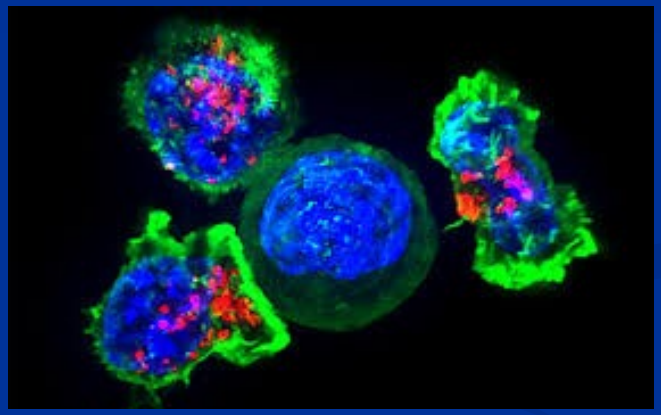
Oncology



Klinika úrazové chirurgie / Dept. of Traumatology
FN Brno-Bohunice

- medical discipline doing research on cancer and caring for oncologic patients, providing prevention, diagnostics, complex treatment and care.

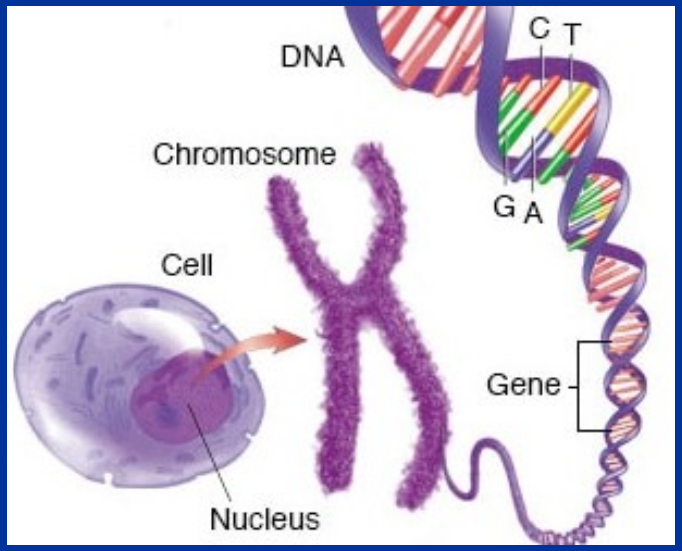
Population morbidity and mortality

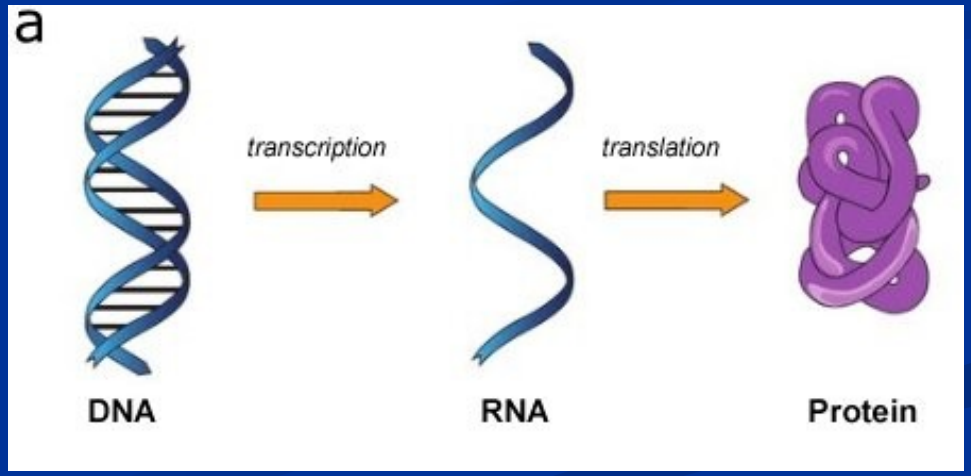
- Cardiovascular diseases 51 %
- Cancer disease 26 %
- Infectious diseases 6,8 %
- External causes (injuries, suicides, poisoning) 5,9 %
- Respiratory disorders 5,6 %
- Gastrointestinal disorders 4,5 %

- Cancer /tumour disease – genetic disorder, disease of DNA,
- Genetic changes can proceed to unregulated atypical cells
- Tumour transformation – can affect whatever somatic cell capable of cell division
- More 100 tumours
- Tumour / Neoplasia – abnormal tissue, mass of abnormal cells with abnormal growth and proliferation
- Cancer – system disease caused by uncontrolled growth and spread of abnormal cells

Cancerogenesis

- Process of formation of mutations that make changes of genetic information - Gene mutations
- Gene – section of DNA designated for proteins, inc. proteins having control over cell cycle
- 1 gene - 2 alleles





Important genes of DNA

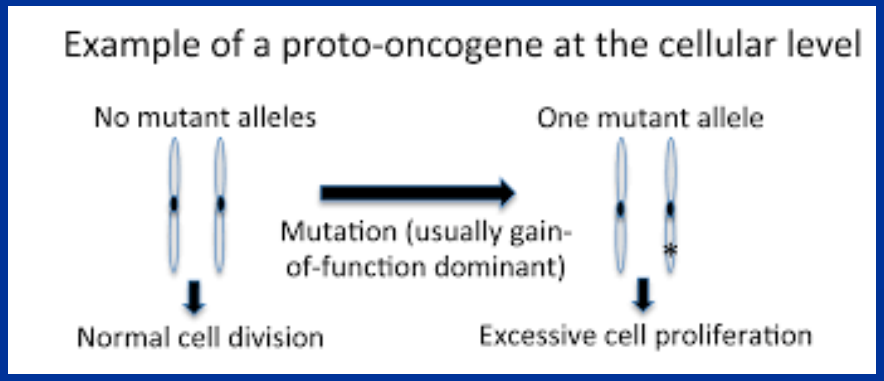
- Proto-oncogene
- Anti-oncogenes/ tumour suppressor genes

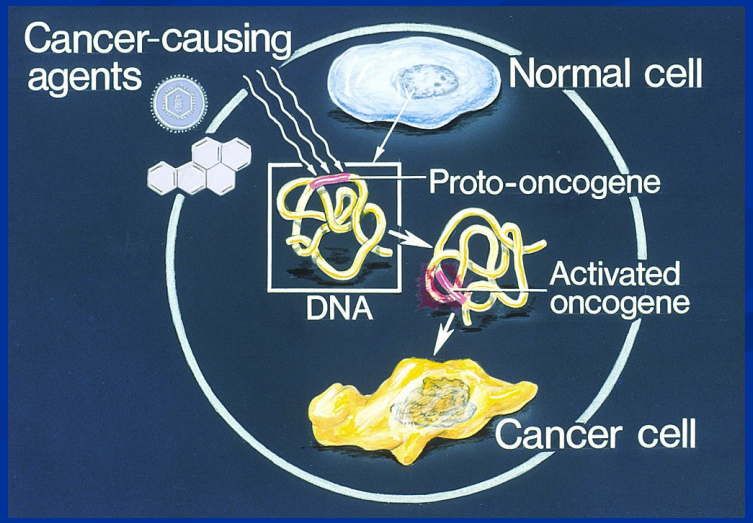
- malignant tumour disease requires several significant mutations (minimally 4-6)

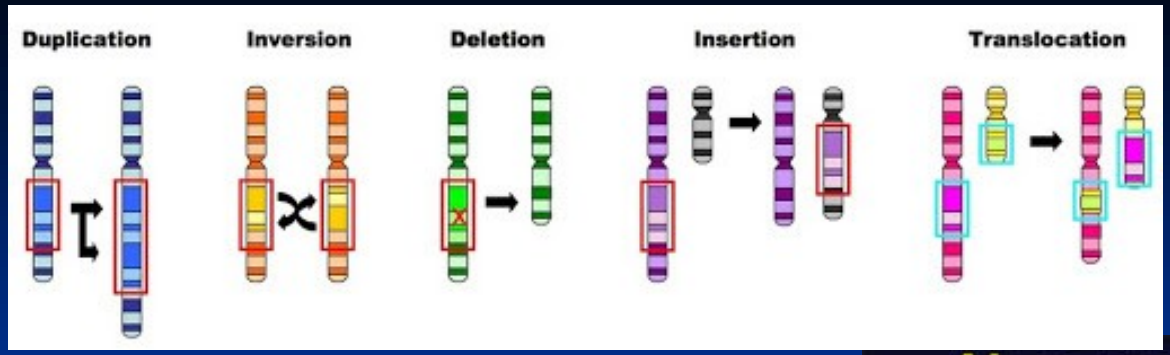
- Proto-oncogene – commonly presenting structural gene which product – protein take control of cell cycle and cell division
- (coding growth factor/receptor, transcription factors)

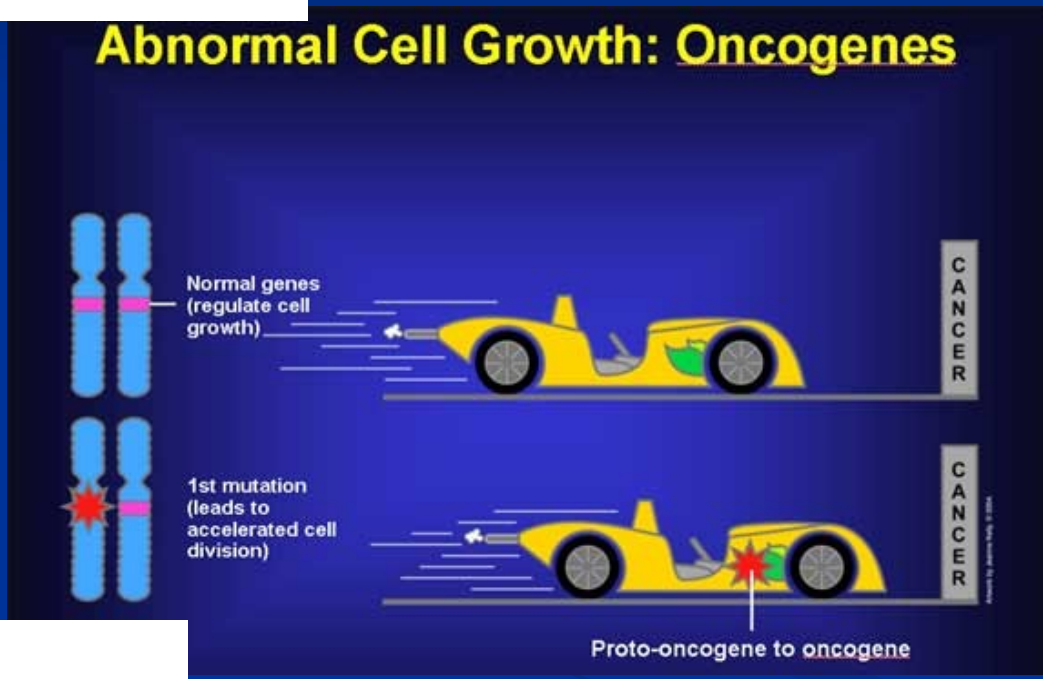
- Oncogene – mutated proto-oncogene – with increased activity presenting permanent mitotic activity, causing ig. overproduction of growth factors, growth factor receptors, ….
- Implementation of virus into oncogene

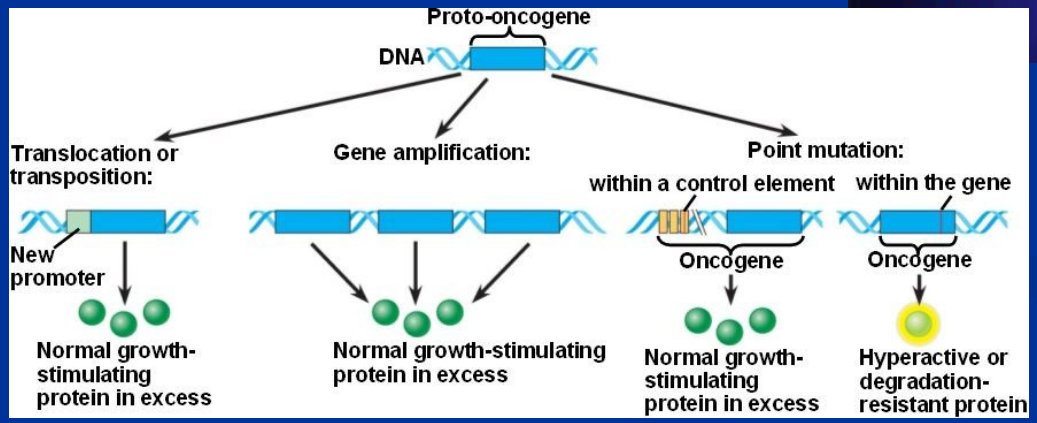
- Mutations are activating
- Dominant mutation – mutation of one allele suffice to bring on manifestation of mutation






Duplication
Inversion
Deletion
Insertion
Translocation

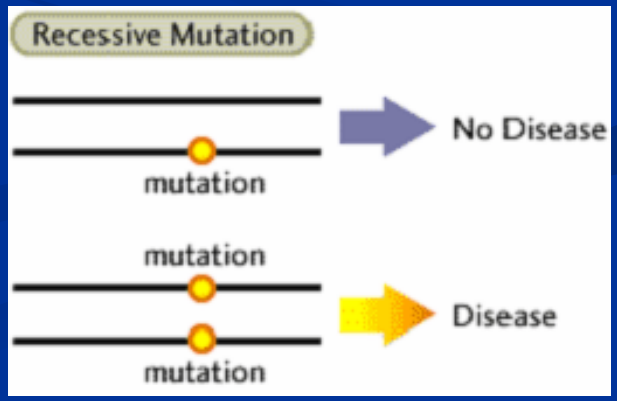

Abnormal Cell Growth: Oncogenes
Normal genes (regulate cell growth)
CANCER
1st mutation (leads to accelerated cell division)
CANCER
Proto-oncogene to oncogene

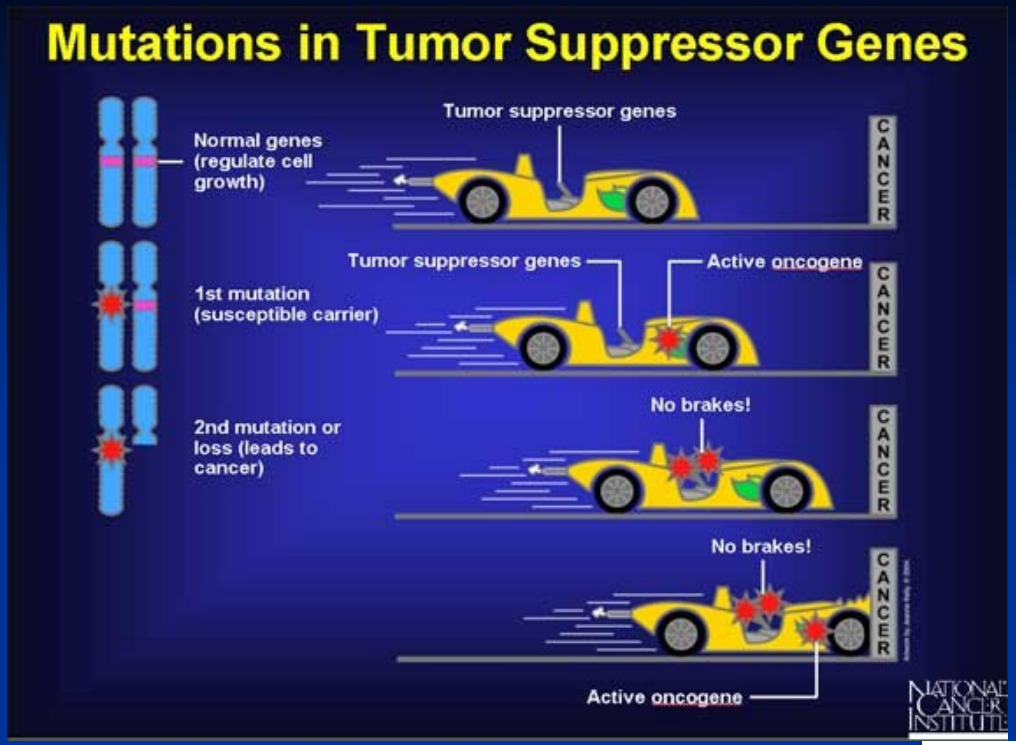

Proto-oncogene
DNA
Translocation or transposition:
Gene amplification:
Point mutation:
within a control element
within the gene
New promoter
Oncogene
Oncogene
Normal growth-stimulating protein in excess
Normal growth-stimulating protein in excess
Normal growth-stimulating protein in excess
Hyperactive or degradation-resistant protein

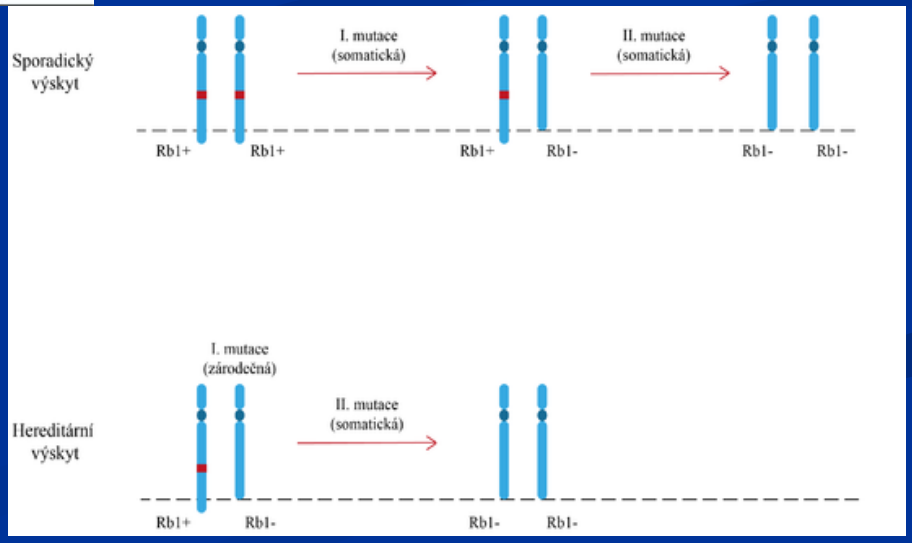
- Tumour suppressor genes – have negative control of cell cycle

- Obstruct cell division when presented DNA mistakes
- Fixing damaged DNA
- Loss of tumour suppressor genes - uncontrolled division of cells with damaged DNA

- Mutations are recessive - inactivating - manifestation of mutation needs damage of both two alleles



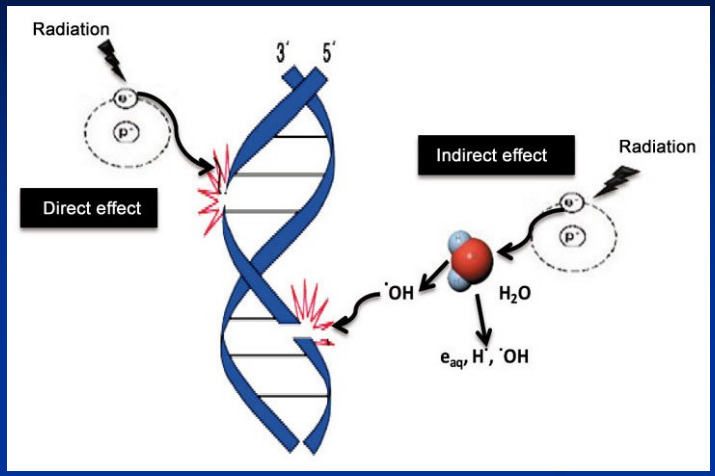

Mutations in Tumor Suppressor Genes
Normal genes (regulate cell growth)
Tumor suppressor genes
CANCER
1st mutation (susceptible carrier)
Tumor suppressor genes
Active oncogene
CANCER
2nd mutation or loss (leads to cancer)
No brakes!
CANCER
No brakes!
CANCER
Active oncogene
NATIONAL CANCER INSTITUTE


Sporadický výskyt
I. mutace (somatická)
II. mutace (somatická)
Rb1+
Rb1+
Rb1+
Rb1-
Rb1-
Rb1-
Hereditární výskyt
I. mutace (zárodečná)
II. mutace (somatická)
Rb1+
Rb1-
Rb1-
Rb1-

Cancerogenous factors - mutagens

Physical factors

- Gama, X-ray, neutron radiation
- UV radiation
- Thermal radiation



- Radiation – direct hit to DNA chain - chain breaks
  indirect effect – formation of ion´s, radicals
- Basis oxidation, breakage of phosphodiester binding

- Chronic mechanical irritation

Chemical factors

- Aromatic and polycyclic hydrocarbons
- Heavy metals
- Aromatic amines
- Nitrogenous substances
- Hormones

- Indirect effect – oxidative stress – ion´s, radicals
- Direct effect to DNA - in replication phase – incorporation of bases analogues
- out of replication – alkylation, desamination, hydroxylation of bases

- Mainly in places of direct contact of substances with mucosa

- Cigarette smoke – mouth, windpipes, lungs, kidneys , bladder
- nitrites, nitrates, fat - large intestine, kidneys, bladder

Biological factors

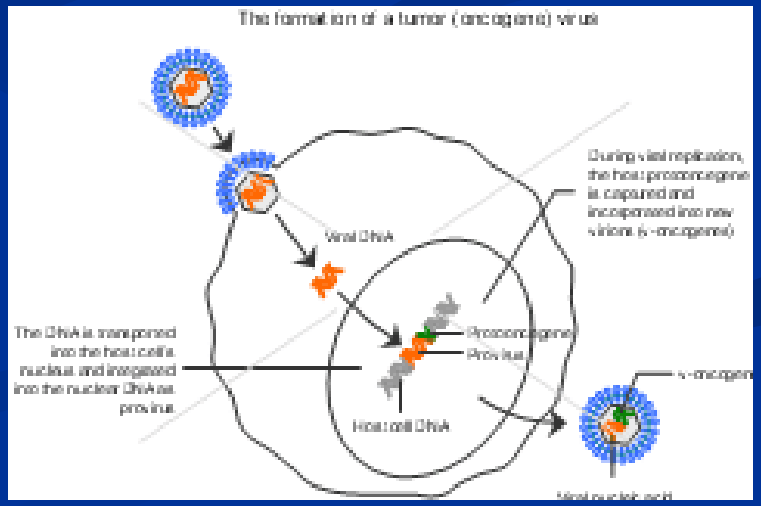
- Virus infections

  Hepatitis B, C virus – hepatocellular carcinoma

  Epstein Barr virus - Burkitt lymphoma

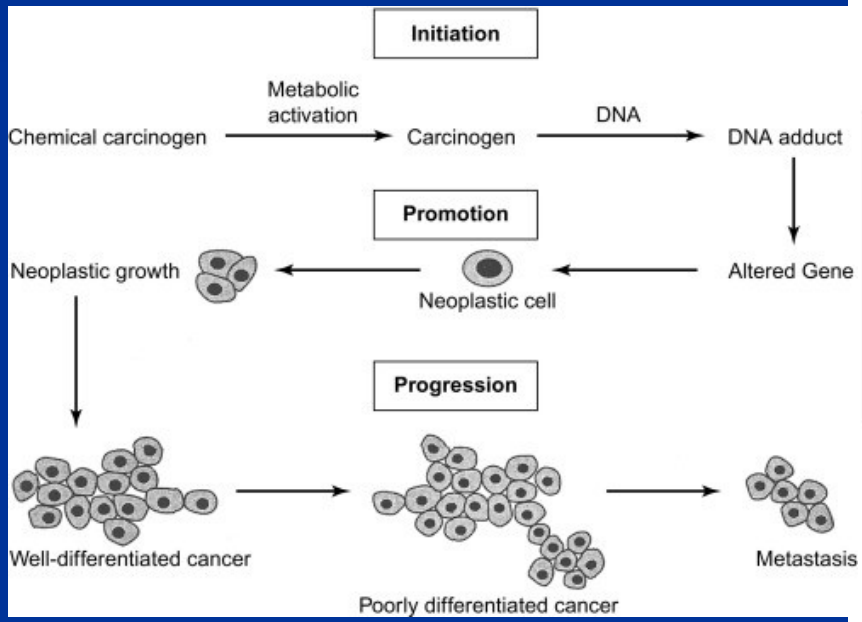
  HPV - cervix and rectal carcinoma
- Chronic infection
- Chronic inflammation

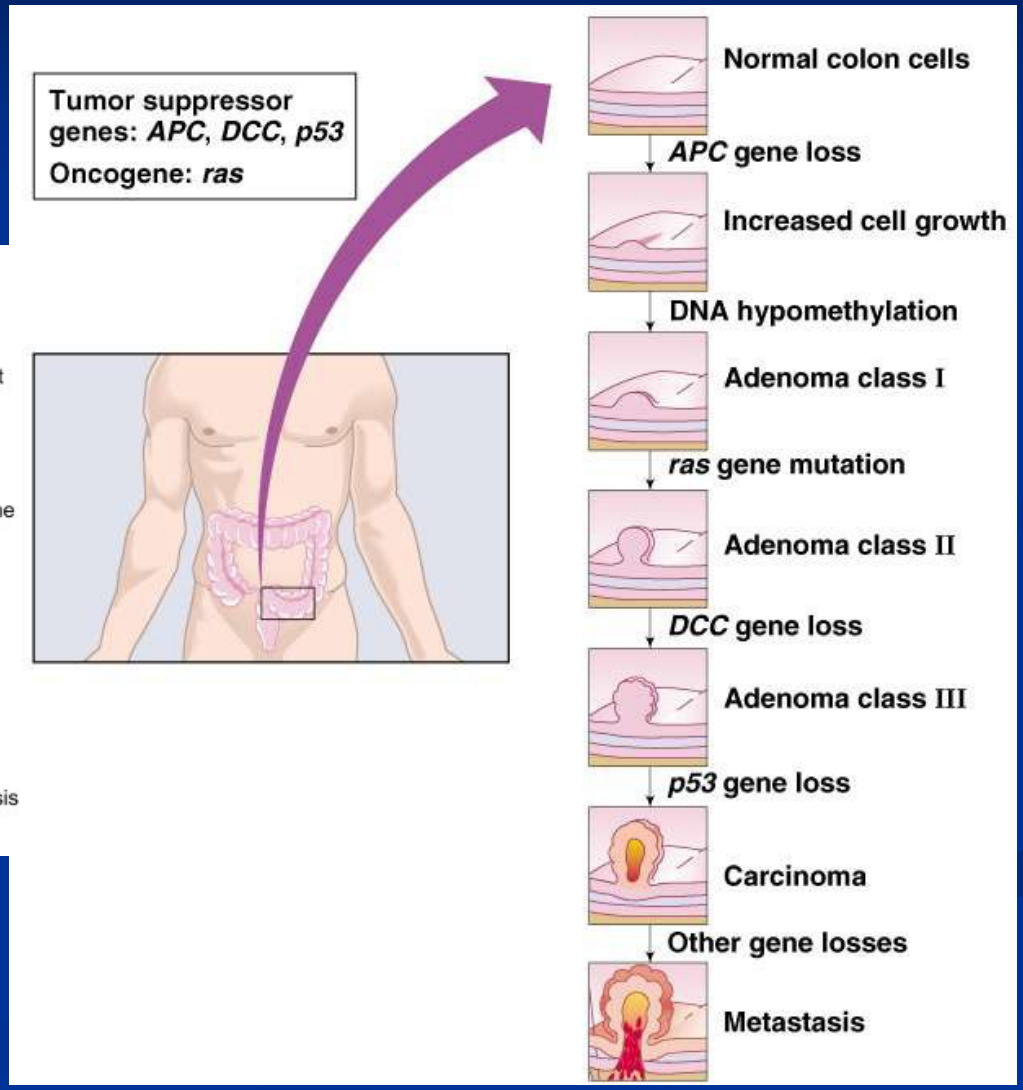
- Biological mutagens - less common



Oncogenesis / Cancerogenesis

- Multiple step process





- Tumorous tissue – have different qualities from healthy tissue
- Morphological difference - tissue and cellular abnormalities
- Functional difference – mainly nonfunctional, newly gained/lost function (hormone production)
- Biological difference - increased ability to proliferate (shorter cell cycles, increased number of replications)

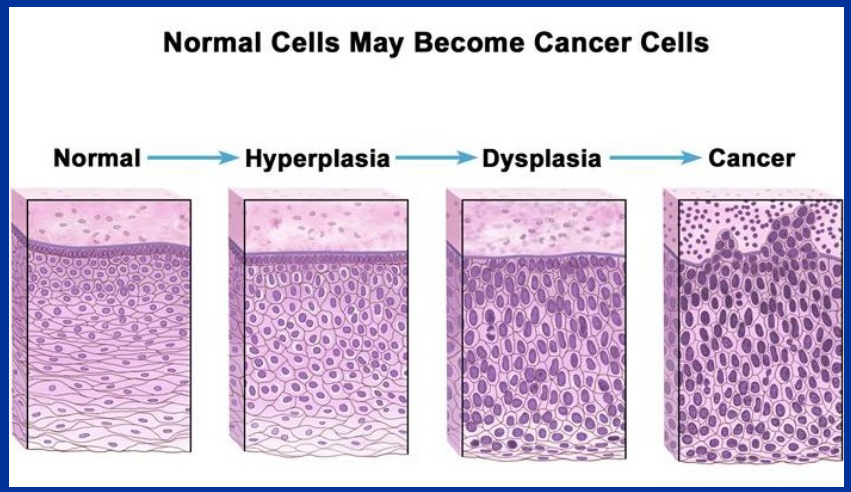
Tumour morphology

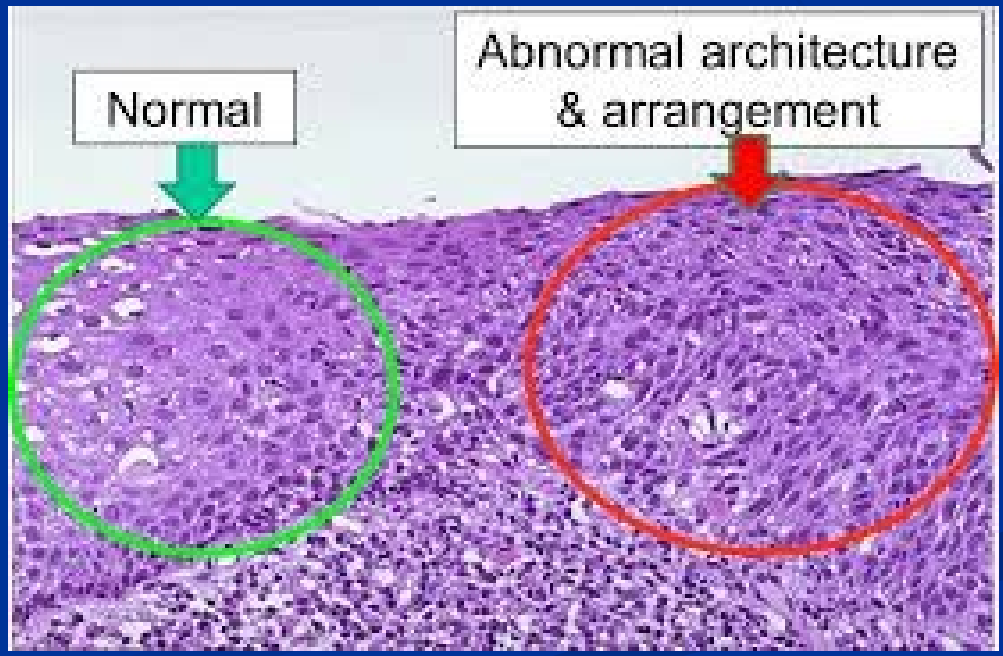
- Tumour differentiation – how much are tumour cells similar to normal specialized cells of tissue from which tumour originate

- Dedifferentiation – appearance of primitive nonspecific and non-specialized cells – means increasing aggressiveness

Tumour morphology

- Dysplasia – still non-tumorous increased cell proliferation, cells have loss of uniformity and architectonics, cells disarrangement, increased mitotic activity, loss of cell stratification – ig. cells with mitotic activity out of basal layer



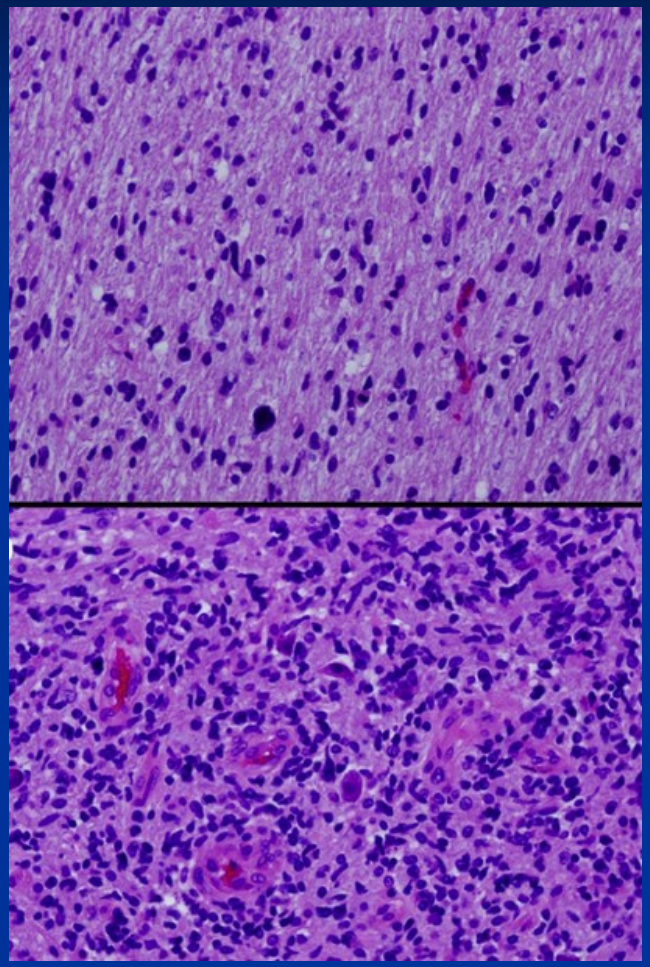


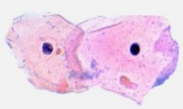
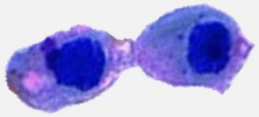
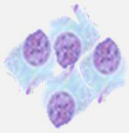
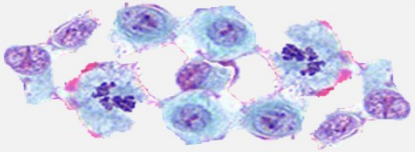
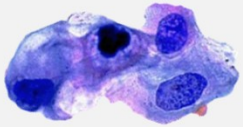
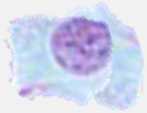
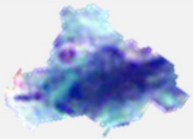
- Tumour abnormalities
- Morphological differences of tumorous tissue

- Loss of layered or glandular arrangement, loss of intercellular cohesion, disappearing of extracellular matrix at mesenchymal tumours

Cellular abnormalities

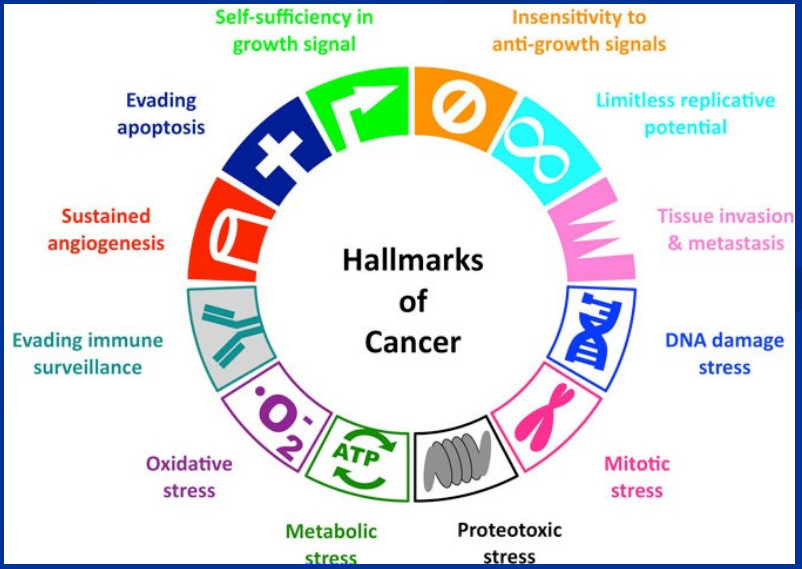
- Nucleus - enlargement, increased nuclear coloration, nuclear polymorphism, multiple nucleus
- Cytoplasmic changes - cellular size changes – mainly enlargement, shape differences, loss of specialized functions or apparatus, increased coloration



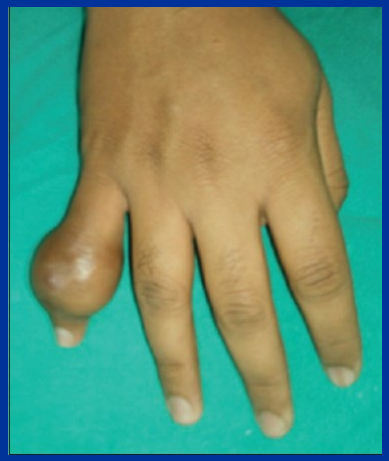
Normal	Cancer	
		Large, variably shaped nuclei
		Many dividing cells; Disorganized arrangement
		Variation in size and shape
		Loss of normal features

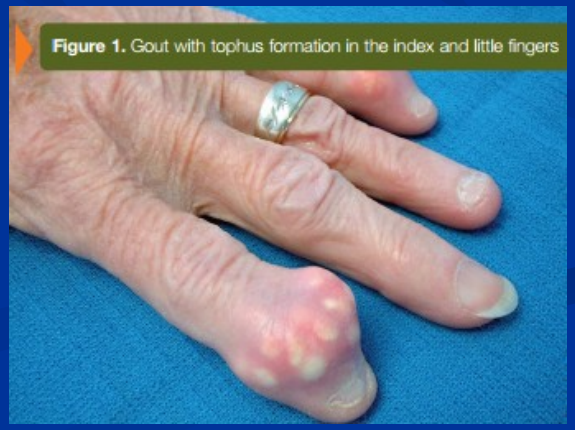
Tumour´s transformation

- Changed ability of functional differentiation
- Increased ability of proliferation
- Decrease of apoptosis
- Increased telomerase activity – prolongation of cell life even cell immortality
- Changed cell intercellular activity with surrounding cells and extracellular matrix - loss of cohesion with other cells, loss of adhesion to extracellular matrix, loss of contact inhibition - tumour invasiveness



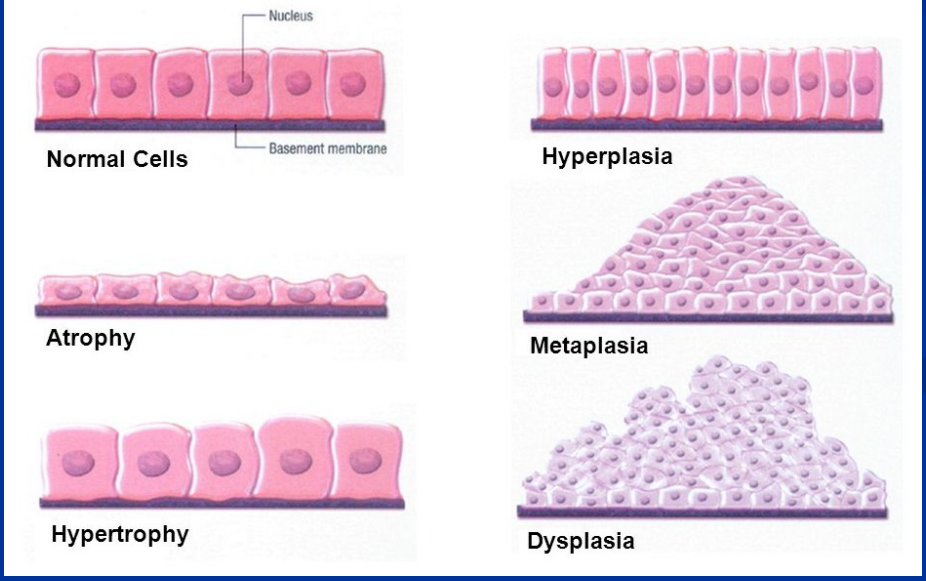
- Tumour (true) x Pseudo tumour (false)
- Pseudo tumours represents lump / bulging of tissue – origin and microscopic view is different from tumours
- Cysts, pseudo cysts, inflammatory pseudo-tumours, piling up of anorganic substances - salts
- Hypertrophy, hyperplasia, hyperregneration





- Hypertrophy – increase in volume of cells (mainly microfibrils) - muscle training, myocardial muscle due to high blood pressure

- Hyperplasia – increase in number as reaction to stimulation of tissue region - chronic mechanical / inflammatory irritation, subside when stimulation disappear
- Due to hormonal stimulation – benign prostatic hyperplasia, thyroid gland



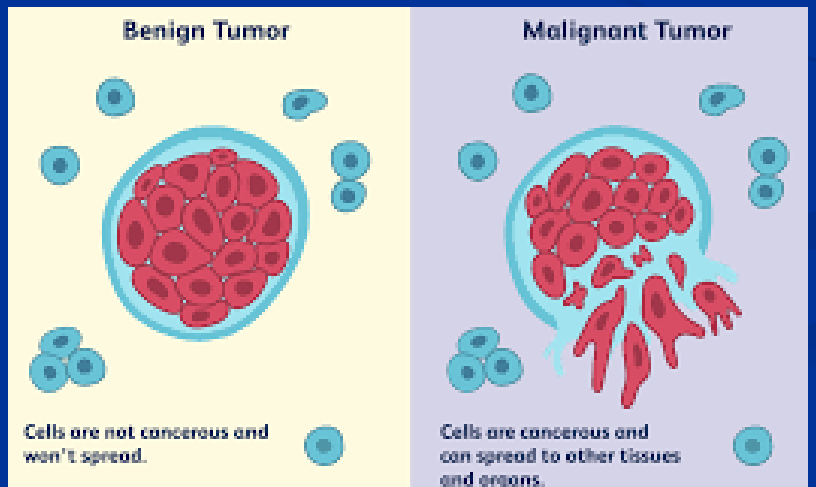
Biological character of tumours

- Determined by genetic (enzymatic) equipment how acts in host organism
- Benign tumours (relative harmless) - slow in growth, clearly bordered – clearly visible boundary between normal and tumorous cells
- Benign tumour cells are similar to normal differentiated cells, low in number of nuclear atypicalities,
- Common fibrous sheath

- don´t have metastasis, expansive growth – enlarging compact mass having local pressure effect on surrounding tissues,
- The mass in moveable against the bottom

- Malignant tumours (harmful) – have rapid growth, don´t have fibrous sheath, poorly unclear boundaries, don´t move against the bottom,
- The cells are substantially immature, irregular in shape and undifferentiated, have a lot of nuclear atypicalities
- Invasive growth – spread to surrounding tissues due to release of enzymes decomposing collagen and proteoglycans

- Produce distant metastasis and have systemic effect



Site of origin

- Mesenchymal
- Epithelial
- Neuroectodermal
- germinal

Histogenetic origin provides name of tumour

- Benign - suffix **- oma** / ademoma, lipoma, fibroma, osteoma /
- Malignant - adjectove - **sarcoma, carcinoma, blastoma** / adenocarcinom, neuroblastoma, fibrosarcoma/

Tumour spreading

- Continuous spreading - tumour mass expand superficially along anatomically defined structures – fascias, perineural / intraneural spreading, along vessels and grow through surrounding tissue

- Distant spreading – metastasis formation – release of tumorous cells from primary focus into distant perceptive tissues

- Haematogenous – tumour grow into the vessels and spreading through venous blood – mainly liver, lungs, brain, kidney, suprarenal gland bones
- Lymphogenous – grow into lymphatic vessels and into lymph nodes and later in to the blood

- Implantation spreading – in cavities (abdominal, thoracic, intestine)
- solitary metastasis – only 1 metastasis in body
- Generalize tumour spreading – primary tumour focus and > 3 metastasis

Complications of tumours

Benign

- Local
- Compression of surrounding structures – compression of ureter, intestine, nerves
- Obstruction of hollow organ – ileus, cyst, jaundice, hydrocephalus
- Necrosis – secondary infection

- General - production endocrine active hormones

Malignant tumour complications

- Local
- Compression of surrounding structures
- Destruction of normal invaded tissue – pathological fractures, reduced haematopoiesis
- Surface ulceration – bleeding (occult blood loss)
- Eroded blood vessels – massive bleeding
- Perforation of hollow organs
- fistula formation
- Necrosis – secondary infection

- General – hormonal activity, cytokine activity

Classification of tumour disease

- Typing - determine histological origin of tumour tissue

- Grading - assess grade of differentiation of tumour cells grade I – IV

- G1 – high grade of differentiation, low malignancy
- G2 – moderate grade of differentiation, moderate malignancy
- G3 – low grade of differentiation, high malignancy
- G4 – undifferentiated , very high malignancy

- Staging – define the extend of general body´s affection – TNM classification

Precancerous / premalignant condition

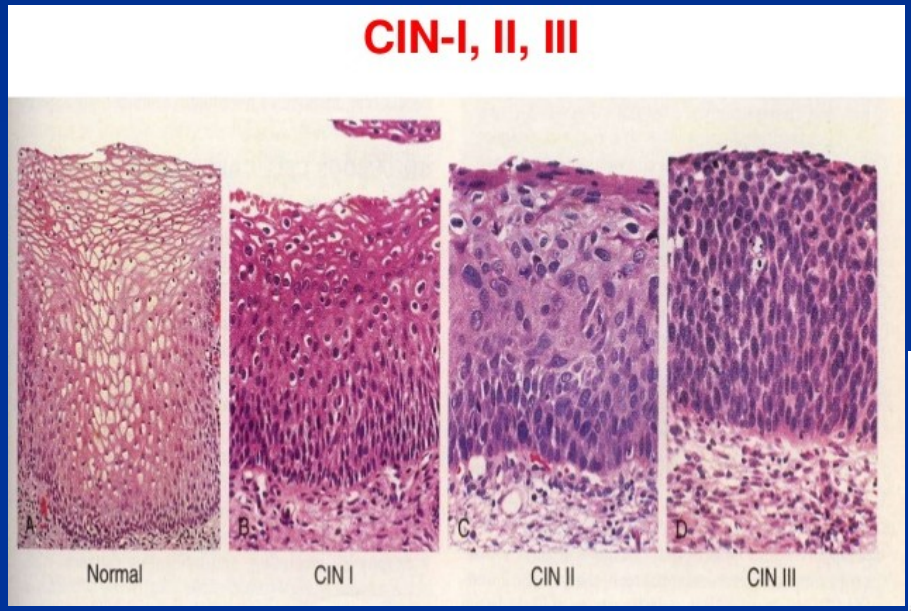
- Dysplasia - morphological abnormal cells associated with increased risk of cancer disease

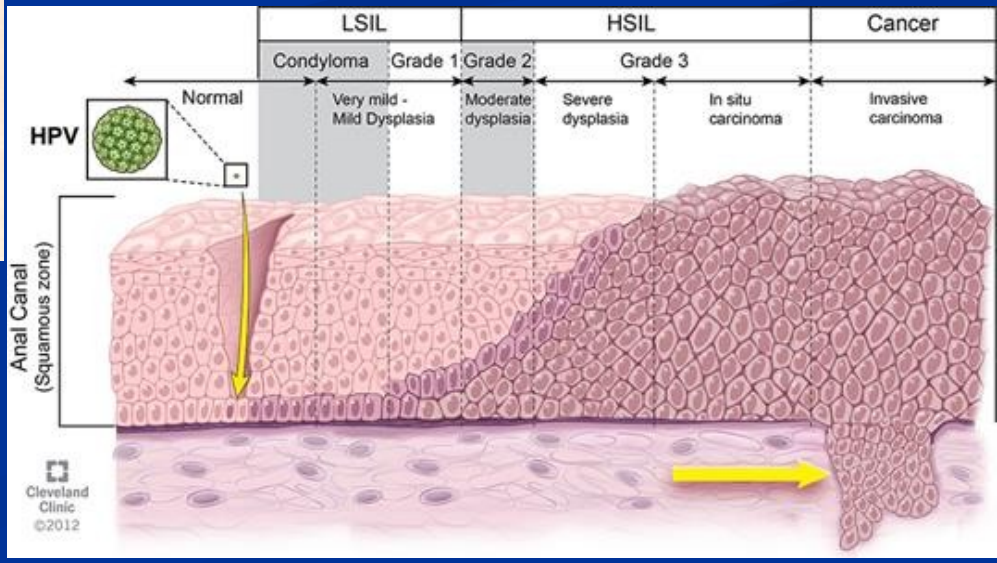
- Hyperplasia – of hormonally dependent tissue – endometrium, prostate
- Dysplasia
- Metaplasia - transformation of one type of epithelial cell into different epithelial cell

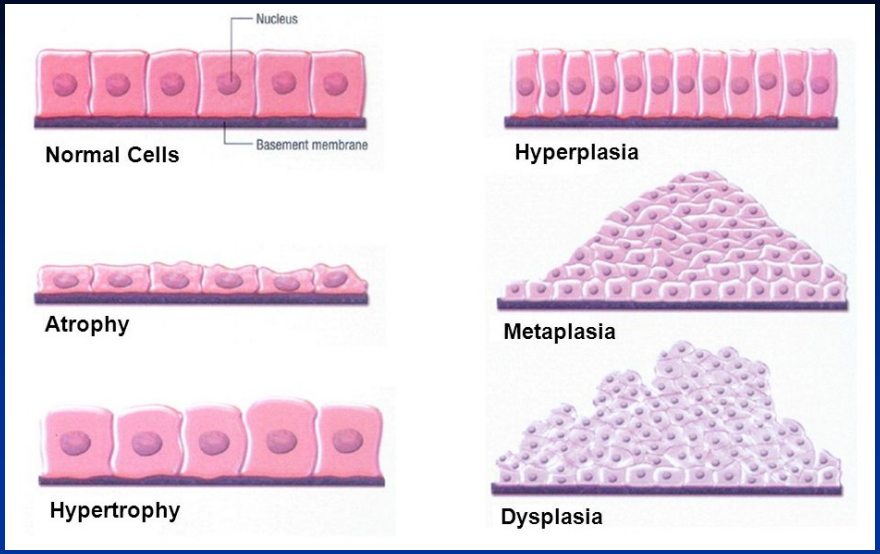
  I.g. – Barrett oesophagus - commonly lined oesophagus with squamous cells due to chronic irritation of gastric reflux in lower part, the mucosa transforms into columnar intestinal-like cells

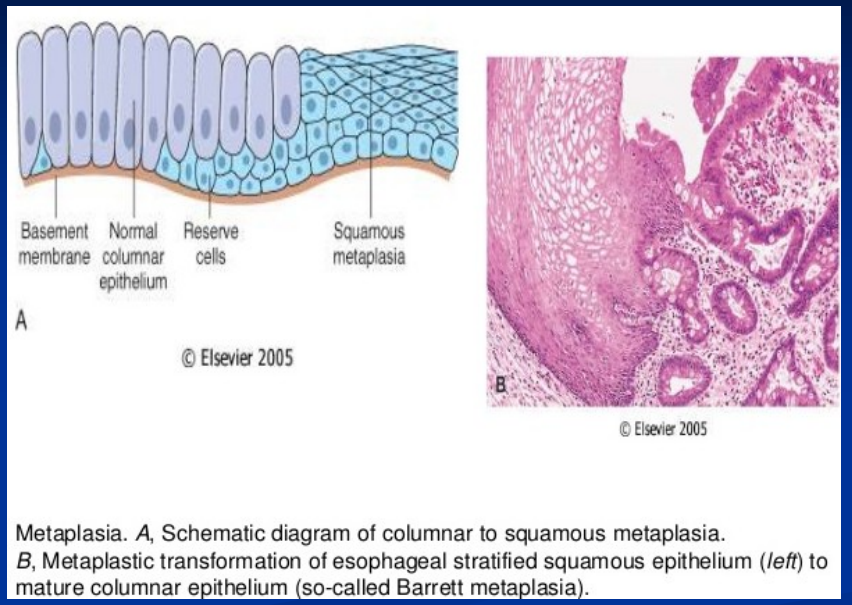
  Bronchial metaplasia due to smoking – ciliated columnar cells transforms into squamous cells

- Level of dysplastic changes - grades I – III.
- Low grade (I) x high grade (II-III)

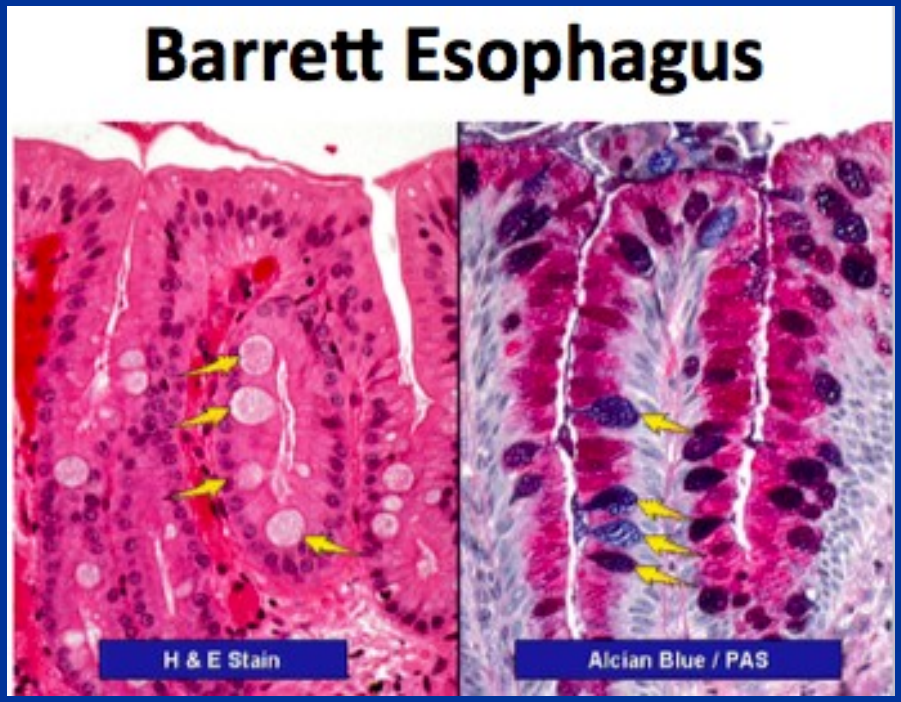








Metaplasia. *A*, Schematic diagram of columnar to squamous metaplasia. *B*, Metaplastic transformation of esophageal stratified squamous epithelium (*left*) to mature columnar epithelium (so-called Barrett metaplasia).

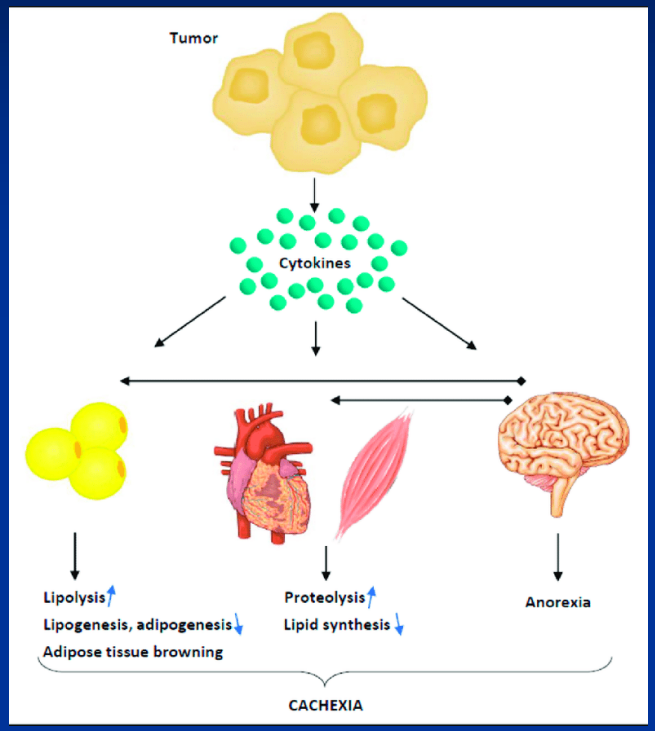


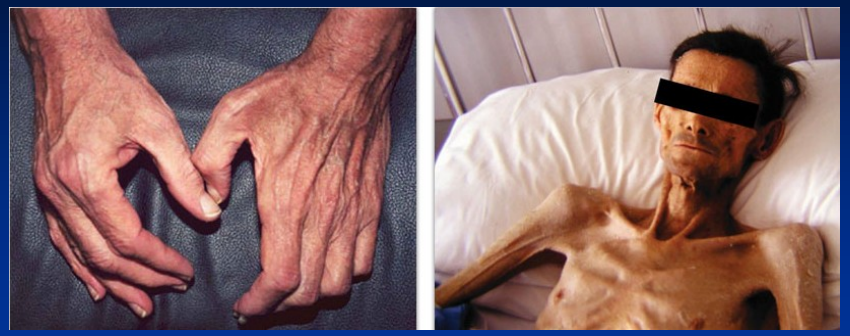
Cancer effects

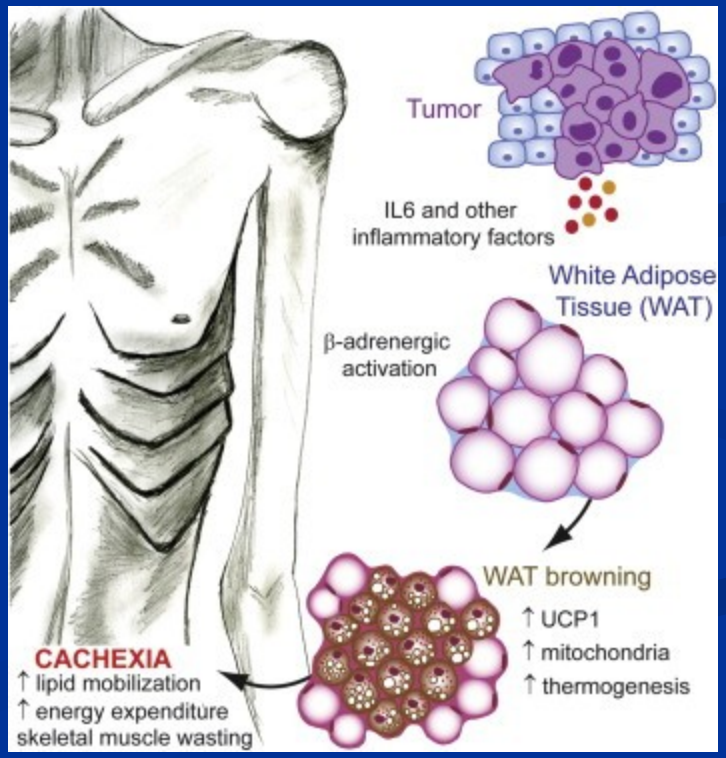
- Patient are put in danger of fatality by dissemination, not by the primary tumour

- Destruction of tissue and organ, loss of function
- Obstruction of hollow organs – stop of passage
- Paraneoplastic syndrome – abnormal hormone /cytokines production – paraneoplastic syndrome – Cushing sy, Hypercalcemia,
- Cancer cachexia – rapid loss of fat, muscles, fatigue
- Immunodeficiency
- Hypercoagulation

- Cancer cachexia





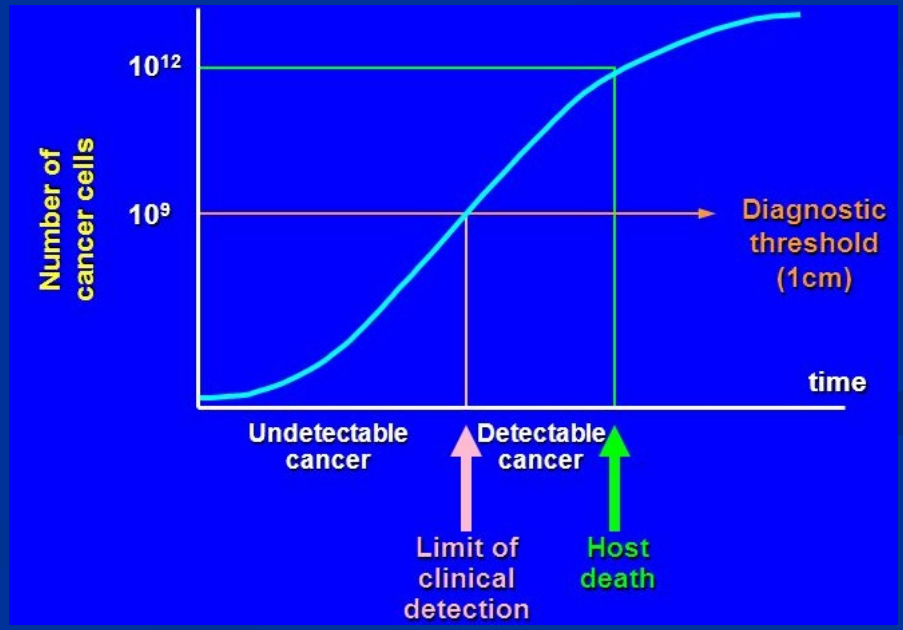


Development of tumour disease

- Precancerosis - long-lasting process of cancer formation of pathologically changed tissue

- Preclinical stadium - there is evidence of malignant transformation of cells, small in size, no difficulties for host, long-lasting process, difficult to find

- Clinical manifestation – progressively faster growth, emerging typical signs and symptoms, usually months.



Diagnostic process

- Early diagnosis of malignant tumours has the most effective results of treatment outcome with low recurrence rate

- Majority of patients come with typical signs of locally advanced disease

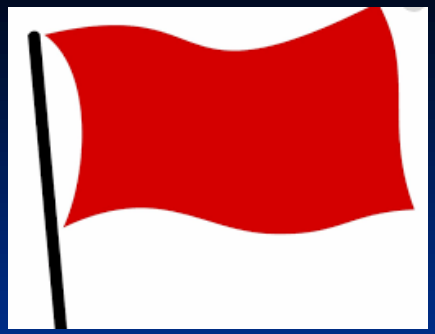
General signs

- Weight loss
- Fever
- Loss of apatite
- Fatigue
- Paraneoplastic syndrome

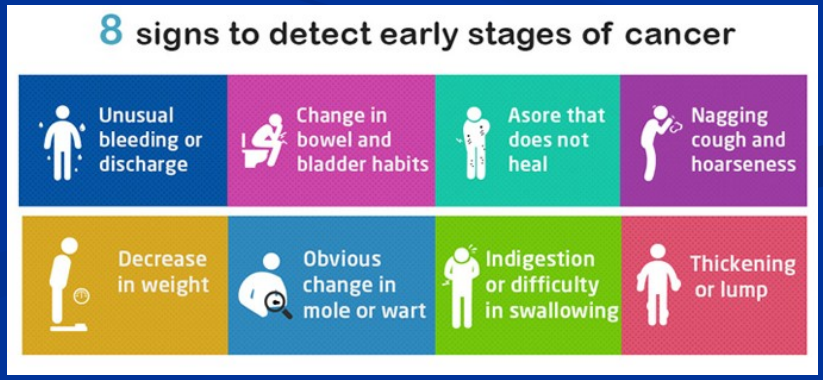
Local signs – related to organ affection

- Lump of tumour mass in soft tissues
- Hollow organ obstruction/ perforation
- Organ function disorder
- Organ/ structure compression
- Bleeding
- pain

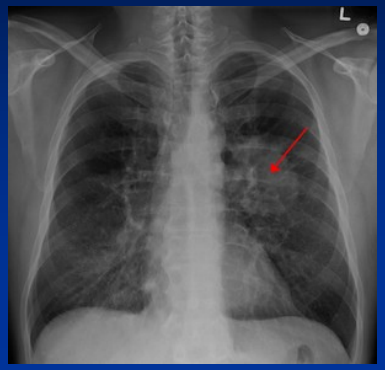
WHO warning signs

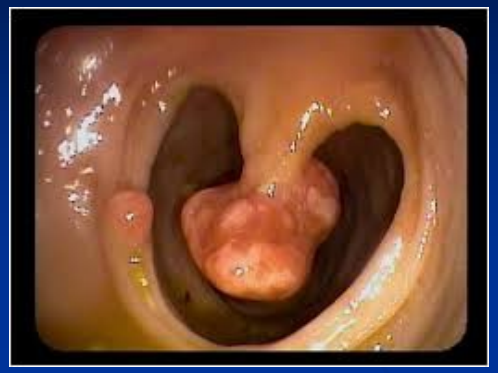


- Change of stereotype of bowl movement /urination
- Unusual bleeding / discharge
- No healing wound
- Lump in breast / soft tissues
- Loss of appetite, loss of weight, dysfagia
- Long lasting cough and hoarseness
- Change in birthmark / nevus

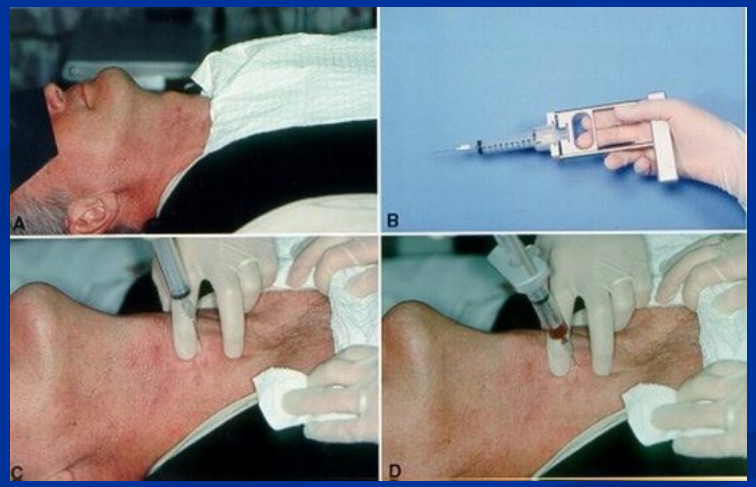


- Clinical examination – visual inspection, palpation, auscultation
- „symptom“ examination

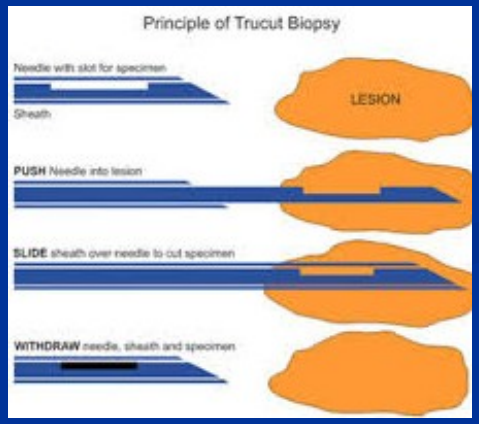




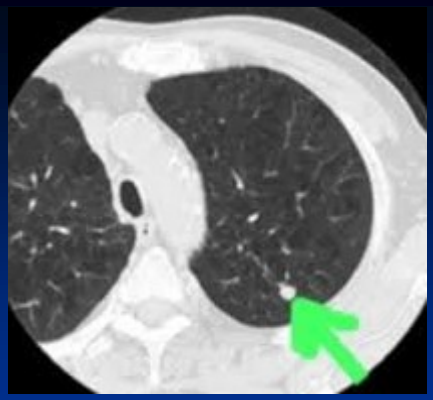
- Obtaining tissue biopsy – biopsy, FNAB, true-cut, cytology

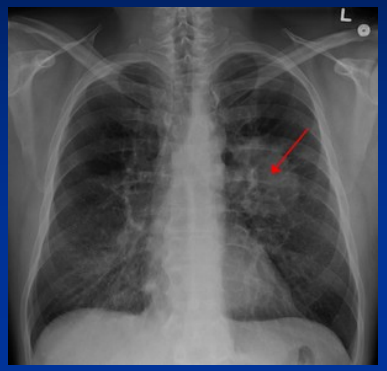


- Histopatological examination
- - Benign/malignant
- - Type
- - Grade

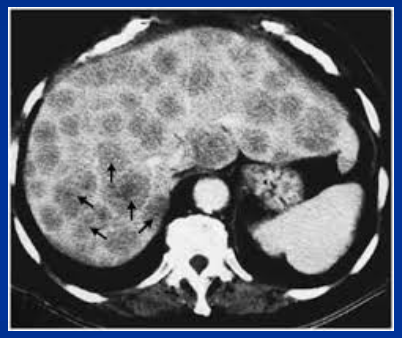


- Staging – assessment of extend of cancer disease

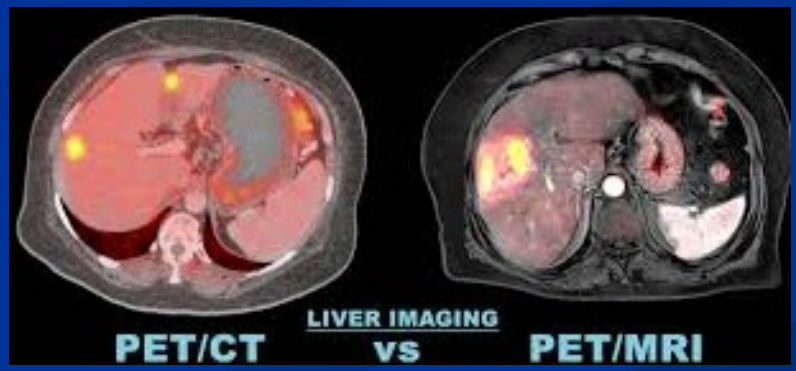




- Local extend
- Systemic extend



- Chest X-ray, abdominal sono
- Chest, Abdominal CT + contrast, MRI
- Bone scan, PET- CT / PET MRI



- TNM classifying

- Assessment of patient´s general status, organ functions, comorbidities

Oncomarkers

- Chemical substances released from tumour / host tissues as response to tumours

- In normal conditions are not presented or in minimal concentrations, benign condition
- low sensitivity and specificity
- Screening and diagnostics : PSA, AFP

- Monitoring of treatment response

- CEA, CA19-9, CA125, PSA,

- **TNM staging system** – internationally used for almost all tumours. Assess anatomic extend - size of tumour, number of lymph nodes, presence of metastases

CANCER CLASSIFICATION

CANCER CLASSIFICATION BY GRADE

Grade 0 – Normal tissue
Grade 1 – Well differentiated cells with slight abnormality
Grade 2 – Moderately differentiated cells that have more abnormalities
Grade 3 – Poorly differentiated cells that are very abnormal
Grade 4 – Very undifferentiated and immature cells, meaning there is no resemblance to the tissue of origin

CANCER CLASSIFICATION BY GRADE

T – **Tumor Size**

T0 no evidence of tumor
T1 increasing tumor to size and
T4 involvement
Tis Carcinoma in situ (or abnormal cells that remain in the place where they first formed

N – **Node Involvement**

N0 no nodal involvement
N1 increasing degrees to of lymph node
N4 involvement
Nx node involvement cannot be assessed

M – **Distant Metastasis**

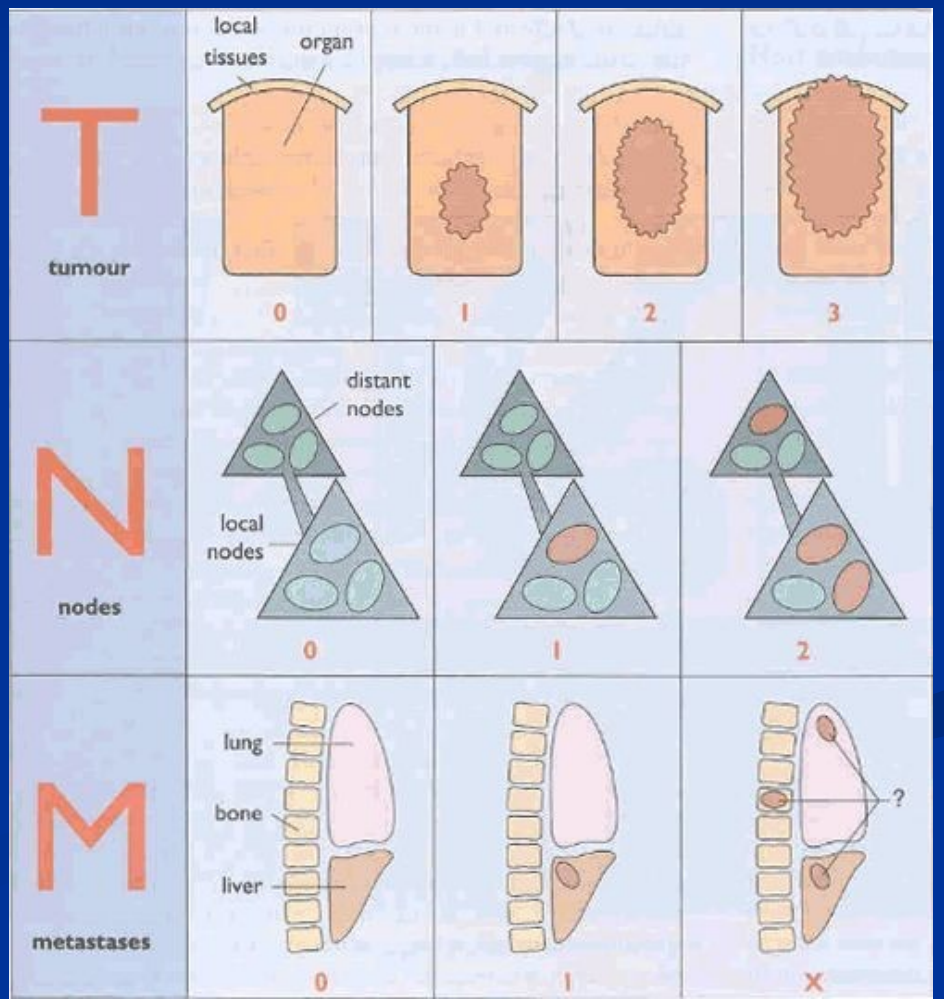
M0 no evidence of distant metastasis
M1 evidence of metastatic involvement

SIMPLE STAGE CLASSIFICATION

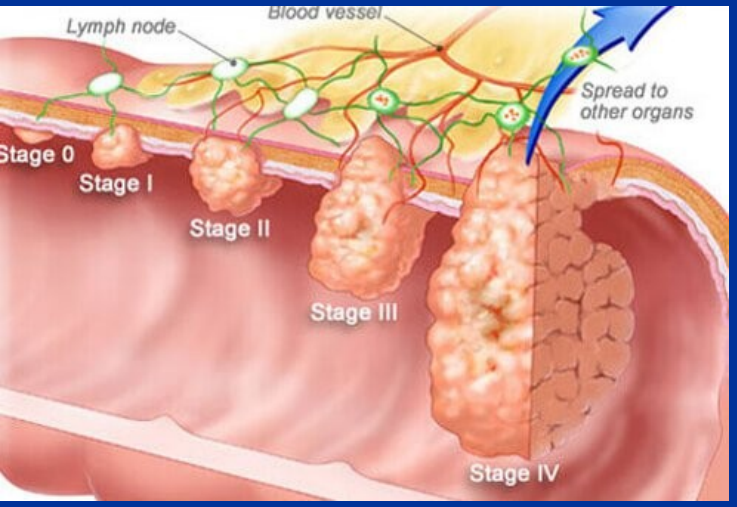
0 – Abnormal cells Present but haven't spread

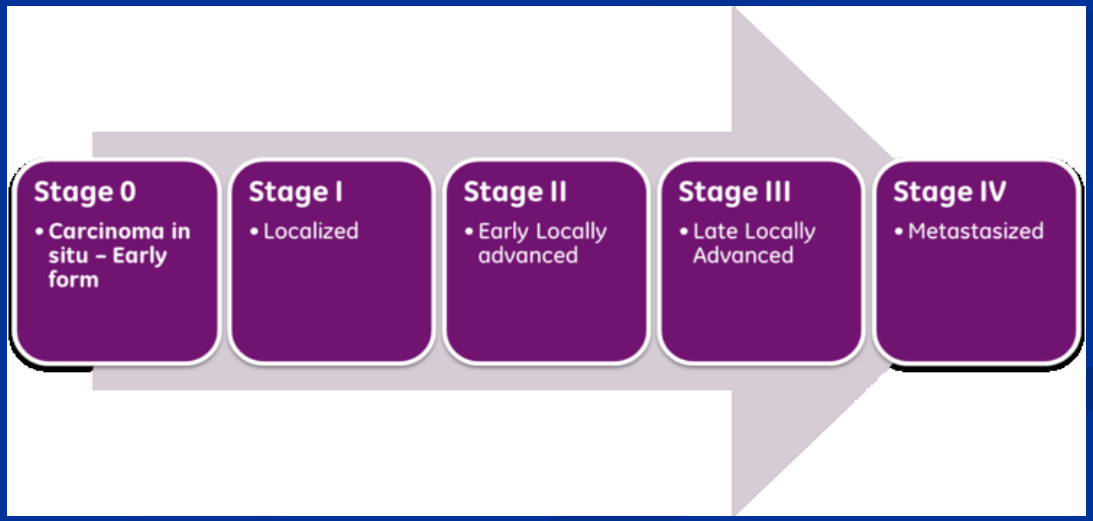
1 2 3 – The higher the number, the more it's spread – Cancer is present

4 – Cancer has spread to Distant parts of the body



- cTNM - clinical - before therapy – clinical examination, imagining examinations, biopsy.
- pTNM – postoperative/pathological/ - after assessment of resected organ and surrounding tissue
- Stage of disease





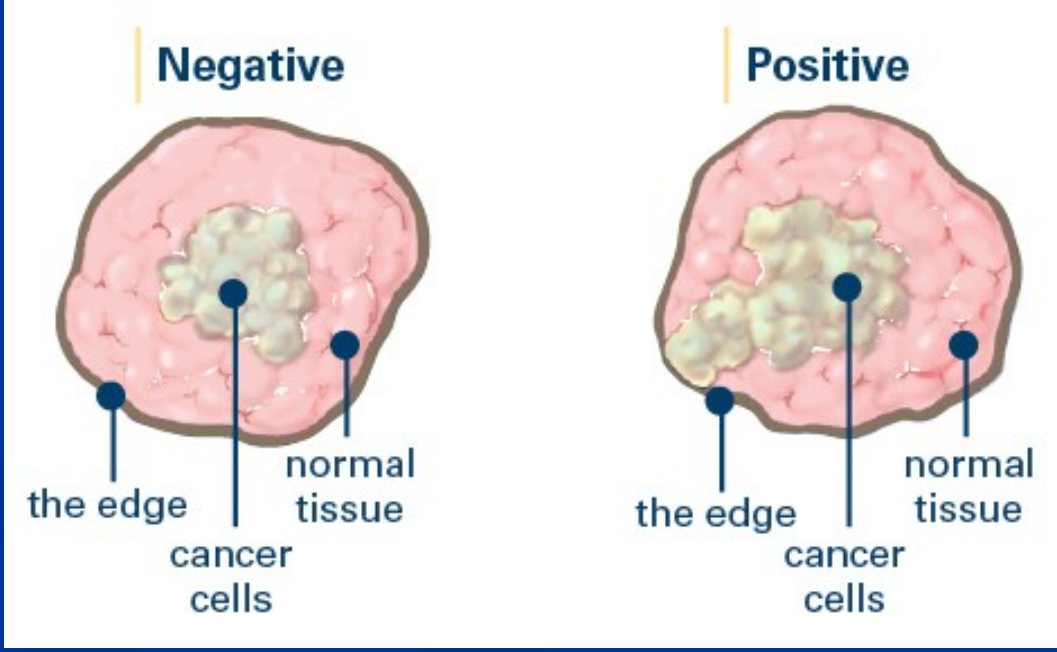
- R –classification

  presentation of tumour at resection margin

  R0 – no tumour

  R1 – microscopic rest

  R2 - macroscopic rest



Performance status

- assessment of cancer patient s general well-being and physical activities of daily living – estimation of therapeutic options – organism functional reserves to withstand aggressive oncologic treatment

- PS 0 – normal activity
- PS 3 – more than 50% daytime in bed
- PS 5 – completely bedridden, no selfcare

- Karnofsky index

Performance status

Karnofsky Scale		Zubrod Scale	
Normal, no evidence of disease Able to perform normal activity with only minor symptoms	100 90	Normal activity	0
Normal activity with effort, some symptoms Able to care for self but unable to do normal activities	80 70	Symptomatic and ambulatory Cares for self	1
Requires occasional assistance, cares for most needs Requires considerable assistance	60 50	Ambulatory >50% of time Occasional assistance	2
Disabled, requires special assistance Severely disabled	40 30	Ambulatory ≤50% of the time Nursing care needed	3
Very sick, requires active supportive treatment Moribund	20 10	Bedridden	4

- Mmultidisciplinary oncologic board

- Specialists of different clinical speciality - radiology, clinical oncology, surgeons, pathologists, radiation therapist

- presented case report, time axes, symptoms, comorbidities, performance status. There is considered stage of cancer disease - anatomical extend of disease and histological type and aggressivity of tumour with regard to therapeutic modalities
- There is define therapeutic plan with agreement of majority of specialists

Therapeutic modalities

Locoregionale

- Oncologic surgery
- Radiation oncology

Systemic

- Chemotherapy
- Hormonal therapy
- Targeted „biological“ treatment
- Immune therapy

Goals of therapy

- Curative – „healing“ from cancer
- Extending life expectancy
- Extending time without severe difficulties
- Symptoms relief

- Curative th – radical surgical, RT, CHT treatment – removing all affected cancerous tissue

- Palliative th – active treatment being aimed at extending life expectancy /CHT, RT/, slow down spreading

- Palliative th – active treatment being aimed at relief of symptoms /CHT, RT, surgery/, improve quality of life

- Palliative – symptomatic and supportive therapy
  no influence on progressive cancer disease , relief difficulties

- Increasement of treatment effectiveness specific combination of treatment modalities

- Neoadjuvant th – initial CHT/RT to reduce tumour mass and tumour extend before planned surgical treatment, RT.

- Adjuvant th (CHT)– after surgical treatment (RT) to eliminate residual micrometastasis (positive resection margins, positive lymph nodes dissection)

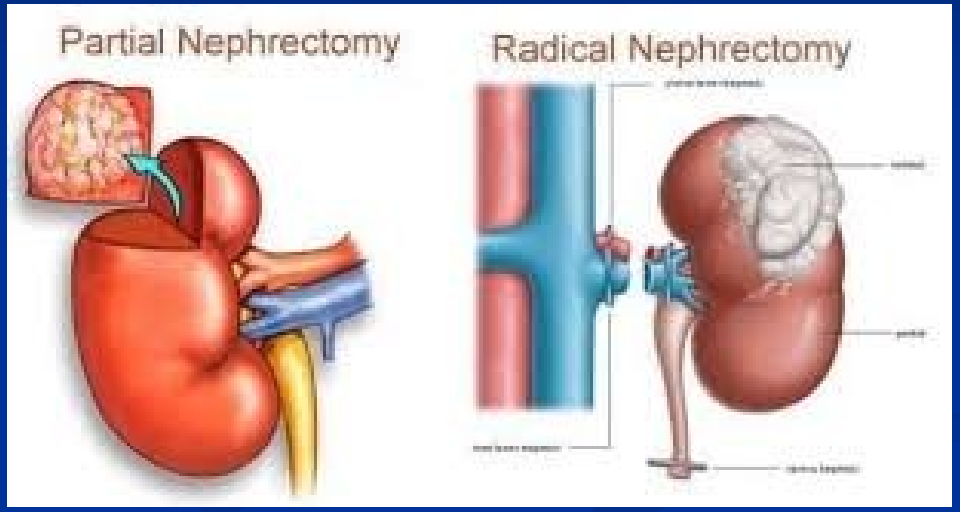
Oncologic surgery

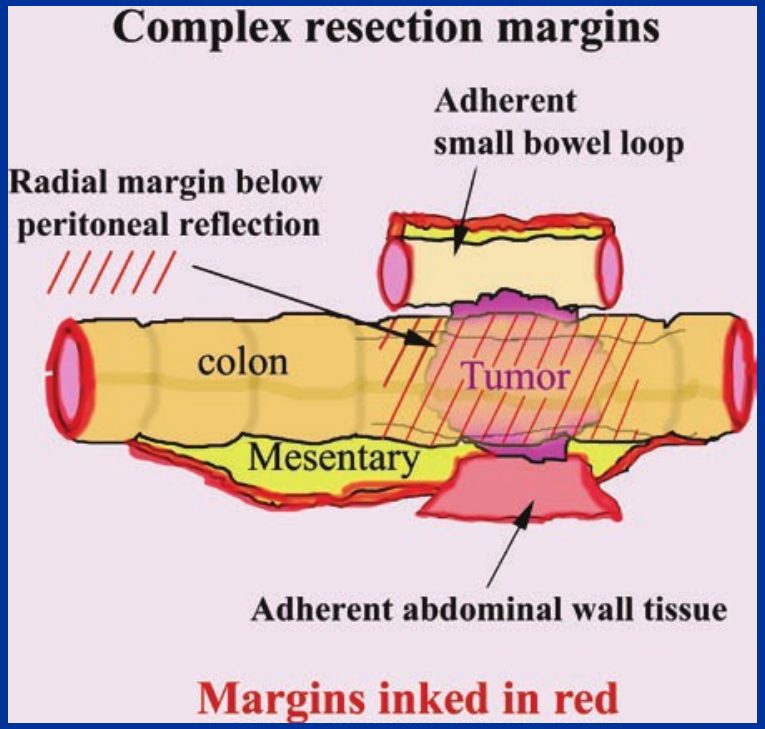
- Most important curative modality of solid tumours – removing tumour mass
- Curative effectiveness at localized disease

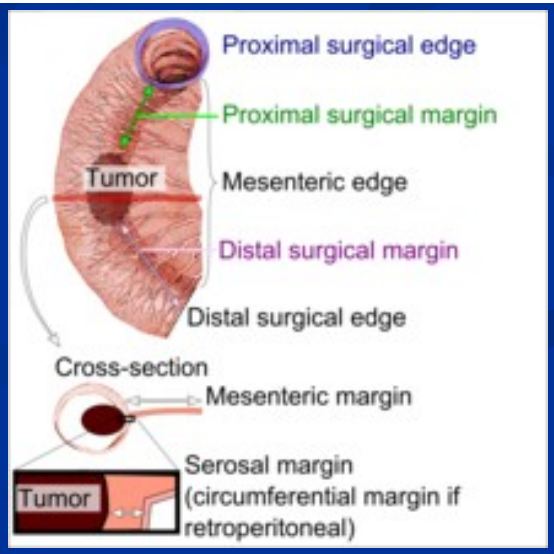
- resection of primary tumour
- resection of affected - draining regional lymph nodes
- metastasis resection

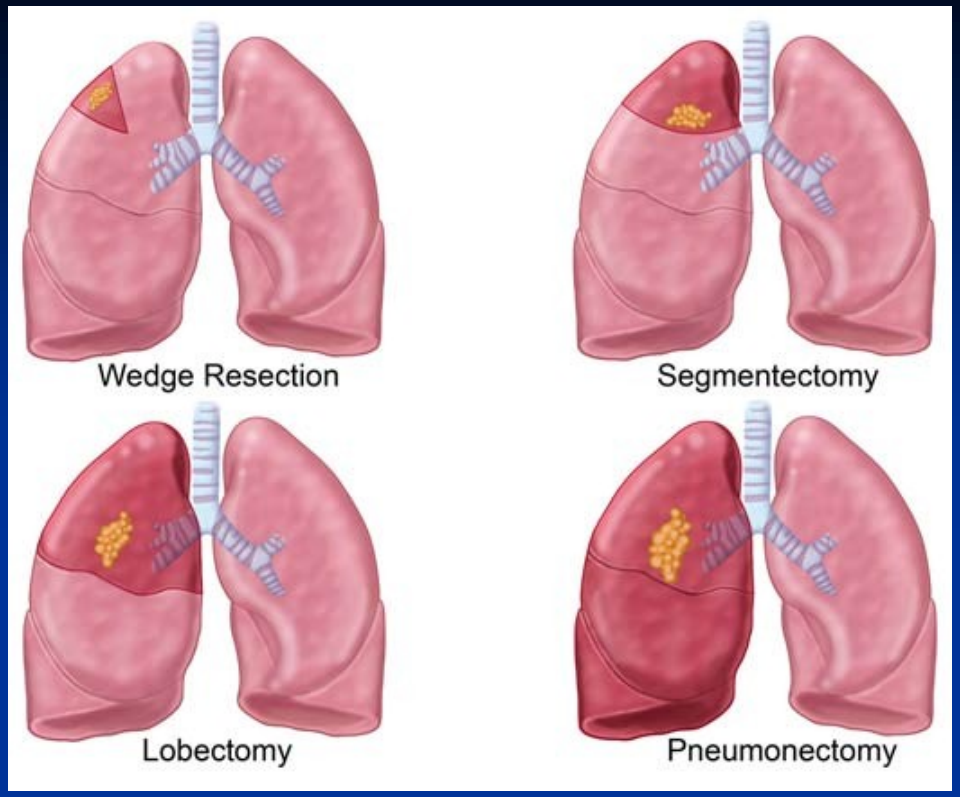
- Management of complications – perforation, obstruction, bleeding, symptoms removal
- Taking of histological samples

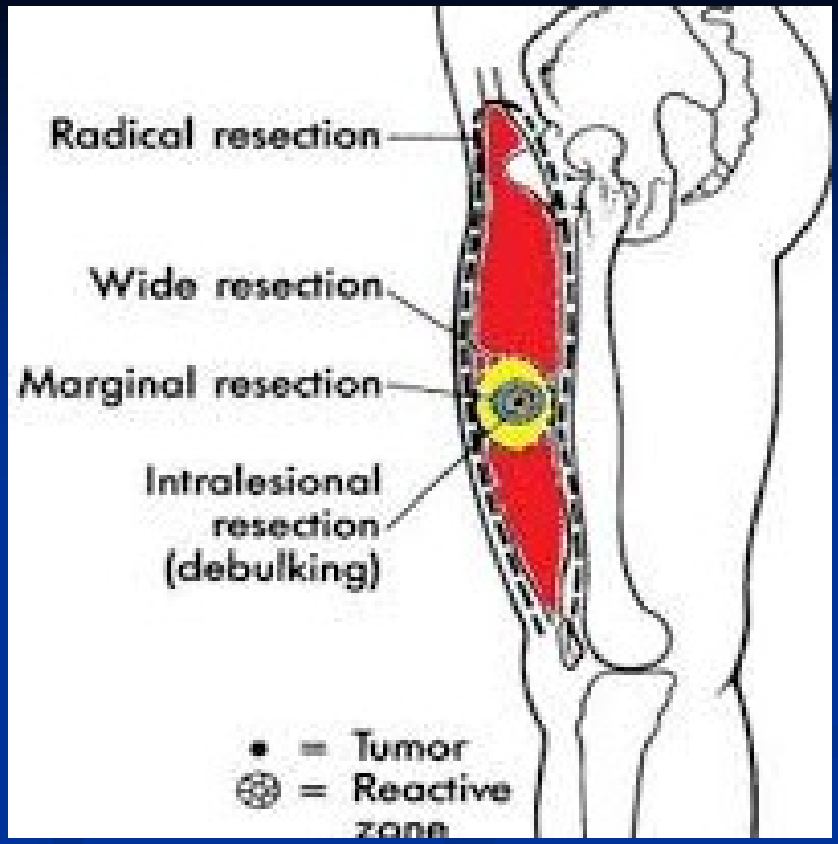
- Radical (safe) resection of tumour focus into healthy tissue – resection margins /R0/ /2cm edge of healthy tissue/








Wedge Resection
Segmentectomy
Lobectomy
Pneumonectomy


Radical resection
Wide resection
Marginal resection
Intralesional resection (debulking)
• = Tumor
= Reactive zone

- Lymphadenectomy – resection of potentially affected regional lymphatic nodes
- En block resection - avoid violation of tumour capsule, don t cut adhesions, resects tumour with surrounding tissue or part of organ if possible
- Vein ligation first

- Multivisceral extended radical resection – radical resection of tumour and solitary metastasis

- Per operative cryobiopsy – assessment of resection margins /R0 x R1/, assessment of lymphatic nodes – extension of resection / lymphadenectomy

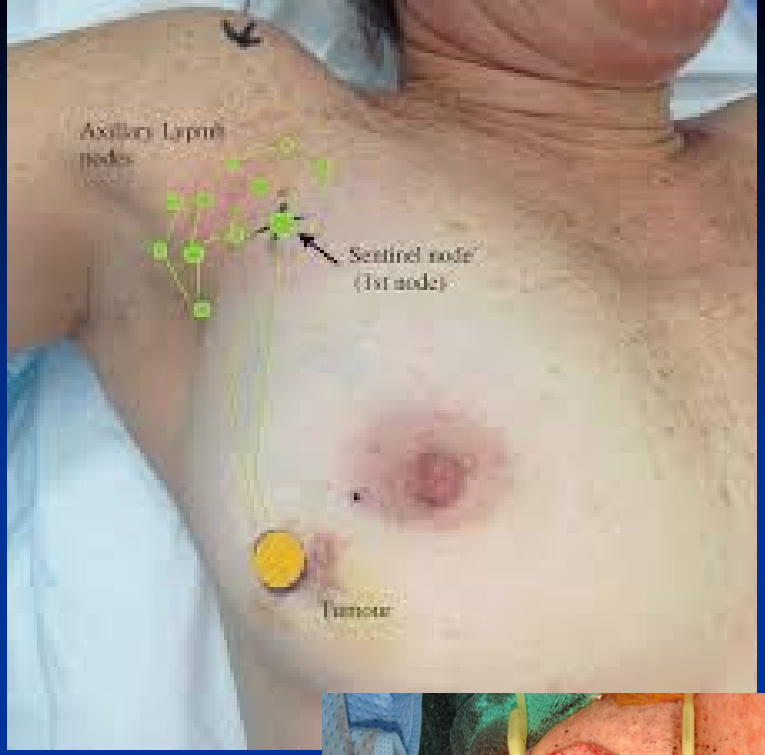
Lymphadenctomy

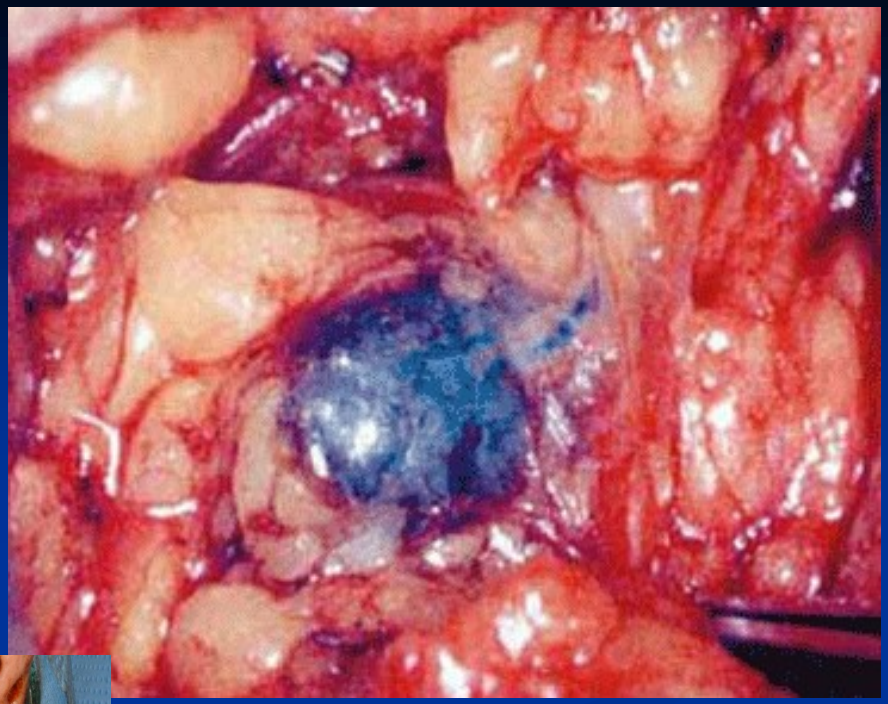
- Standard procedure – primary tumour resection + regional lymph nodes. Preventive measure eradication of potential contained micro metastasis
- special histological examination - immunohistochmistry, PCR – can prove micro metastasis 2mm

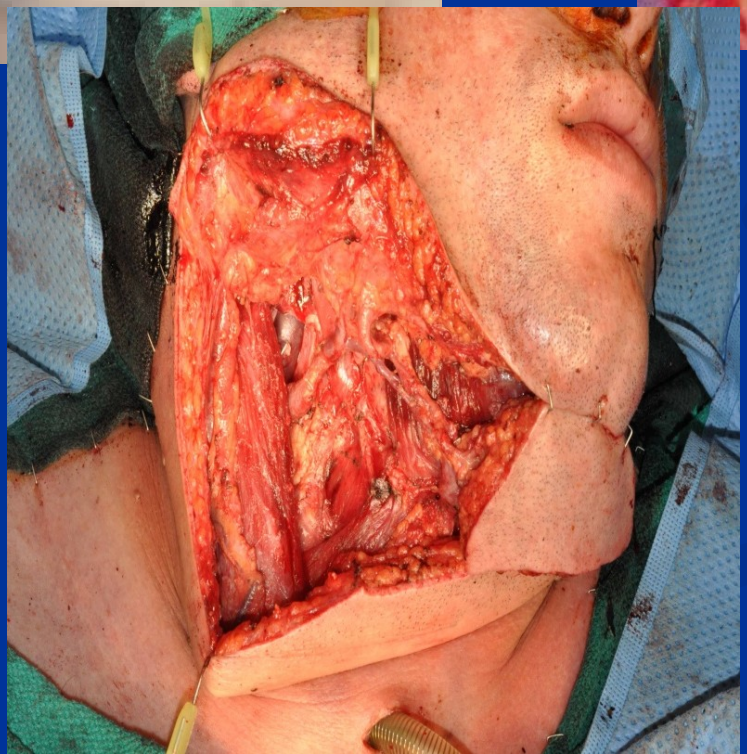
selective – therapeutic – dissection of tumour affected lymph nodes , prevention of locoregional relapse

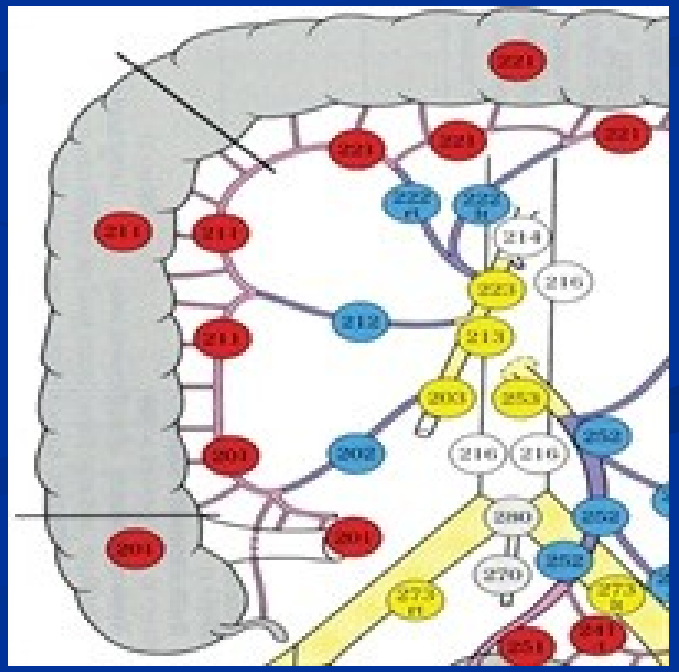
Usually in solid tumour dissection of I. level of lymph nodes

- Sentinel lymph node - patent blue dye, / radionuclide , most common breast cancer, melanoma,
- examination of sentinel lymph node decide about extend of lympadenectomy


Axillary Lymph nodes
Sentinel node (1st node)
Tumour



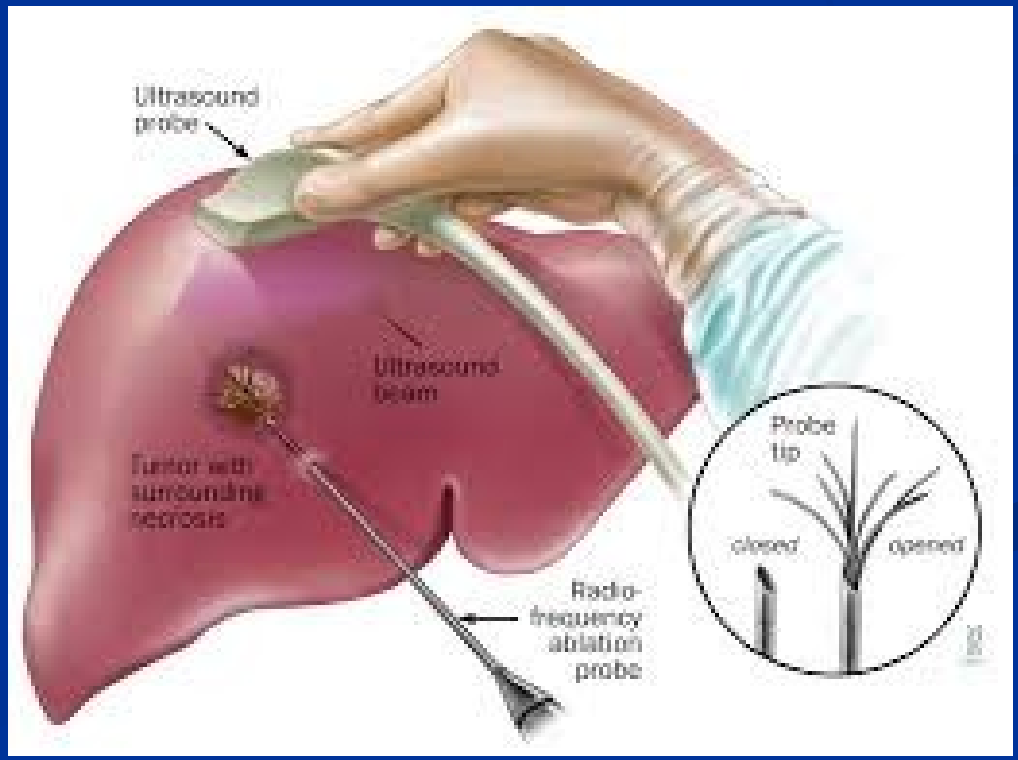



221
211
212
213
214
216
201
202
280
270

- Metastasis surgical therapy

- Biological convenient type of tumour, limited number of meta
- Primary tumour is possible to remove
- There are no unremovable metastasis

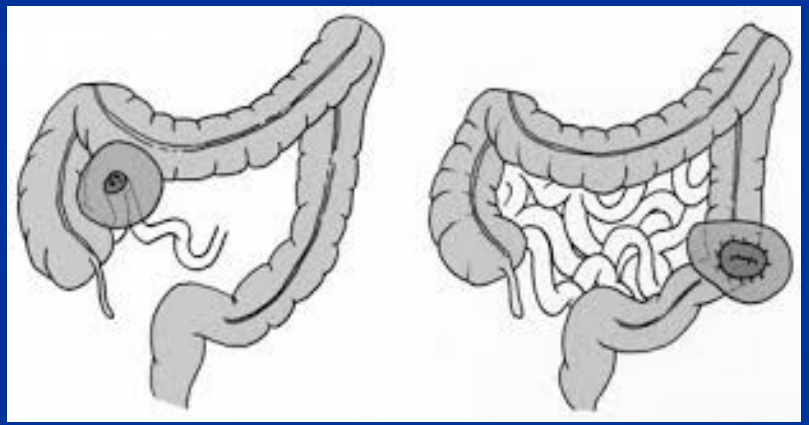
- Colorectal – liver
- Kidney - bone

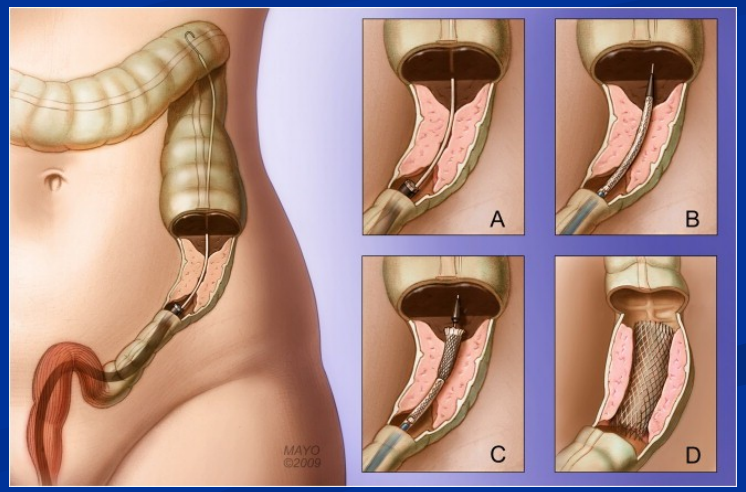


Palliative surgical therapy

- In case of impossible radical resection of tumour or metastasis
- Improve quality of life, prevent complications, treating complications

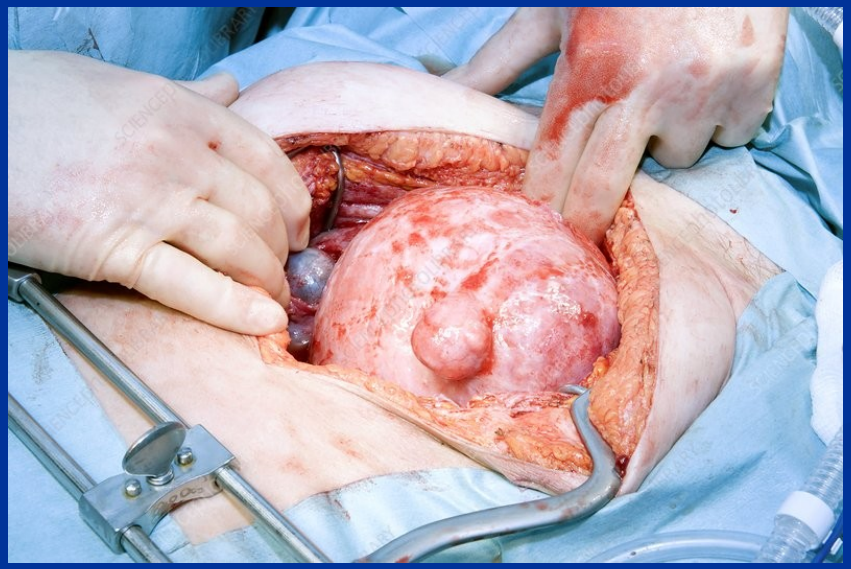
- bypass procedures, ostomies - in case of bowel obstruction,
- Treatment of bowel perforation, stop of bleeding, dilatation and stenting of stenosis,
- insertion of CVC, enteral catheter

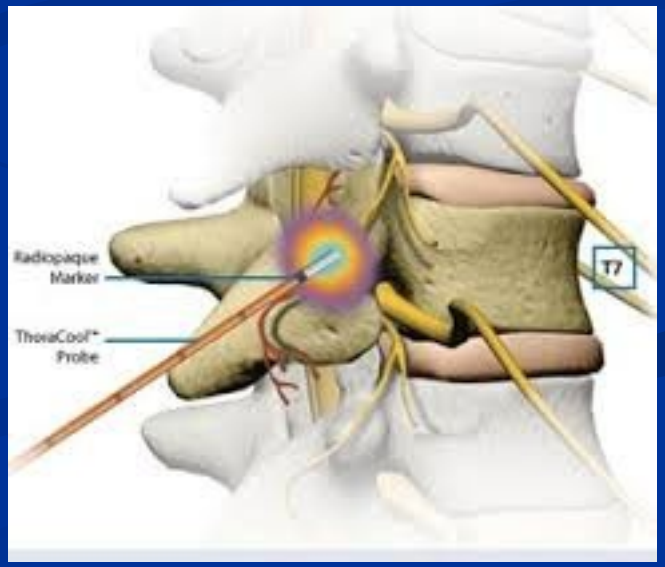




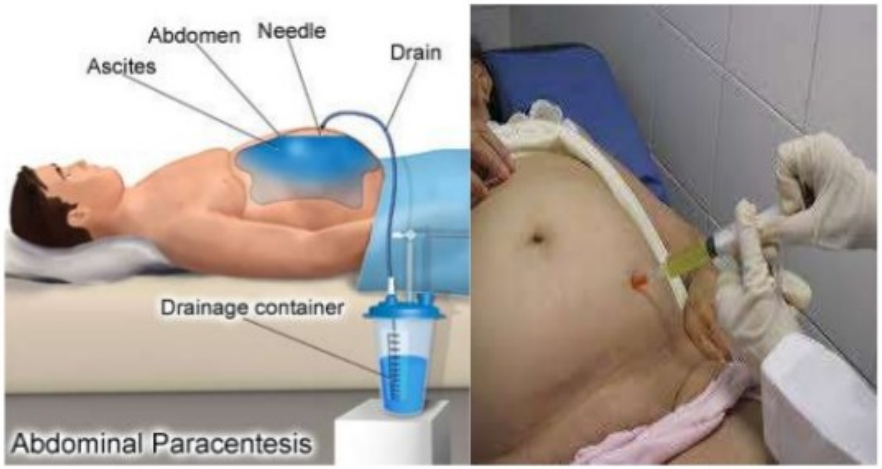
- Palliative tumour resection – R1, R2 – lower complication rate, symptomatic effect, better response to chemoradiotherapy

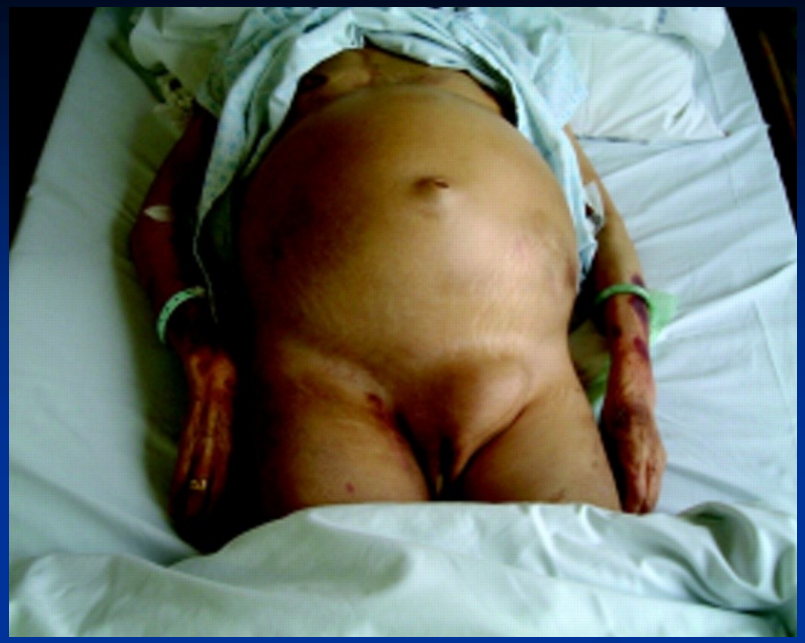
- Cytoreduction/ debulking - reduction of tumour mass - before chemotherapy radiation therapy/
- Decompression procedures - spinal cord
- Pain release

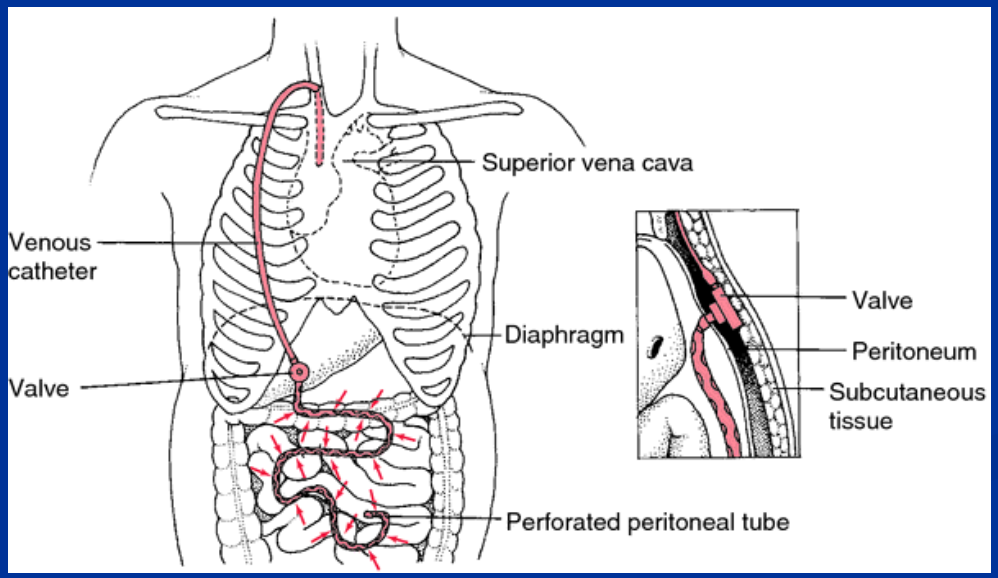


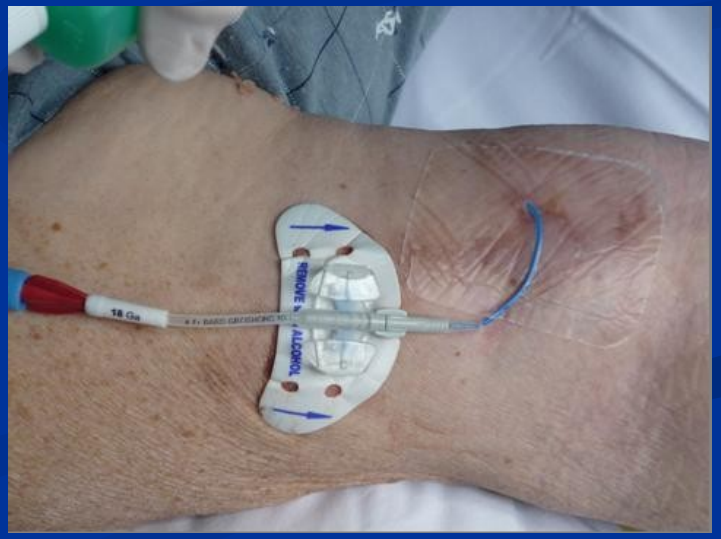


ABDOMINAL PARACENTESIS







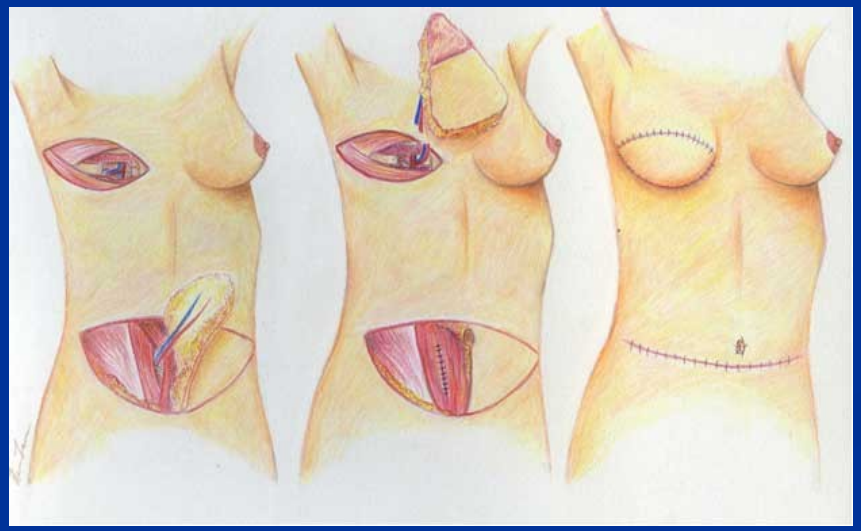


- Reconstructive phase of surgical therapy - improve quality of living in patients with long-term prognosis
- Reconstruction of soft tissues defects, after breast resection
- Restoration of bowel continuity, reservoir function

- Preventive surgical procedures - genetic predisposition

  FAP – colectomy

  MEN II - thyreoidectomy



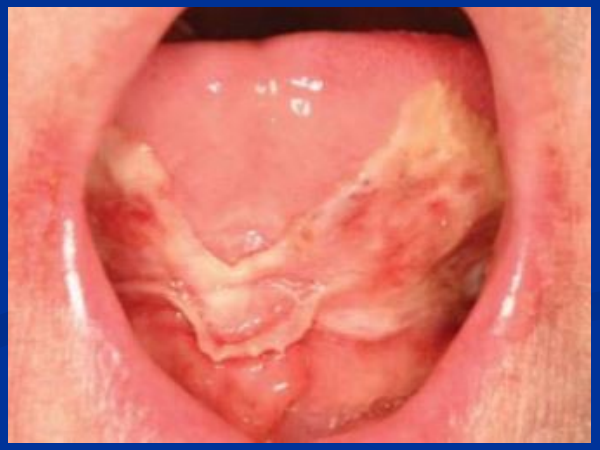
Radiation therapy /RT/

- Some types of tumours are radiosensitive - focused dose of ionizing electromagnetic radiation can destroy cancer cells
- locoregional effect /tumour + regional lymph nodes/

- Differentiated tumours of thyroid gland, Prostate, epidermal skin tumours, tumours of head and neck, breast

- /X-Ray, Gamma/ – cellular death, gamma radiation - exponential kinetics
- Proton therapy - particular radiation higher energy, the most of energy release in tumour mass,

- Important critical structures reduce extend of use of RT
- Adjuvant RT prevents locoregional relapse after surgical resection /breast cancer, head and neck cancer
- Palliative RT – bone metastasis
- Side effects of RT



Acute

Postiradiation dermatitis

Mucositis

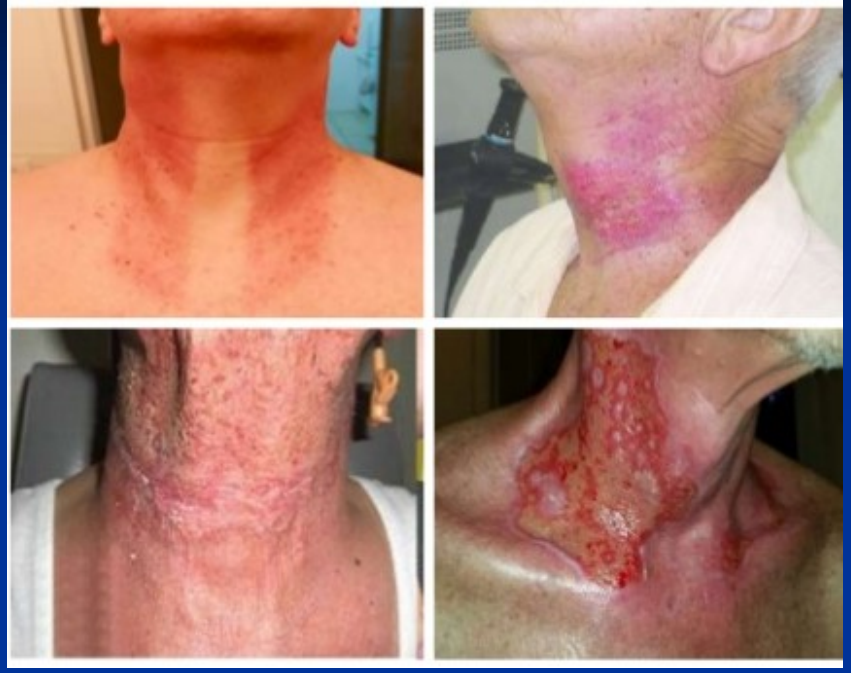
Chronic

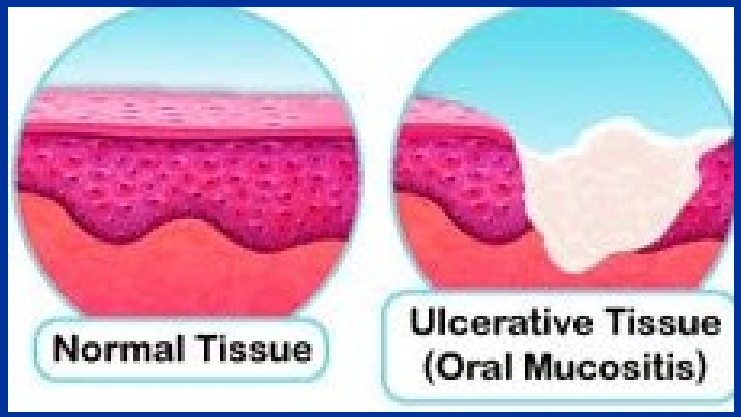
Fibrosis

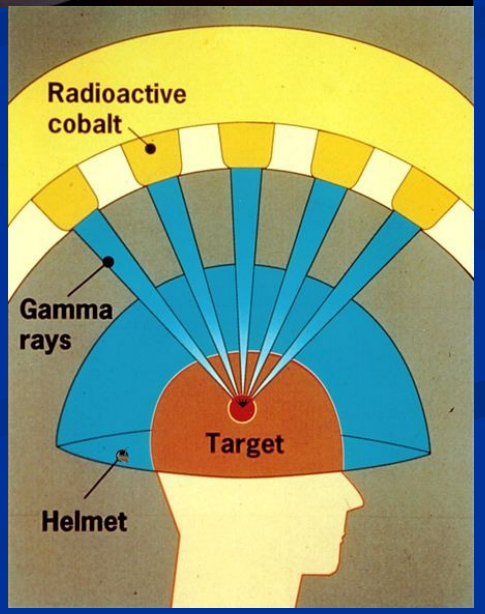
Neurodegeneration

radiation ulcers

Radiation Dermatitis







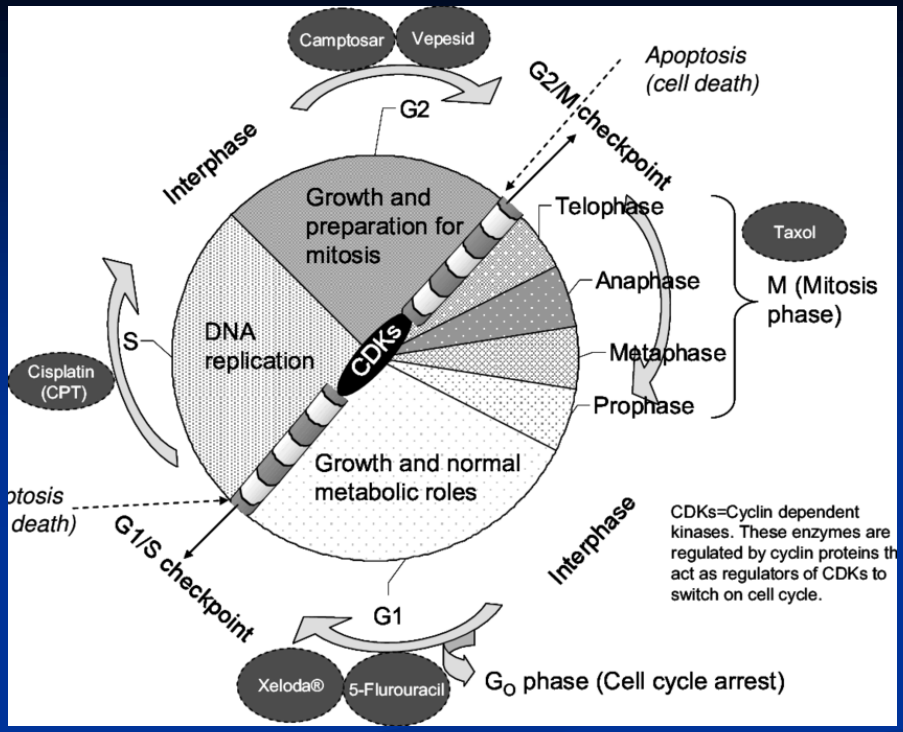
Chemotherapy

- Medication which is effective against process of cell division, - gene toxicity, the fastest dividing the most affected
- Usually used in combination of more drugs to take advantage of different mechanisms of effect to have stronger anti-tumor effect

- Curative therapy – chemosensitive haematological tumours
- Curative / palliative therapy - metastatic extend of disease – systemic effect – penetrate into all tissues, general effect
- Affecting all rapidly dividing cells - malignant cells, Bone marrow, hair follicles, mucosa, germinal cells

- Requires cyclic administration

- Alkylation agents
- Antitumor antibiotics
- Antimetabolites
- Plant alkaloids



- Chemotherapy side effects

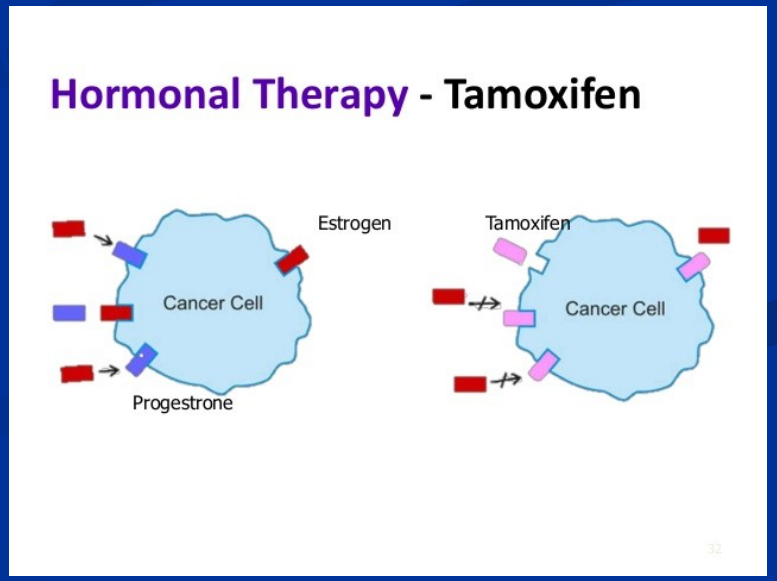
- Acute - Nausea, vomiting
- Subacute - Alopecia, mucositis, hematotoxicity
- Chronic - Infertility, neuropathy, cardiovascular disorders, secondary tumours

Hormonal therapy

- Hormonally active tumours – use hormones as GF
- Blocking hormone = blocking of proliferation

- Breast, Prostate, Ovarium, Thyroid gland cancer

- Organ removal
- Block of receptor – antiestrogene - Tamoxifen
- Block of hormone synthesis
- Pituitary gland blocking



Targeted biological therapy

- Non gene toxicity
- Targeted against specific signal pathways of GF or pathways of controlling molecules inside tumour cells
- Blocking these pathways stop proliferation of tumour cells, don´t destroy tumour cells

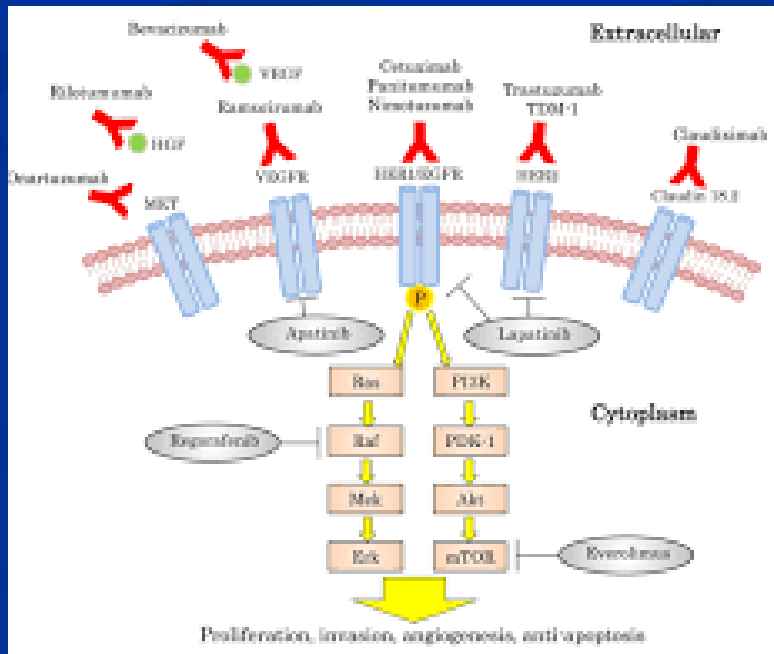
- have no side effects related to overall stop of proliferation and cell deaths
- Combination of targeted therapy + chemotherapy/ RT

- Different spectrum of side effects – hypertension, rashes, hypothyroidism, positive correlation between effect and side effect
- Usually have not curative effect

Imatinib /Gleevec/ – CML

Bevacizumab /Avastin/ angiogenesis inhibitor

Trastuzumab /Herceprin/ - breast cancer



- Monoclonal Ab – against receptors on surface
- large molecules – iv administration, can´t get in brain
- Complex of binding Ab +receptor cell can by lysate by complement lymphocytes
- Flu like side effect symptoms – fever, chills, muscle joint pain, anaphylaxis

- „small molecules“ – get in cell, block signal pathway inside, p.o. intake, cam get in brain
- No immune effect
- Side effect skin and GI symptoms

Immune therapy

- Bring about or stimulate nonspecific – innate and specific immune response against tumour cells

- IL -2 – renal carcinoma, interferone alfa
- Bone marrow transplant
- Anti-tumour vaccination (preventive, therapeutic) - HPV

- Risk of induction of autoimmune response

Supporting therapy

- Relieve patient from difficulties from tumour symptoms or oncologic treatment

- pain killers
- Antiemetic
- Leukocyte growing factors
- Blood transfusion, Epo
- Anti depressants
- Enteral / parenteral nutrition
- Medication to improve nutrition
- Antibiotics
- psychotherapeutic support

Epidemiology

- Mandatory announcement of detection of new cancer disease to Oncological register

- **Mortality rate** – parameter of deaths on tumours per 100 000 and year
- **Incidence rate** - number of newly diagnosed tumours on 100 000 and year

- 5year survival rate – since treatment,

Prevention

- **Primary** prevention — keeps disease from occurring, exclusion of inner and outer risk factors

  e.g. healthy diet, non-smoking policy, environment, vaccination - HPV

- **Secondary** prevention – diagnostics of early cancer disease, before locally advanced, better therapeutic options.

  Active screening of malignant diseases and precancerosis and their treatment.

- Tertiary prevention – regular oncologic follow ups after the end of therapy for cancer disease – burst out of relapse – regular re-staging

Preventive screening

- regular preventive GP examinations
- Inpatient exam - breast, digital rectal exam.
- Widespread screening measures

- Preventive check up q 2 y GP
- Prostate M >50 yo q 2 y
- Preventive gynaecologic check up F > 18 yo q1y
- Mammography F > 45 yo q 2 y
- Occult stool blood >50 yo q 2 y
- Endoscopic bowl exam > 55 yo q 10 y
- Per rectum exam >55 yo q 10 y

Most common malignity

- M: lung cancer, prostate cancer, colorectal cancer, renal cancer
- F: breast cancer, lung cancer, colorectal cancer, ovarian, cervical cancer,