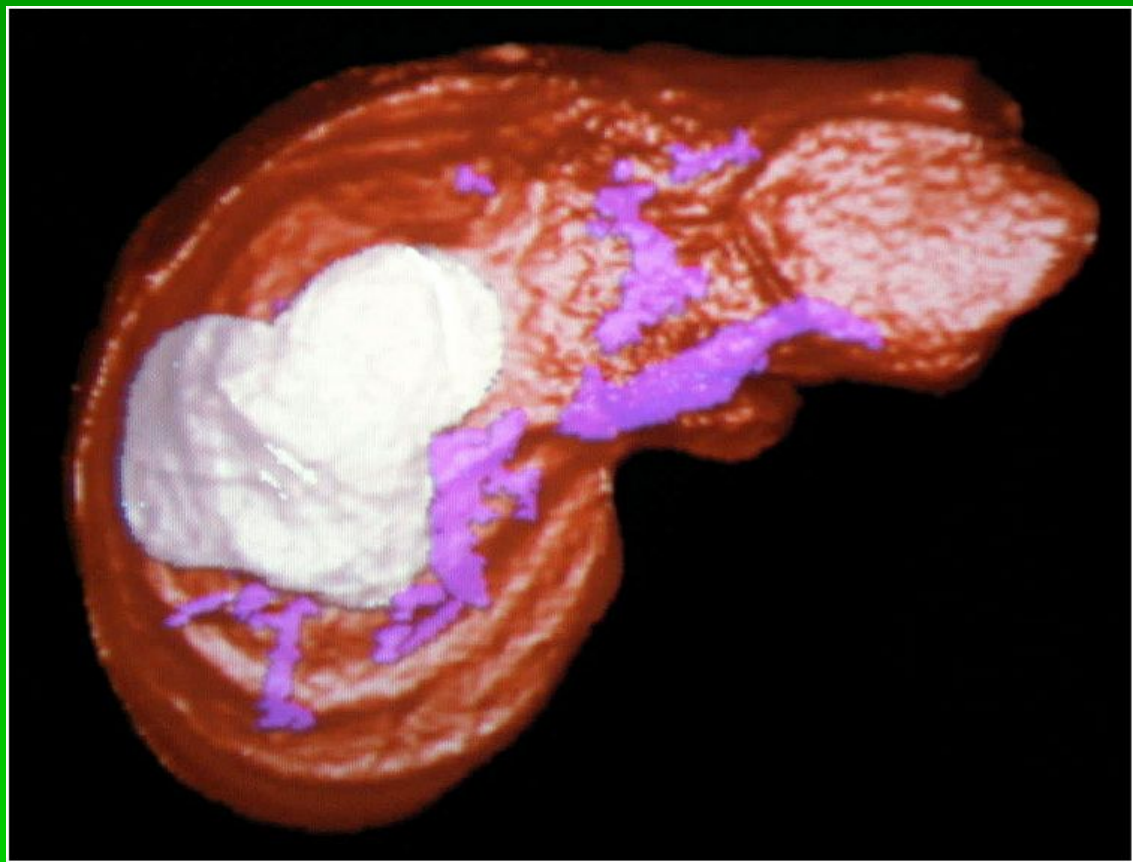
USI /Doppler scanning/. Metastases of cancer in the liver.





(CT) COMPUTER TOMOGRAPHY OF LIVER WITH CANCER (mts).

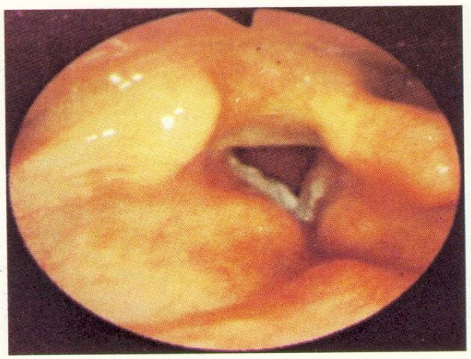


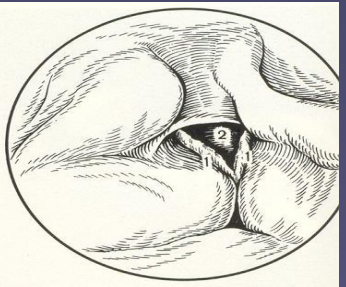


Diagnostics of tumors-VII

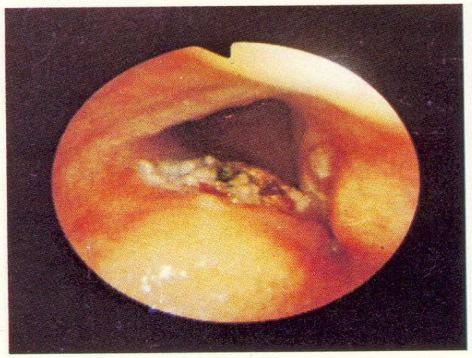
- **Endoscopic methods** allow to carry out investigation with the help of special instruments, – endoscopes, - to investigate hollow organs, abdominal and thoracic cavities, intertissue space during which to carry out biopsy or take material for histological investi-gation.
- Application of endoscopic methods allow to diagnose early stage of tumor (preinvasive cancer).

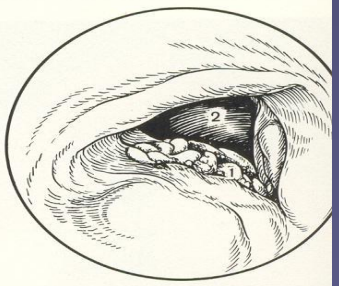
ENDOSCOPY in diagnostics of cancer of hollow organs



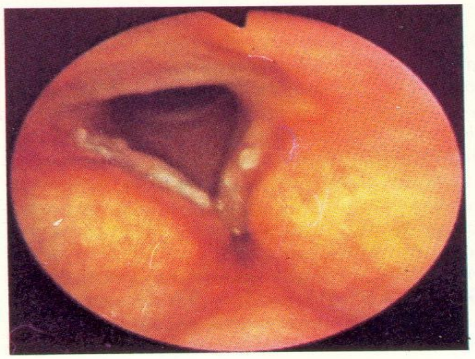


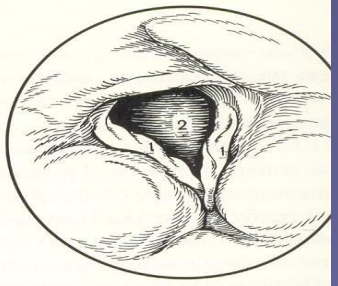
8. Пахидермия голосовой складки.
1 — голосовые складки; 2 — просвет гортани.



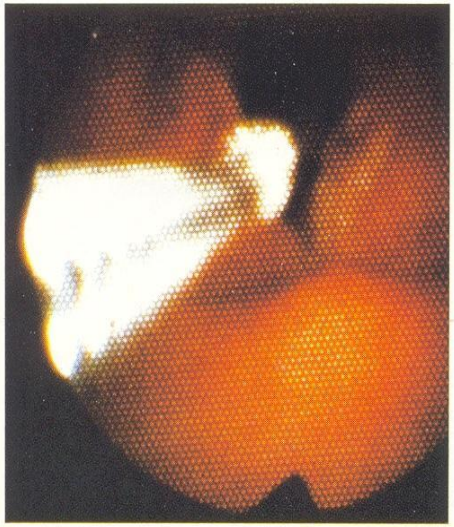


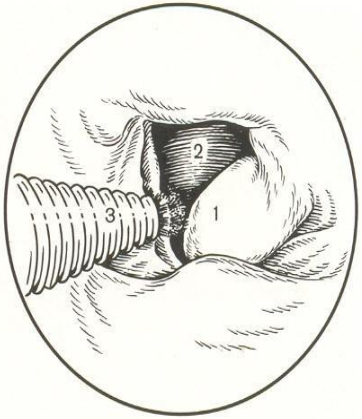
9. Вторые сутки после лазерной деструкц
пахидермии голосовой складки.
1 — голосовые складки; 2 — просвет гортани.



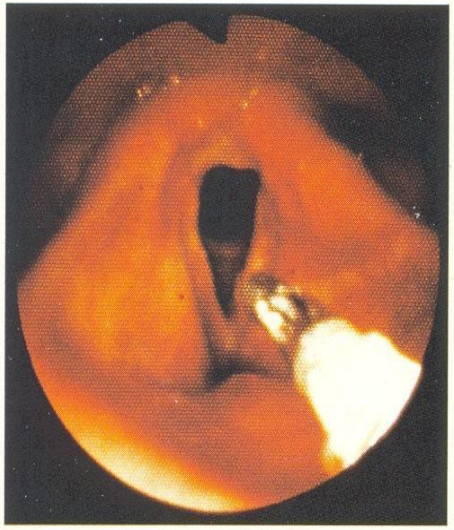


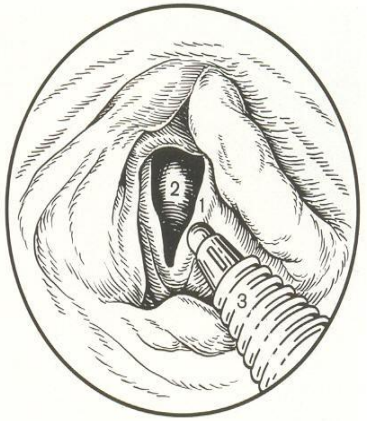
10. Десять суток после лазерной деструк
пахидермии голосовой складки. Почти
ная эпителизация голосовой складки.
1 — голосовые складки; 2 — просвет гортан





6. Рак правой половины гортани. Соскоб с опухоли щеткой.
1 — опухоль; 2 — просвет гортани; 3 — щетка.





7. Рак левой голосовой складки с переходом на переднюю комиссуру. Биопсия опухоли.
1 — опухоль; 2 — просвет гортани; 3 — щипцы.

- **Radioisotopic methods** of investigation are based on the ability of many tumors & their metastases to accumulate radioactive nuclides. These methods are used to determine location of tumor, its borders, presence of metastases, estimation of the results of therapy, as well as revealing of functional shifts in organs & systems, caused by the tumor & its meta-stases. For the diagnostic purpose radioactive nuclide with a short period of half-disintegration is inserted to the patient; distribution of nuclide is caught in the patient's organism by special counters.

Treatment of tumors-I

- **Treatment of benign tumors -** operative excision of tumor /in individual cases it is possible to use cryo- or laser- or diathermo-destruction/.
- Such an approach is grounded by the fact, that ***benign tumors are precancerous conditions*** along with *ulcers, fistulas, anacid gastritis, mastopathies, uterus cervix erosions, pigmented birthmarks* & s.o.

Treatment of tumors-II

- **Treatment of malignant tumors** is fulfilled by various means depending on: a) character of tumor growth and its histological shape; b) location of tumor; c) clinical stage of tumor; d) the patient's age; presence of accompanying diseases.
- Treatment of oncological patient may be: a) **radical** (that cures the patient comp-letely); 2) **palliative** (prolonging the patient's life); 3) **symptomatic** (alle-viating only separate symptoms of the disease).

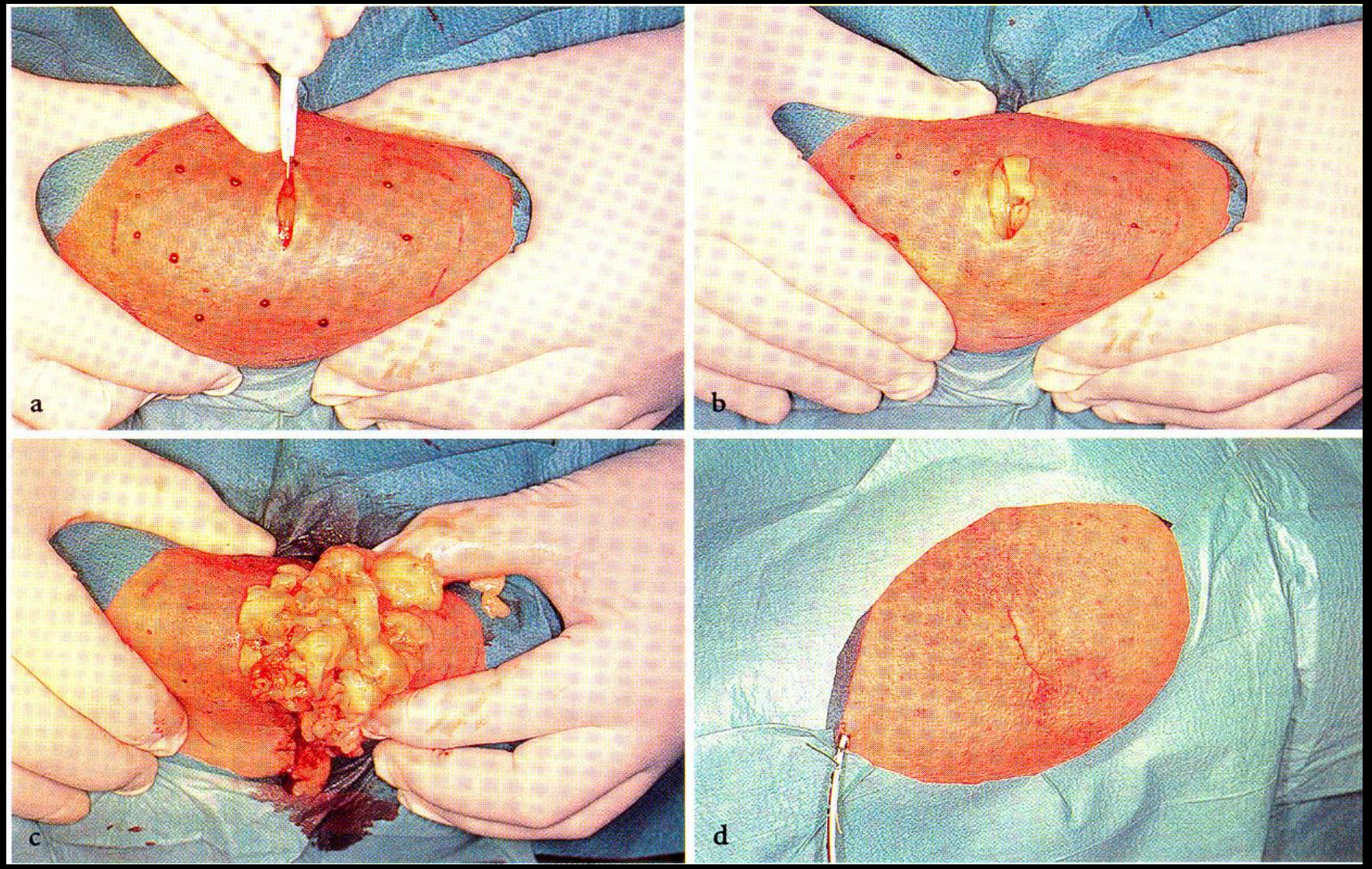
Treatment of tumors-III

- **The main methods of treating of malignant tumors** are:
- 1) **surgical treatment;**
- 2) **radioactive therapy;**
- 3) **medicinal treatment** with the use of antineoplastic remedies (**chemotherapy).**
- * In the process of treating oncological patient it is possible to combine the main methods of treating malignant tumors. If two methods of treating the patient are used, they say about ***combined*** treatment, if all three methods are of use – it is ***complex*** treatment.

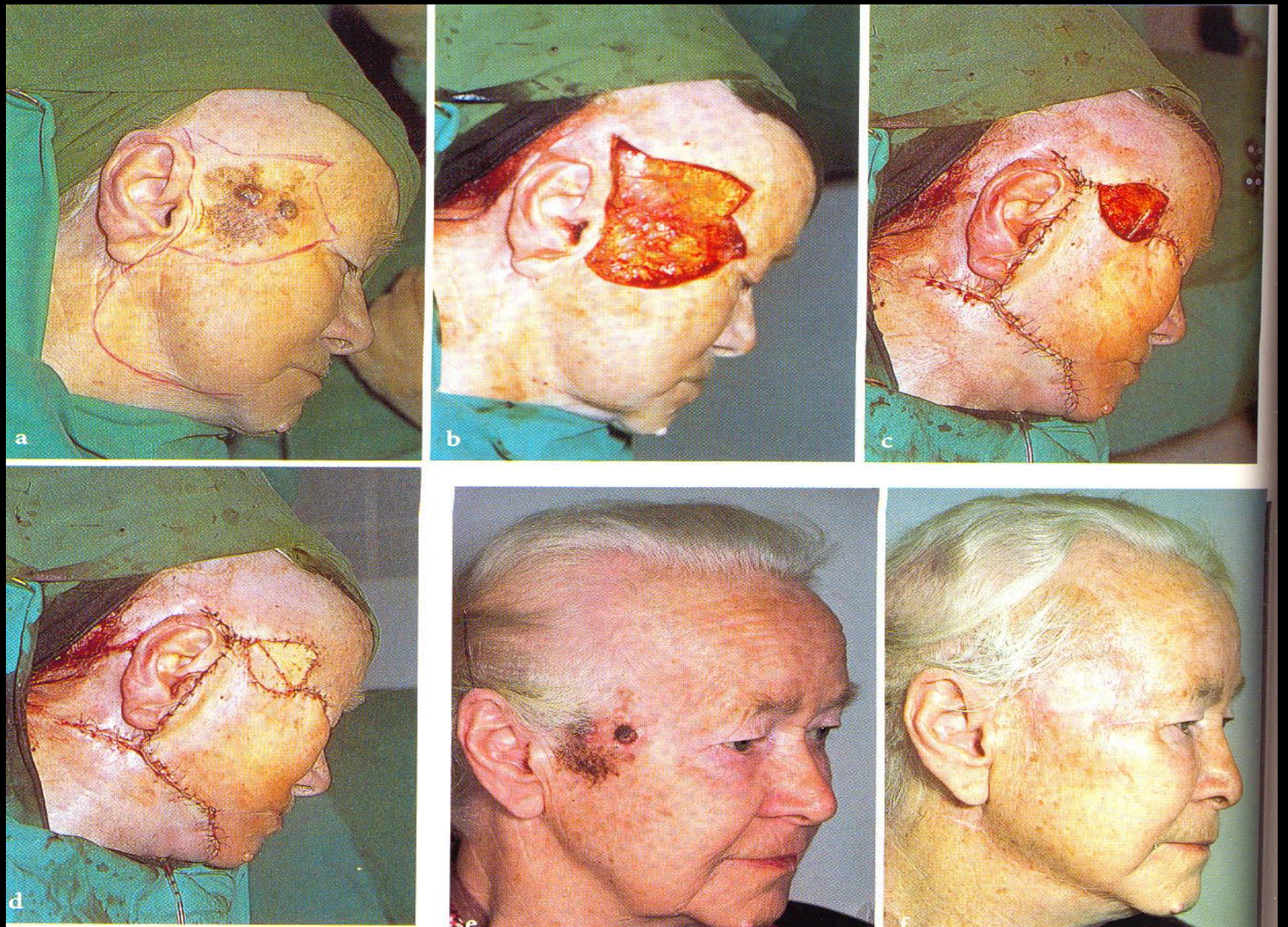
Treatment of tumors-IV

- Surgical treatment is the main one in the most tumors. It may be used either independently or in combination with the other methods of treatment. Surgical operation may be found as a test one (in greatly developed tumor process), radical or palliative. Palliative surgery is for example applying of bypass anastomoses in the tumors, that can't be removed and cover the lumen of GIT. **Radical surgical operation on account of malignant tumors is based on the principle of complete removal of tumor within the bounds of healthy tissues.**

SURGICAL TREATMENT OF LIPOMA



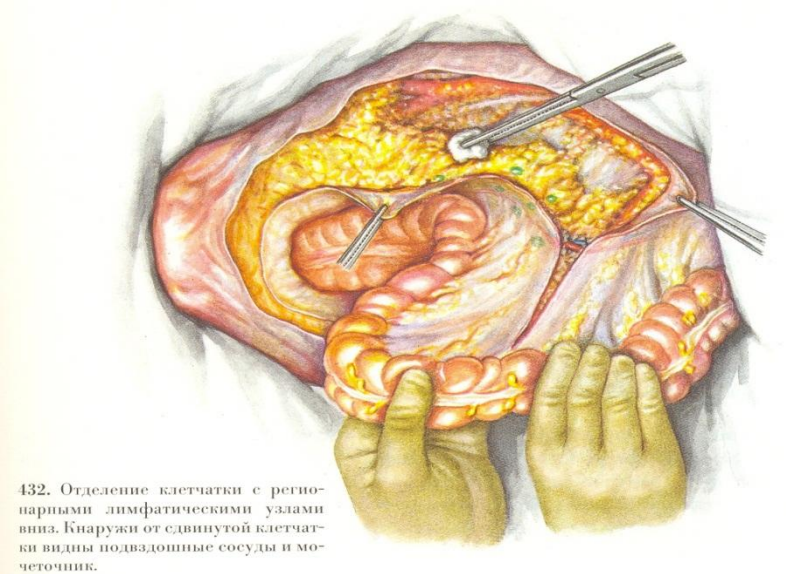
SURGICAL TREATMENT OF MELANOMA



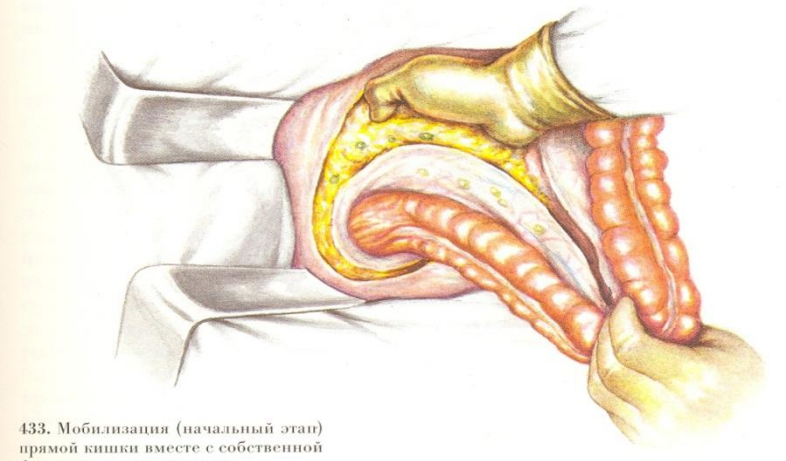
Treatment of tumors-V

- During the removal of malignant new formation it is necessary to observe so-called oncological principles:
- 1) ablastics;
- 2) antiblastics;
- 3) zoning;
- 4) saving «case» in process of removing tumor.

Example of principles of oncological operations



432. Отделение клетчатки с регионарными лимфатическими узлами вниз. Кнаружи от сдвинутой клетчатки видны подвздошные сосуды и мочеточник.



433. Мобилизация (начальный этап) прямой кишки вместе с собственной фасцией по задней стенке.

- D-S: CANCER OF RECTUM
- OPERATION:
- TOTAL ABDOMENO-PERINEAL PROCTECTOMY

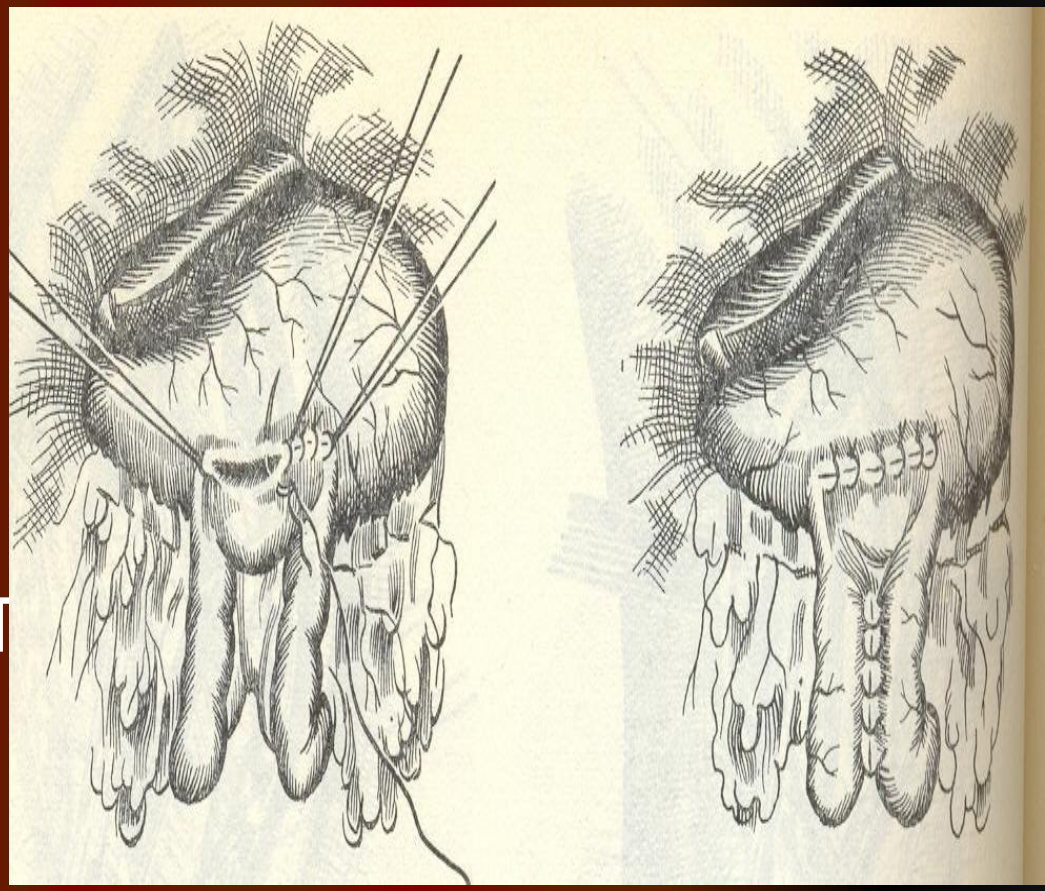
(**EXTIRPATION OF RECTUM**)
-intraabdominal stage.

/radical operation/.

Example of principles of oncological operations

- D-S: CANCER OF STOMACH (IV stage).
  STENOSIS OF ANTRAL /distal/ PART OF STOMACH.
- OPERATION: applying of GASTROENTERO-ANASTOMOSIS.

/palliative operation/.



Treatment of tumors-VI

- **Ablastics –** complex of measures directed at prevention of tumor cells spread at the time of operation.
- For that: incision is performed only within the bounds of certainly healthy tissues; to avoid mechanical injury of the tumor tissue; aimed to ligate as quicker as possible the vein vessels, branching from the formation; during the operation on the hollow organ it is tying up with the tape above & below the tumor (in order to avoid migration of tumor cells along the lumen); the tumor is removed as a single mass with cellular tissue and regional lymph nodes; before manipulation with tumor the wound is limited with a napkins; after the removal of the tumor instruments & gloves are changed (or proces-sed), limiting napkins are changed.

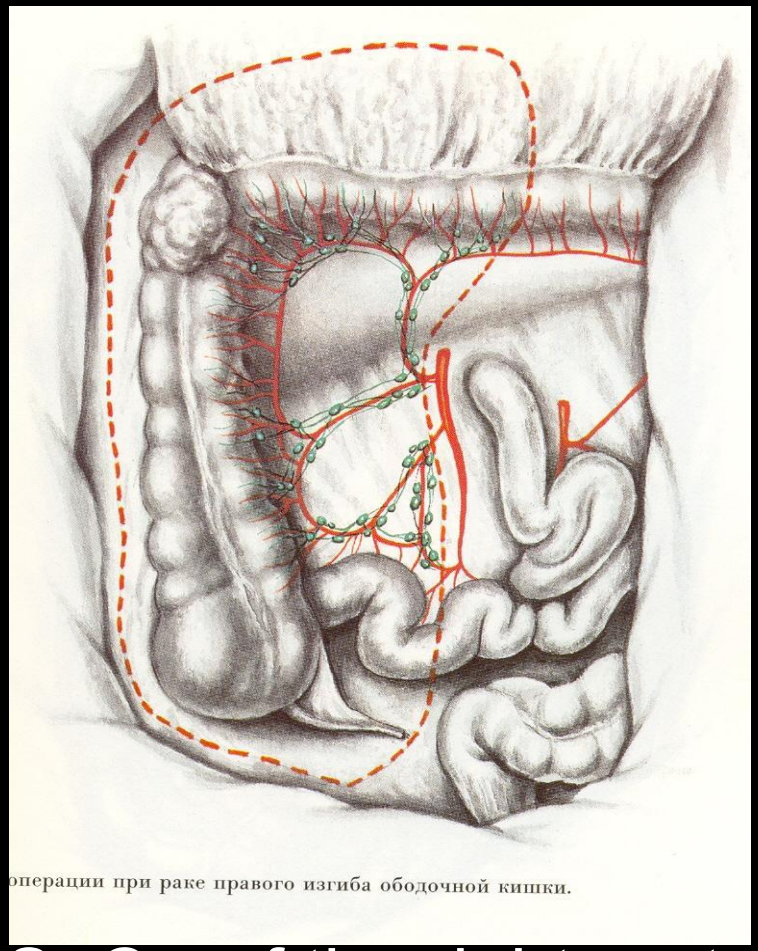
Treatment of tumors-VII

- **- Antiblastics** – complex of measures directed at destruction at the time of operation of individual tumor cells, detached from the basic tumor mass, which may later on become the source of tumor or metastases recurrence.
- There are distinguished *physical* & *chemical* antiblastics. The measures of physical antiblastics include: using at the time of operation electric scalpel, laser, cryodestruction, as well as irradiation of tumor before operation & at the early postoperative period. Chemical antiblastics includes: processing of the wound after removing tumor with 70% spirit; i/v injection of antitumoral chemical preparations on operational table; regional perfusion of the area of surgical operation with antitumoral chemical preparations.

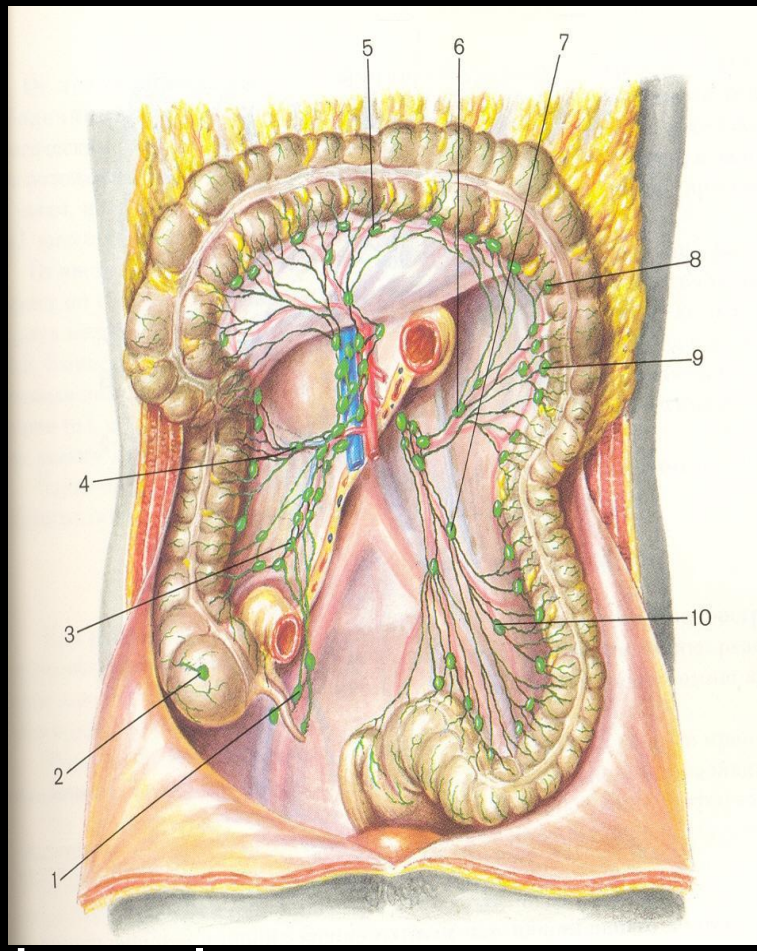
Treatment of tumors-VIII

- **- Zoning.** During the operation for malignant tumor it is necessary to remove not new formation only, but the whole of the zone, where may be placed individual cancer cells – this is the principle of zoning. These cells may be situated in tissues close to tumor, as well as in brunching from it lymph vessels and regional lymph nodes.

Example of principles of oncological operations



операции при раке правого изгиба ободочной кишки.



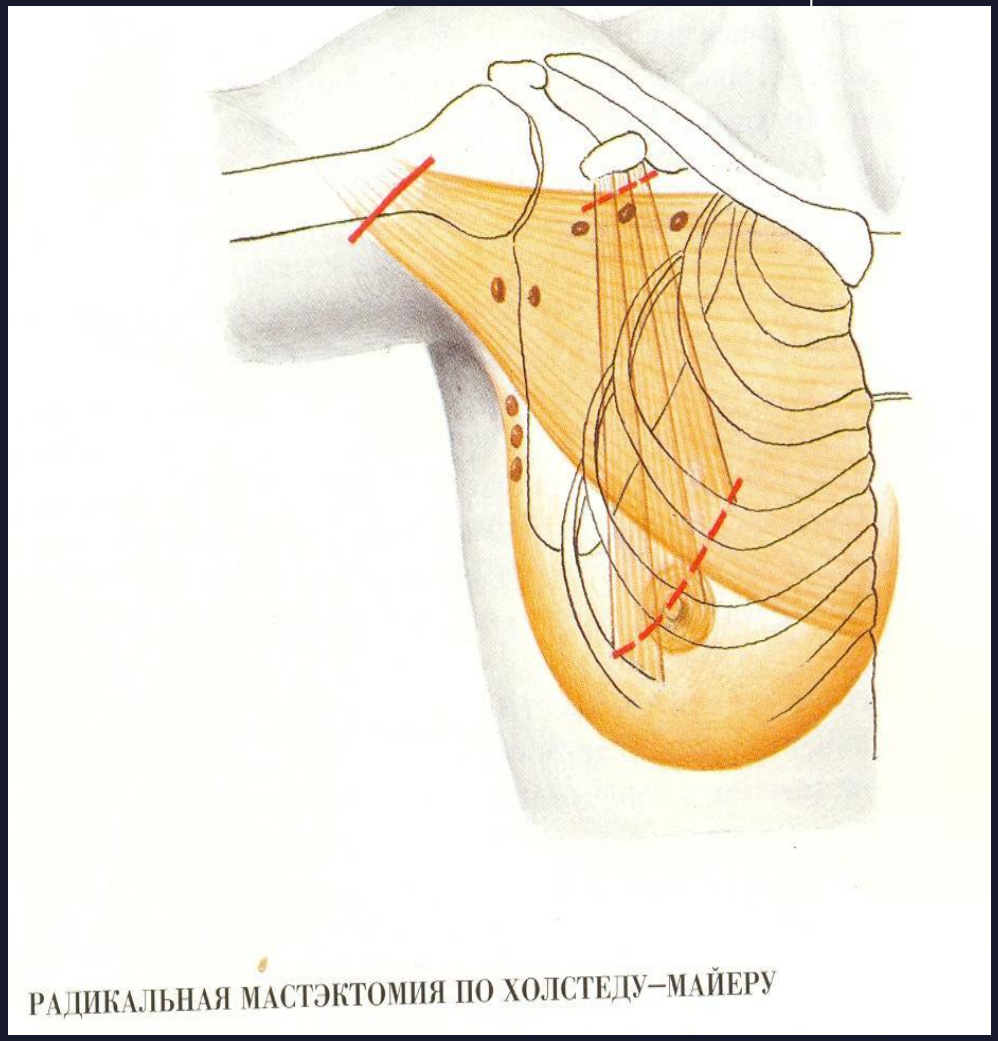
- D-S: C-r of the right part of large bowel.
- Volume of removing tissues.

Treatment of tumors-IX

- In ***exophytic growth of tumor*** /when its base is relatively narrow, and the most portion is directed to the outward or to the lumen, so-called "polypoid" or "mushroom" shape of tumor / ***it is necessary to dissect tissues, at the distance 5-6 cm from the outer border of tumor.***
- In ***endophytic growth of tumor*** /spread of tumor along the wall of the organ, that is prostrating-infiltrative growth of cancer/ ***it is necessary to step aside from the visible borders not less 8-9 cm.*** Together with the organ or its portion all lymphatic vessels and nodes, gathering lymph from this zone should be removed as a united block.

Example of principles of oncological operations

- D-S: C-r of the right mammary gland.
- Volume of removing tissues.



РАДИКАЛЬНАЯ МАСТЭКТОМИЯ ПО ХОЛСТЕДУ–МАЙЕРУ

Treatment of tumors-X

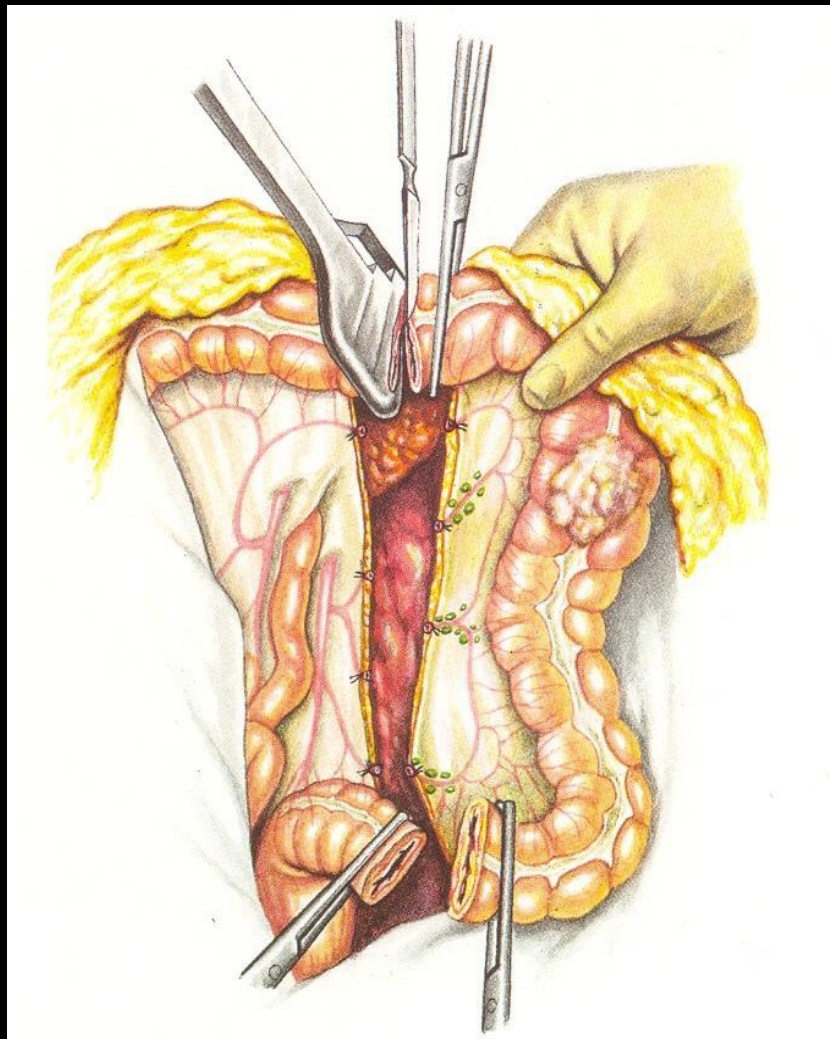
- **(Saving/keeping/ «case»).** Lymph vessels and nodes, through wich is possible the spreading of tumor cells, are located in the cellular space, divided by fascial partitions. In this connection for the most efficiency it is necessary to remove the cellular tissue of the whole fascial sheath, advisable coupled with fascia. As an example of observing the principle of saving /keeping/ **«case»** is operation for cancer of thyroid gland /at that extracapsular removal of thyroid gland with visceral leaf of the IV fascia is used/In a number of cases it is justification to perform combined operations, when together with affected organ a partial resection of the adjusting organs is done.

Treatment of tumors-XI

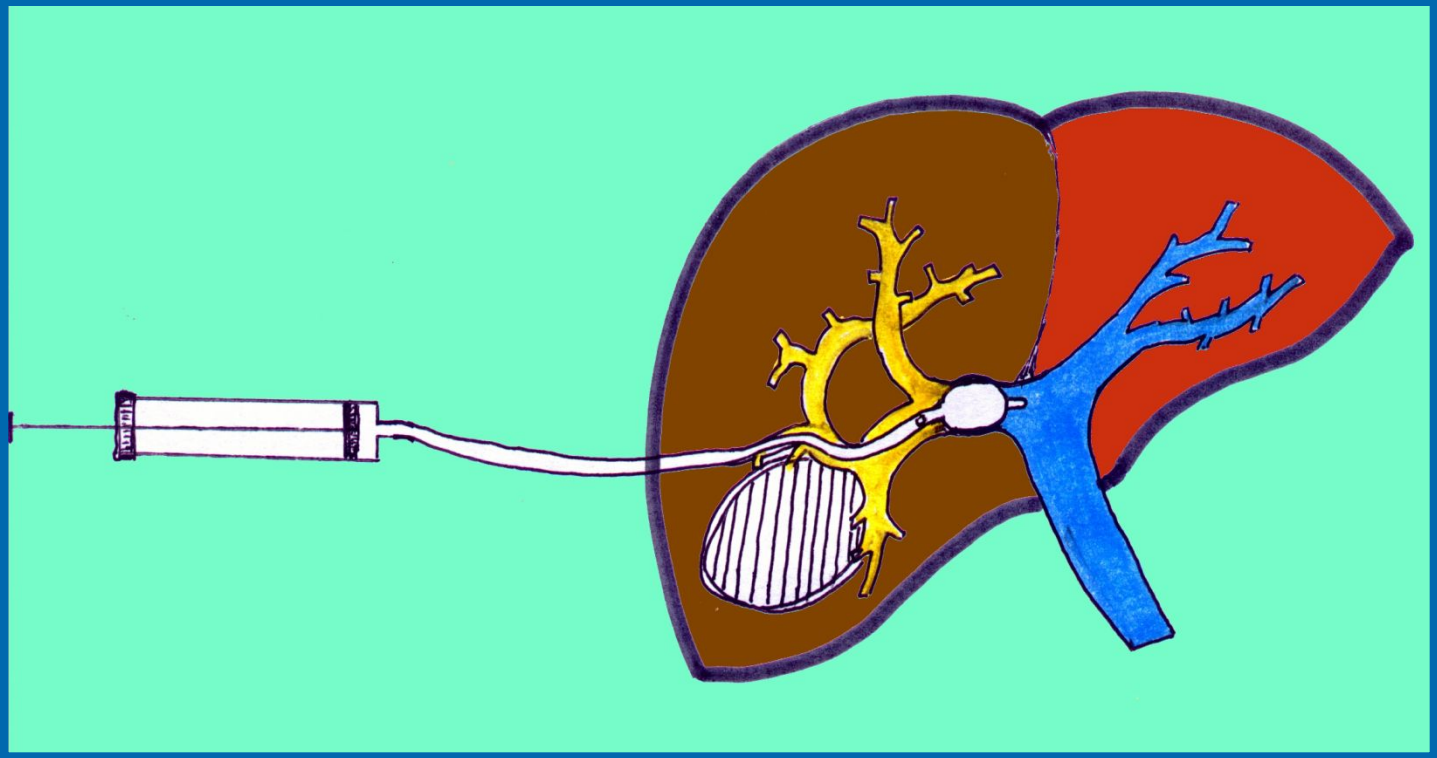
-

EXAMPLE OF MULTISTAGE OPERATIONS –I.

- D-S: C-R OF COLON DESCENDENS
- I – st STAGE OF RADICAL TREATMENT –
- **HEMICOLON-ECTOMY**



EXAMPLE OF MULTISTAGE OPERATIONS –II.



- II –nd STAGE – **EMBOLISATION OF RIGHT BRANCH OF V. PORTA**

EXAMPLE OF MULTISTAGE OPERATIONS –III.

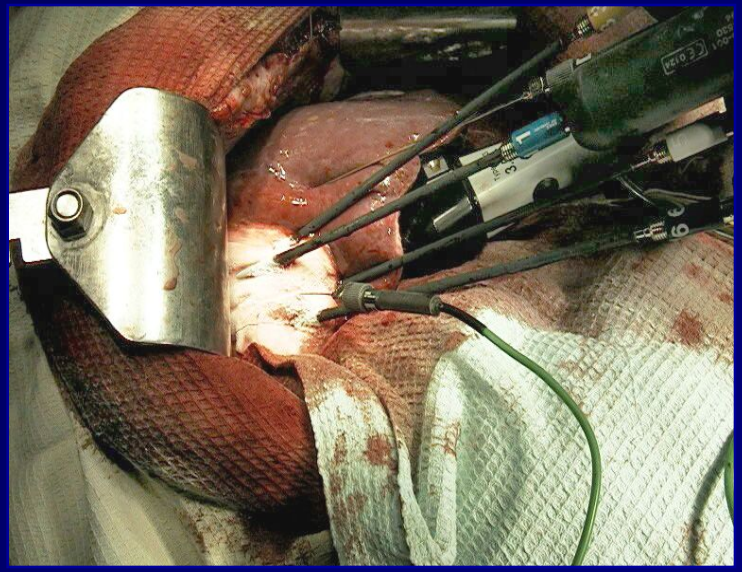
- III – D stage – RIGHT HEMIHEPATECTOMY carries out in 4 weeks, when aseptic necrosis of right lobe of hepar develops.

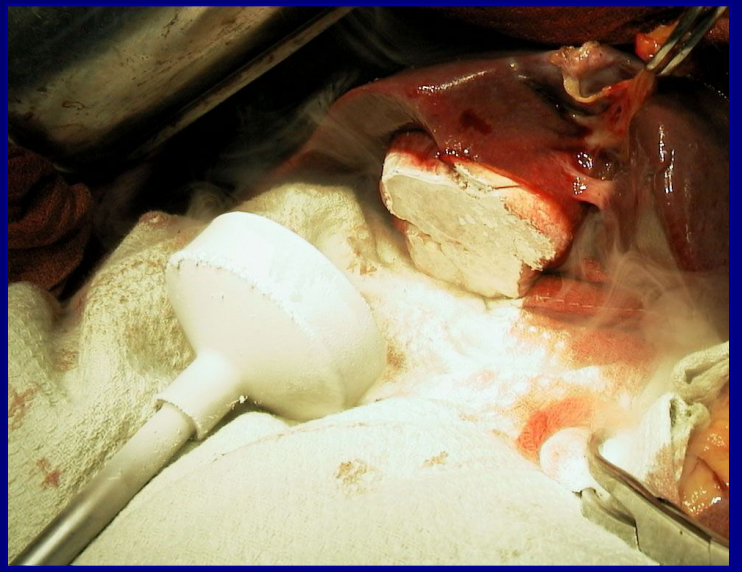
Treatment of tumors-XII

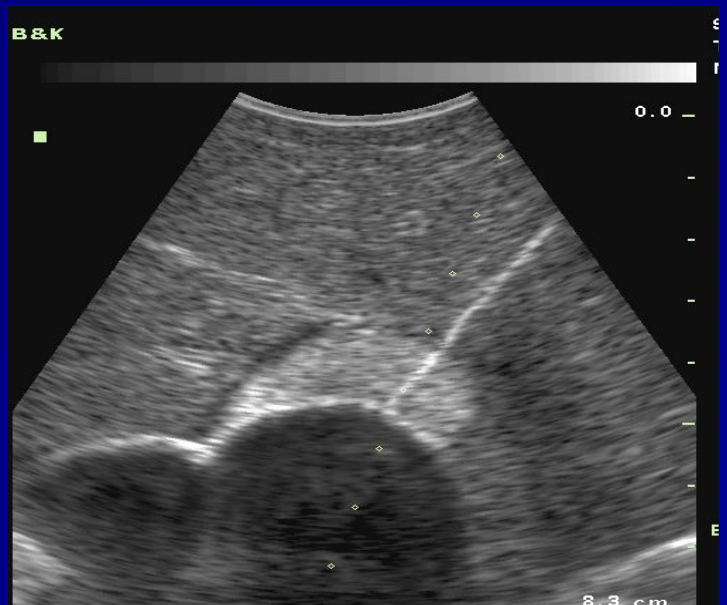
- Besides classical surgical treatment **laser-** or **cryodestruction** is performed. Cryodestruction is used in cancer of the skin as well as in neglected cases of cancer of the rectum, esophagus with the aim to restore passability and to control the pain, to stop bleedings from tumor.

- The results of surgical treatment depend mainly on the kind and location of tumor and on the stage of the disease. The best results have been achieved in treatment of cancer of the skin. In this location 5-years' survival mounts to 90 %. At the same time in cancer of the stomach even after radical operations 5 years' and more live about 30 % patients.

Cryodestruction of metastases







Treatment of tumors-XIII

Treatment of tumors-XIV

The efficiency of the damage of tumor cells de-pend on the size of absorbed dose of radiation, the factor of the time (in the cases of interrup-ted or continuous radiation), the state of oxy-genation of tumor, its reproductive ability, the degree of the cellular anaplasia, & the phase of mitotic cycle. The most sensitive to radiation are connective-tissue tumors with round-cellu-lar structures (lymphosarcomas, myelomas), some kinds of epithelial tumors (seminoma), tumors with histological substrate of the inte-gumentary epithelium (c-r of the skin, c-r of the lip, c-r of the esophageus). Less sensitive are glandular tumors (adenocarcinomas), highly differentiated sarcomas (fibro-, osteo-sarcomas), as well as

Treatment of tumors-XV

Treatment of tumors-XVI

- Different kinds of electromagnetic or cor-puscular irradiation are used for radiation therapy, namely: **X-ray**, **gamma**-, brems-strahlung (**megavolt**) radiations, streams **of neutrons**, **protons**, **electrons**.
- Depending on the place of being of the radiation source three main kinds (methods) of radiation therapy exist.

Treatment of tumors-XVII

- In the ***external*** (distance) radiation devises for X-ray therapy and telegammatherapy (isotopes Co 60 and Cs 137) is used.
- The method is the most effective in superficially tumors. In **deep-seated tumors multifield (consisting of several fields) cross impact or rotatory radiation is applied.**

Treatment of tumors-XVIII

- ***Intracaval*** radiation allows to move a source of radiation near the place of tumor location. The source of radiation through the natural openings is inserted into the urinary bladder, cavity of the uterus, oral cavity – achieving the maximum dose of radiation of the tissue tumor.
- Intracaval radiation is often combined with distance radiation therapy.

Treatment of tumors-XIX

Treatment of tumors-XX

Interstitical radiation is carried out be introducing into tumoral tissue radioac-tive needles, hollow nylon tubes with isotopes or granules Au 198. In some cases radiation of tumor may be achieved by means of infiltration of it with colloid solutions containing isotopes or by means of their endolymphatic induce. In some tumors, as in cancer of thyroid gland, their features to accumulate selectively radioactive iodine combinations are used.

Treatment of tumors-XXI

- Depending on the purpose of radiation therapy /if it is used independently/ is divided into: radical, palliative and symptomatic.
- ***Radical*** radiation therapy makes provision for radiation of zone of the primary tumor and its regional metastases in medicinal doses.
- ***Palliative*** radiation therapy is aimed to the partial destruction of tumor and stabilization of the process. At that, focal doses are usually lower than in radical treatment.
- ***Symptomatic*** radiation therapy is used at the later stages of tumor process and is directed on the elimination of individual symptoms, dominating in clinical picture of the disease (pain, compression syndrome and so on). The effect achievable in the result of symptomatic radiation therapy has a temporary character.

Treatment of tumors-XXII

- **Radiation methods of treatment may be a part of combined or complex treatment of oncological patients**. Preoperative radiation therapy is indicated in the presence of tumors which are more often recur and spread metastases, as in melanoma, sarcoma of soft tissues, cancer of the upper jaw, cancer of rectum, cancer of the mammary gland, and others. At that, the principle task comes to the lowering of tumor cells ability for implantation in normal tissues and development of metastases or local recurrence. Postoperative radiation therapy is directed to the elimination of tumor cells in the operative zone projection (in the case of insufficient radical surgical operation).

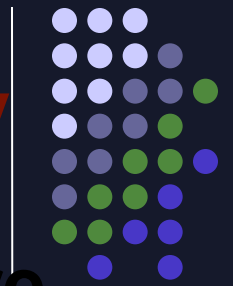
Treatment of tumors-XXIII

- **Medicinal treatment,or chemotherapy –** means the use of medicinal preparations, having a damage effect on the tumor tissue.
- In the most cases chemotherapy is one of the components of complex treatment and is used on a certain stage of the disease, supplying abilities of surgical and radiation therapy.
- However, in some oncological diseases (hemoblastomas) chemotherapy is used as a unique method of treatment.

Treatment of tumors-XXIV

- All preparations used for medicinal treatment of tumors are subdivided into two groups: hormonal preparations and proper antitumoral preparations.
- Hormones are applied for the treatment of tumors, keeping the ability of the initial tissues to respond to hormones, in norm regulating their growth (in so-called hormone-depended tumors): cancer of prostate, cancer of mammary gland, cancer of the uterus body, cancer of thyroid gland). Antiestogenes are relative to hormones, they block up the receptors of steroid hormones). Corticosteroids are used in the schemes of hemoblastoses treatment too.

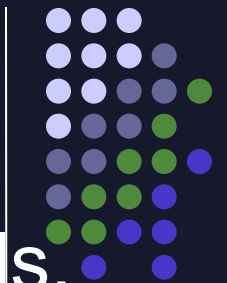
Treatment of tumors-XXV



- Proper chemotherapeutic preparations are subdivided into:
- 1) cytostatics:

  a) alkylating preparations; b) alkaloids;
- 2) antimetabolits;
- 3) antitumoral antibiotics;
- 4) platinum preparations;
- 5) immunomodulators.

Treatment of tumors-XXVI



- **Cytostatics** inhibit reproduction of tumor cells, oppressing their mitotic activity. At that alkylating preparations (cyclophosphan, thyo-taf, embyhin, myelosan) attack nucleophilic group and form covalent connections. *Alkaloids* (vincristin, vindlastin), connecting with microtubes, blockade metaphase of mitosis.
- **Antimetabolits** (Metotrexat, 5-ftoruracil, mercapto-purin) influence on S-phase of mitosis by means replacing normal metabolits and competition with normal metabolits in the tying with certain (catalytic and allosteric) centers of ferments and with cellular ferments.

Treatment of tumors-XXVII

- **Antitumoral antibiotics** (doxorubicin, bleomycin, rubromycin, mitomycin) suppress DNA and RNA synthesis, strengthen activity of cellular cycle regulators.
- **Platinum compounds** (cysplatin, oxaliplatin) interact with DNA, forming interchain ties; are connected with nuclear and cytoplasmic proteins.
- **Immunomodulators** (interleukin-2, interferon) at the expense of stimulation of immunity in some tumor locations (cancer of the kidney) contributes to the stabilization of oncological process even in going too far stages of the disease.

Treatment of tumors-XXVIII

- **Taking into account up-to-date abilities of chemotherapy all tumors may be conditionally subdivided into 4 groups**:
- 1. tumors, in which recovery with the help of chemotherapy is principally possible (chorionepithelioma of uterus, acute leucosis in children, lymphogranulomatosis, seminoma of testicle, Berkitt's lymphoma);
- 2. tumors, in which chemotherapy gives clinical efficiency (acute leucosis in adults, chronic leocoses, lymphosarcoma, myeloma disease, Yung's tumor, cancer of mammary gland, cancer of ovaries, Vilms' tumor, angiogenic sarcomas);

Treatment of tumors-XXIX

- 3. tumors with low sensitivity to the action of chemotherapy (cancers of GIT, melanoma, squamous cell cancer (carcinoma) of the head and neck, retinoblastoma, cancer of the urinary bladder, insuloma, leuomyosarcoma, sinovial sarcoma, osteogenic sarcoma);

- 4. tumors which are practically not sensitive to the up-to-date chemotherapeutic preparations (cancer of the cervix of uterus, fibrosarcoma).

PROGNOSIS

Prognosis is determined first of all by the location, stage & degree of tumor differenti-ation, as well as by the state of the initial immune patient's status. In the external tumor location & timely treatment the prognosis is quite favorable. Location of tumor in internal organs, as well as presence of metastases in regional lymph nodes (especially – of distant metastases in the internal organs) greatly worsen prognosis. In sharp suppression of initial immune status (anti-tumoral immunity) prognosis greatly worsens. In low-differentiated cancer prognosis of treatment is worse than in mature forms of new formations.