

State Establishment “N.N. Alexandrov National Cancer Centre of Belarus”



Minsk, Belarus 2009

THE COUNCIL OF MINISTERS OF THE BYELORUSSIAN SSR

Resolution

On Intensifying Cancer

from May 23, 1959 № 364

Research Investigations

The Council of Ministers of the Byelorussian SSR states that the level of researches on malignant neoplasm diseases is absolutely insufficient in medical and research institutes and establishments of the Byelorussian SSR. There is no material and technical basis for experimental studying the most important problem in the republic. Some oncological dispensaries (Mogilev, Gomel and others) are located in premises, inadequate in area, Vitebsk and Grodno dispensaries have no in-patient departments; there are no hostels-hotels for oncological patients undergoing out-patient treatment. With the aim to create necessary conditions for organizing and conducting broad experimental and clinical researches on cancer problem at an up-to-date level, training highly qualified specialists-oncologists as well as improving prophylactic and medical help to patients with malignant diseases, the BSSR Council of Ministers

Decides:

1. To take into consideration that in the seven-year plan, the BSSR Public Health Ministry foresees constructing a 200-bedded research institute of oncology and medical radiology in a zone out of Minsk; 5 oncological dispensaries with radiological and in-patient departments.



1960 y.

**N.N. Alexandrov – the founder and first director near
a model of the future institute**

Administration building





Modernized building for oncological mammalogical department



Laboratory building



Recreational pavilions in pedestrian zones on the Centre territory

**With the Decree of President of the Republic of Belarus
Alexandr Grigoryevich Lukashenko
from July 6, 2005**

**oncology is included into the structure of main trends of
scientific and technical activities in the Republic of
Belarus in 2006 – 2010**



Specialized Medical Help to Oncological Patients

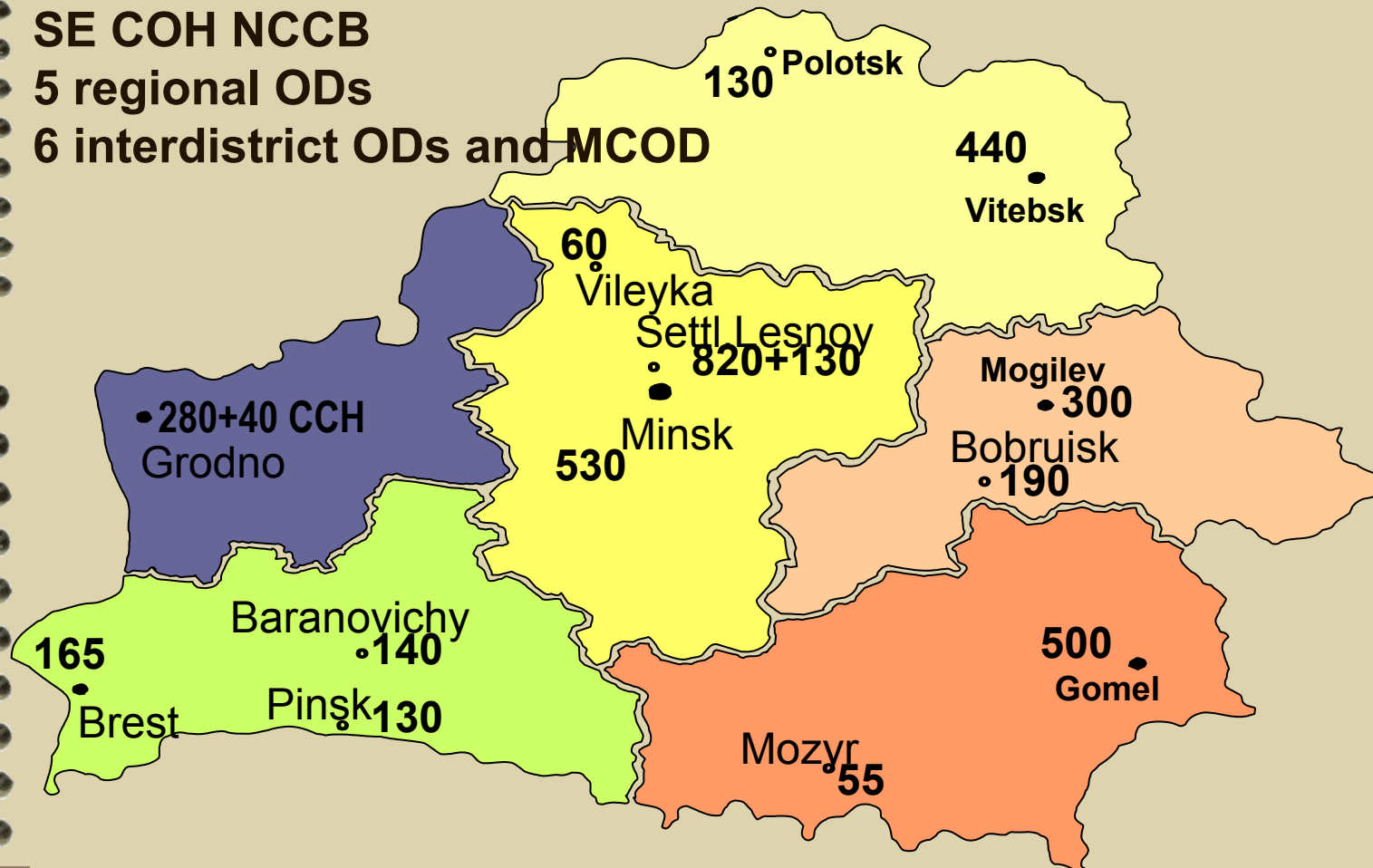
3 910 special beds for oncological patients

SE N.N.Alexandrov NCCB

SE COH NCCB

5 regional ODs

6 interdistrict ODs and MCOD



Centre Structure

Research Sector:

Research departments – 13
Auxiliary services – 3

Staff: 135 persons, including
79 researchers

Doctors of Sciences– 16
Candidates of Sciences 22

Clinical Sector:

Departments and laboratories– 31
Auxiliary services - 21

Staff: 1578 persons,
including 270 doctors

Doctors of Sciences - 7
Candidates of Sciences – 31

At the base of the Centre, the BelMAPO Oncology Department (2 Doctors of Sciences and 2 Candidates of Sciences) functions as well as the Council for dissertation defense Д 03.12.01 on specialties
14.00.14 – oncology
14.00.19 – radiodiagnosis, radiotherapy

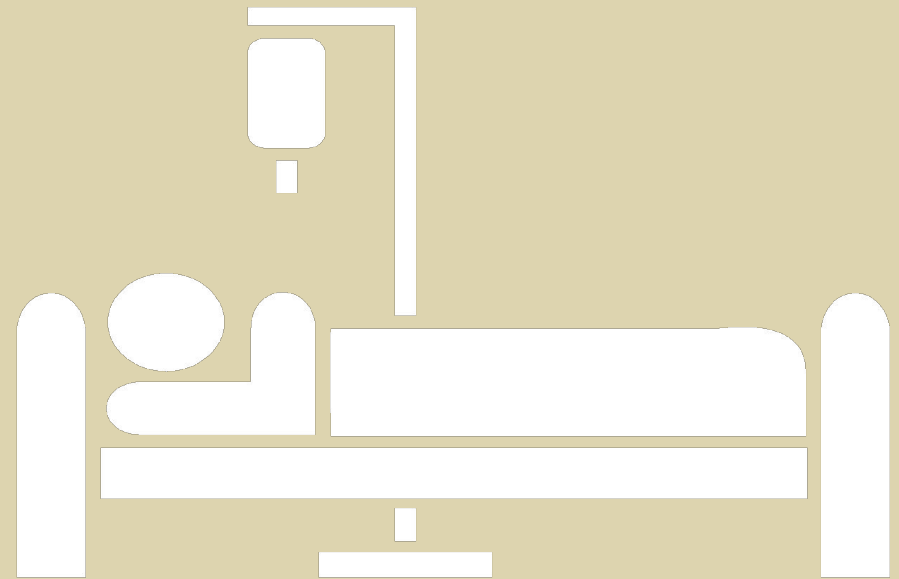
Research Trends

- **organizing anticancer struggle, studying cancer epidemiology and prophylaxis**
- **developing new technologies for diagnosing malignant tumours**
- **developing new technologies for managing patients with malignant neoplasms**
- **developing new technologies for rehabilitation and bettering quality of oncological patients' life**
- **carrying out clinical trials of new drugs**
- **improving medical and technical basis of the oncological service of the republic**

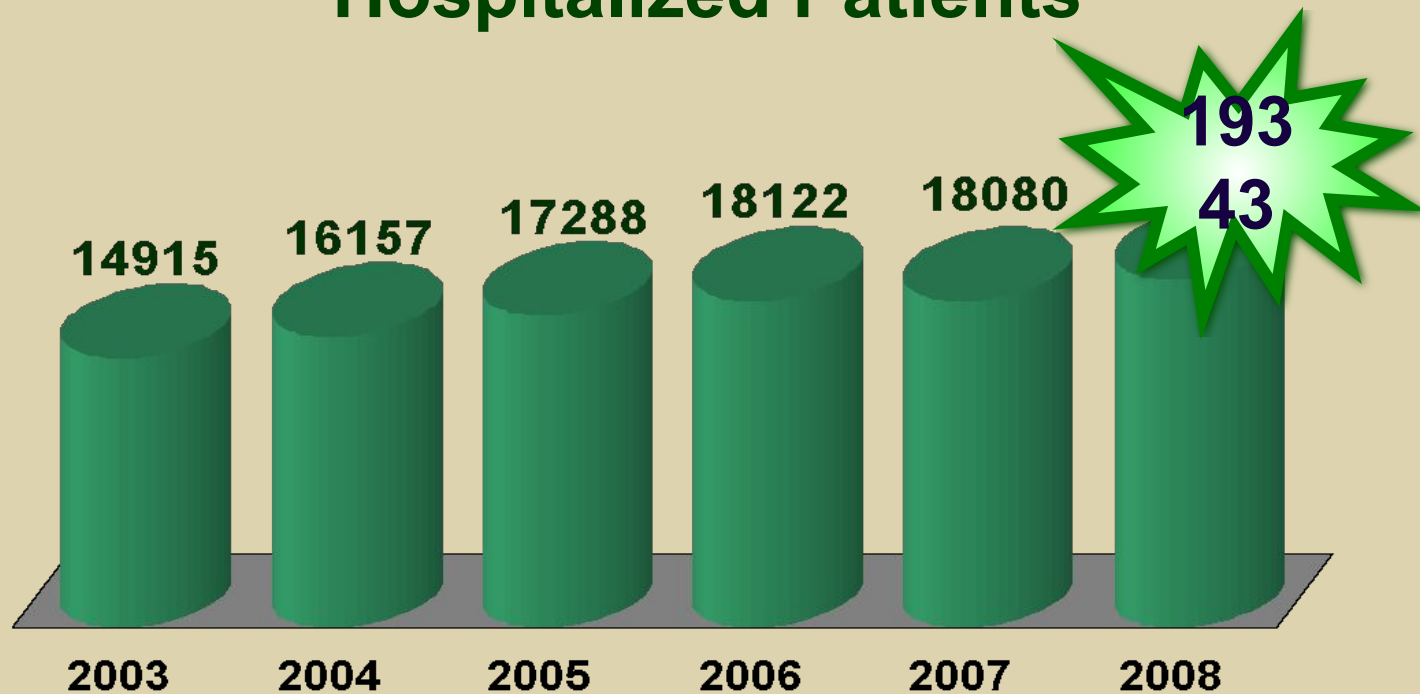
Center Bedding

820 beds

12 beds— the Resuscitation Department



Hospitalized Patients



Annually more than 200 foreign patients from the USA, France, Russia, India, Iraq, Poland, Azerbaijan, Armenia, Georgia, Kazakhstan, Latvia, Lithuania, Moldova, Uzbekistan, the Ukraine and other countries undergo medical treatment in the Centre.



Diagnostic Base of the Centre

Laboratory Diagnosis

Practically, the whole specter of biochemical, clinical, immunohistological, radioisotopic, molecular and genetic investigations is performed.

Laboratory of Molecular Oncogenomics

Specter of Performed Investigations

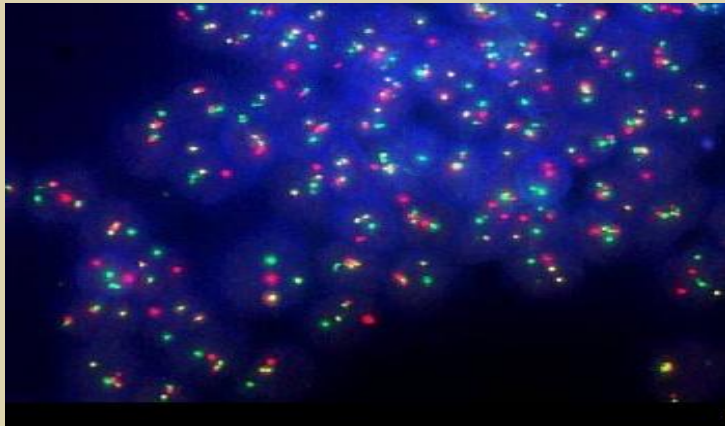
- Detecting mutations in genes of hemodialysis system
- Detecting mutations in genes hereditarily associated with breast and ovarian cancer (BRCA1 and BRCA2) development
- Identifying mutations in genes hereditarily associated with colon cancer (APC, K-ras, MLH1, MSH2, BCL2) development
- Assessing a residual minimal disease under malignant neoplasms of breast, lung and prostate



FISH-Laboratory

FISH – fluorescent in situ hybridization

- identifying amplifications of HER-2/neu gene at breast cancer for performing a target (using monoclonal antibodies) therapy;
- detecting translocations, deletions, inversions in non-Hodgkin's lymphomas;
- detecting chromosomal aberrations in solid tumours (breast and bladder cancer, some soft tissue tumours, brain tumours)



Translocation t(11,14) under lymphoma from mantle zone cells

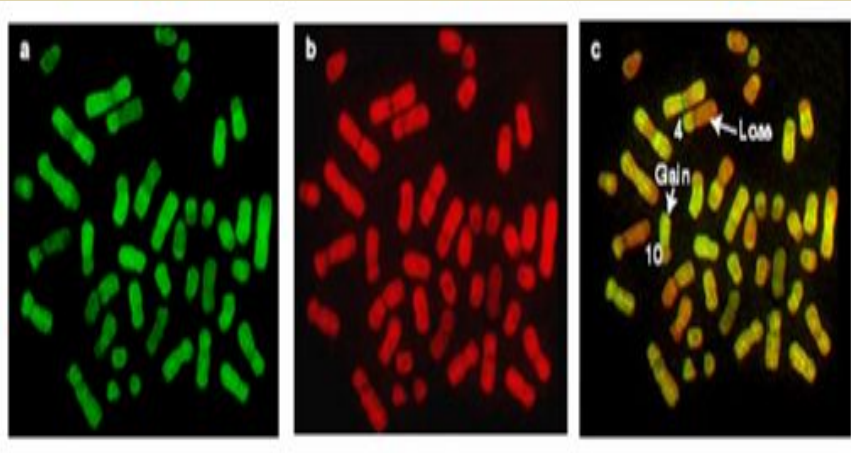


Fluorescent microscope Axioskop 40

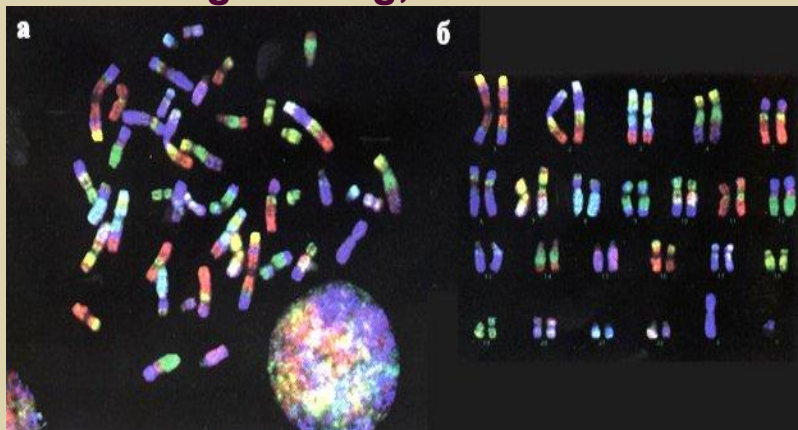
Laboratory of Molecular Cytogenetics

Modern Methods of Molecular and Cytogenetic Investigations

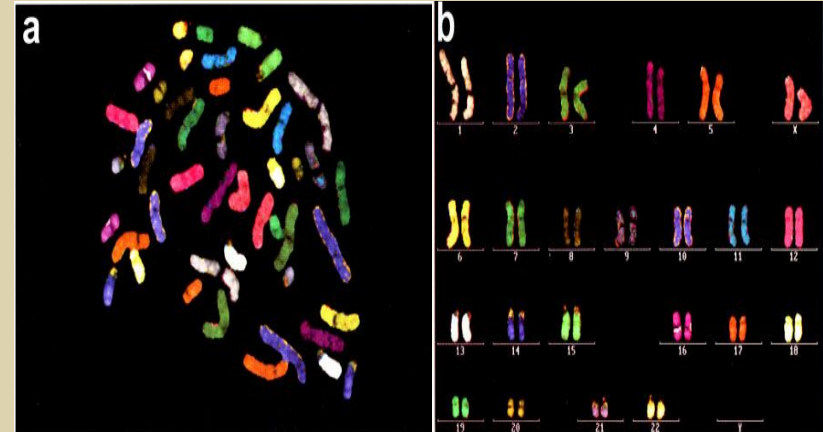
Comparative Genomic Hybridization,
CGH



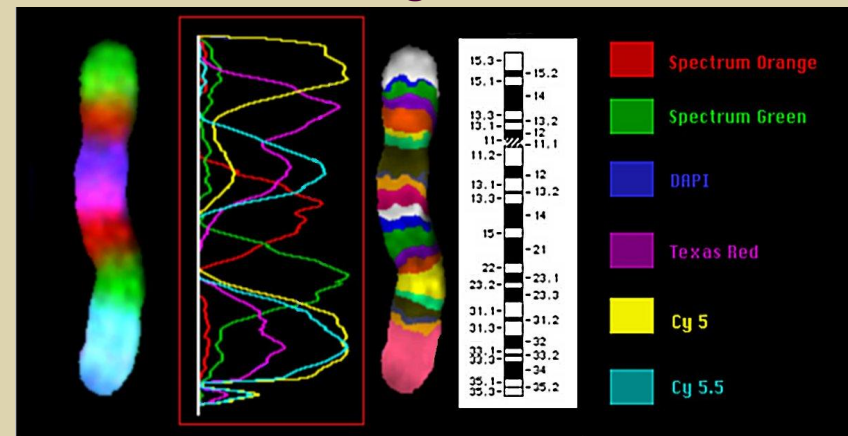
Interspecific chromosomes
segmenting, RxFISH



Spectral Karyotyping, SKY



Multicoloured human chromosome 5
staining, MCB

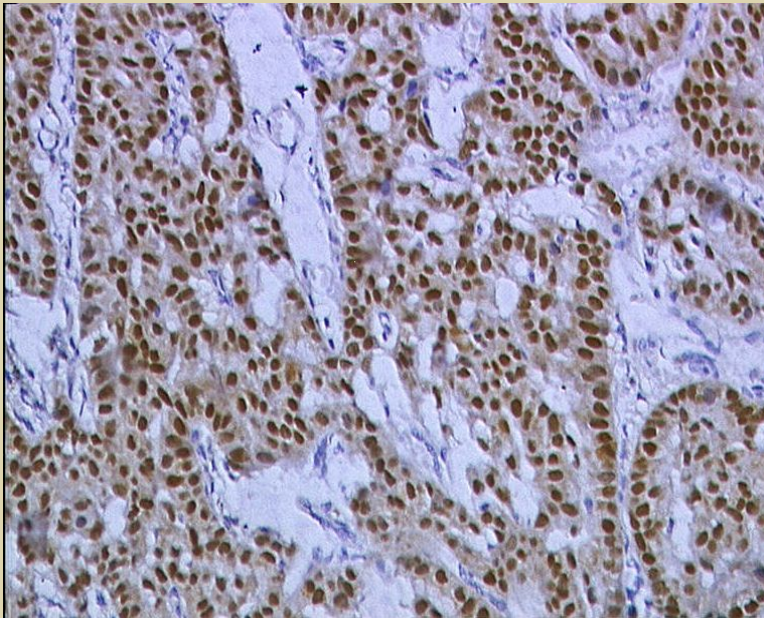




Morphological Methods of Investigation

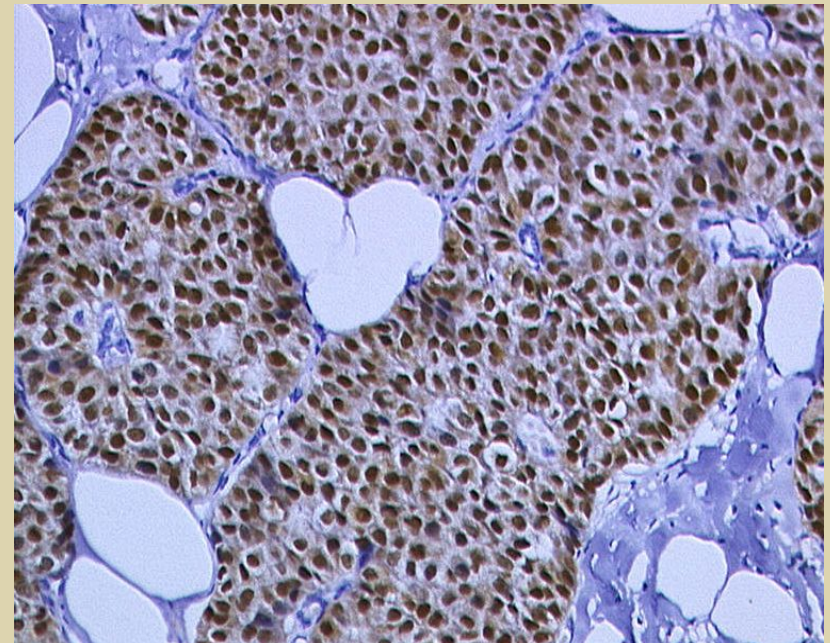
Up-to-date immunohistological investigation methods using more than 60 poly- and monoclonal antibodies are introduced and widely used in practical work at present .

■ Receptor status: **ER, PR**

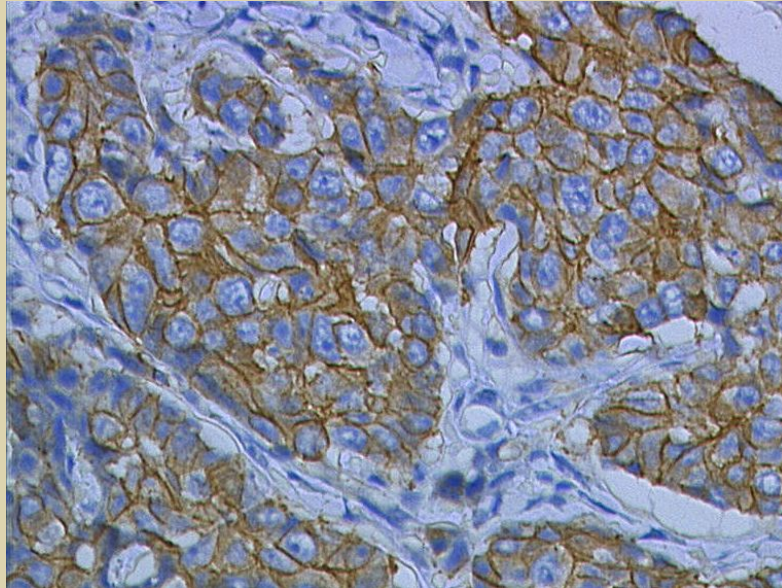


Distribution of protein ER in tumour cell nuclei at BC, x40.
Immunohistochemical staining MKAT
(clone 1D5, DAKO)

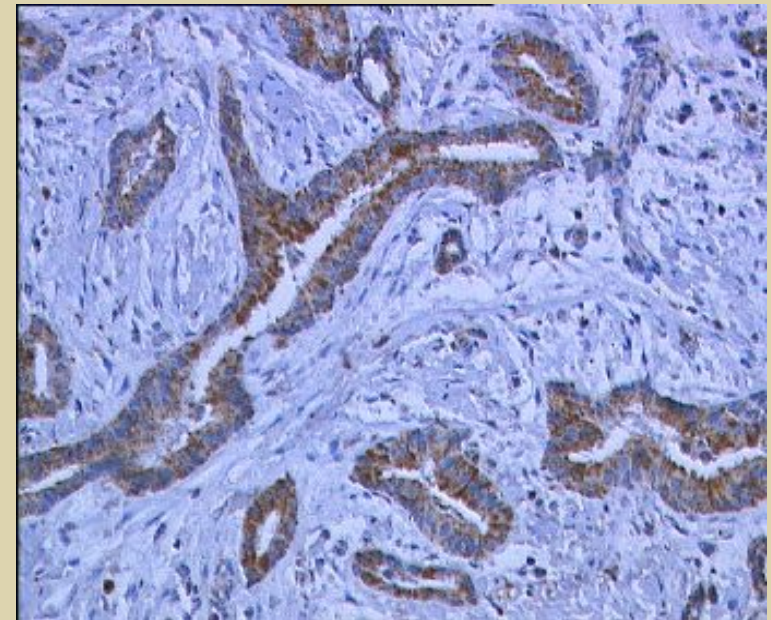
Distribution of protein PR in tumour cell nuclei at BC, x40.
Immunohistochemical staining MKAT
(clone PgR636, DAKO)



■ Level of Protein **c-erbB-2** and Protein **BRCA I** Expressing



Cytoplasmatic distribution of protein BRCA1 in tumour cells at BC, x40.
Immunohistochemical staining MKAT (dilution 1:50, clone E30, DAKO)



Distribution of protein **c-erbB-2** in tumour cell nuclei at BC, x40.
Immunohistochemical staining MKAT (dilution 1:300, polyclonal, DAKO)



Telepathology system for giving on-line consultations on morphological preparations

Modern equipment for biopsy material automated paraffin covering



Radiodiagnosis

The department is equipped with modern, mainly, digital diagnostic instruments securing the use of an advanced filmless technology of getting, transmitting, processing and keeping images.

At the base of the department one realizes a big work on training specialists in radiodiagnosis for medical institutions of the oncological profile of the Republic of Belarus (at working places and conducting thematic seminars). The permanent school for advanced training of radiodiagnosticians of Minsk region has been functioning here for 5 years.



**Computer roentgen
tomographs**





Magnetic resonance tomograph



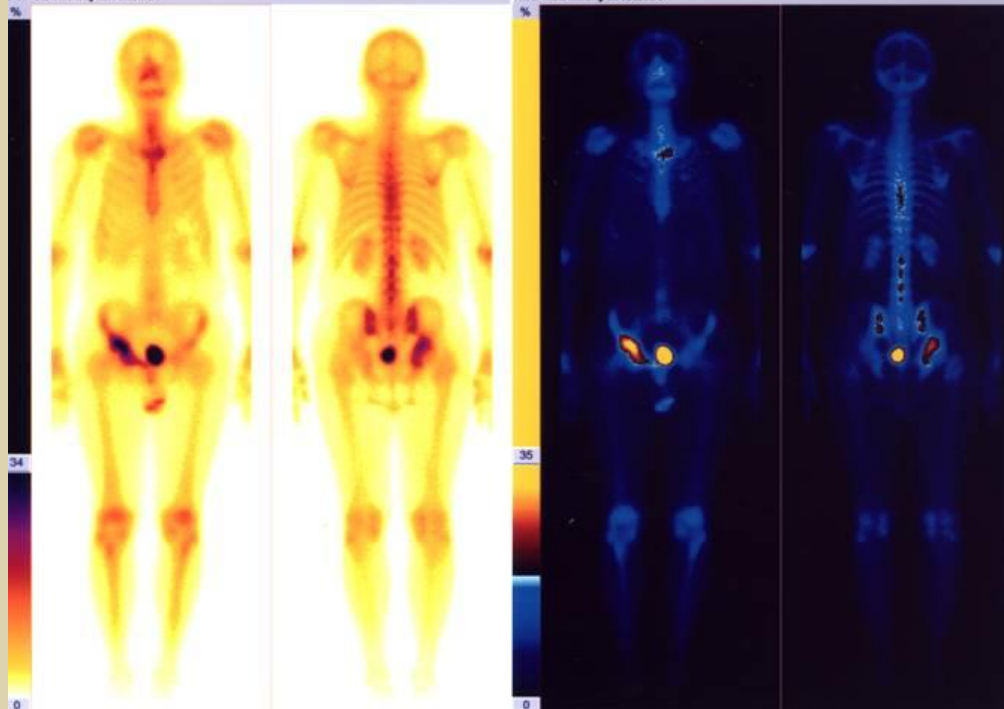
One-photon emission tomograph



Patient Name: Apetenok, Vjacheslav Patient ID: 1251/05 DOB: 7/6/1947
Study Name: Wholebody imaging Study Date: 6/15/2005

3 Hr Wholebody 6/15/2005

3 Hr Wholebody 6/15/2005



Angiographic investigations

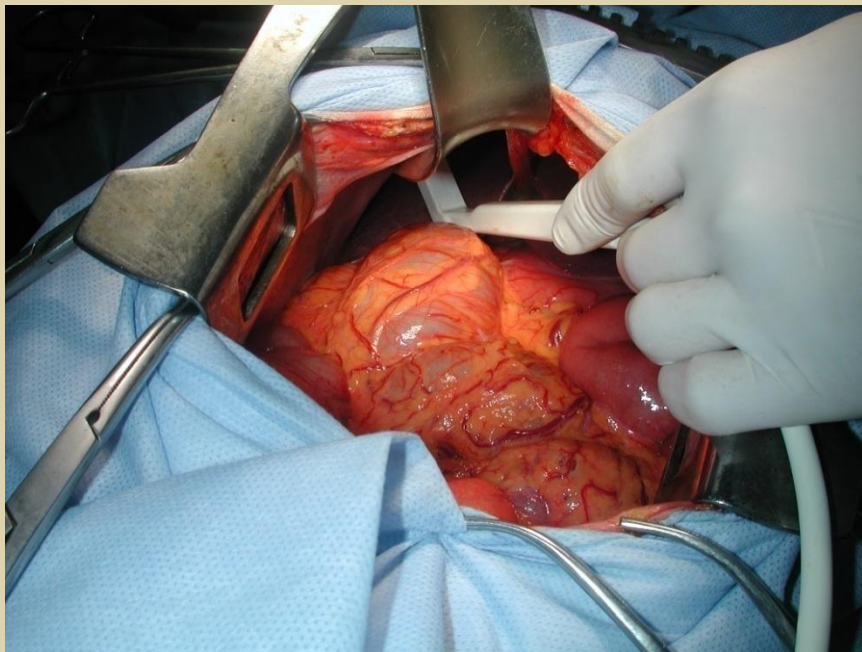


Ultrasound investigations



USI scanners in the expert class

Intraoperative ultrasound investigation



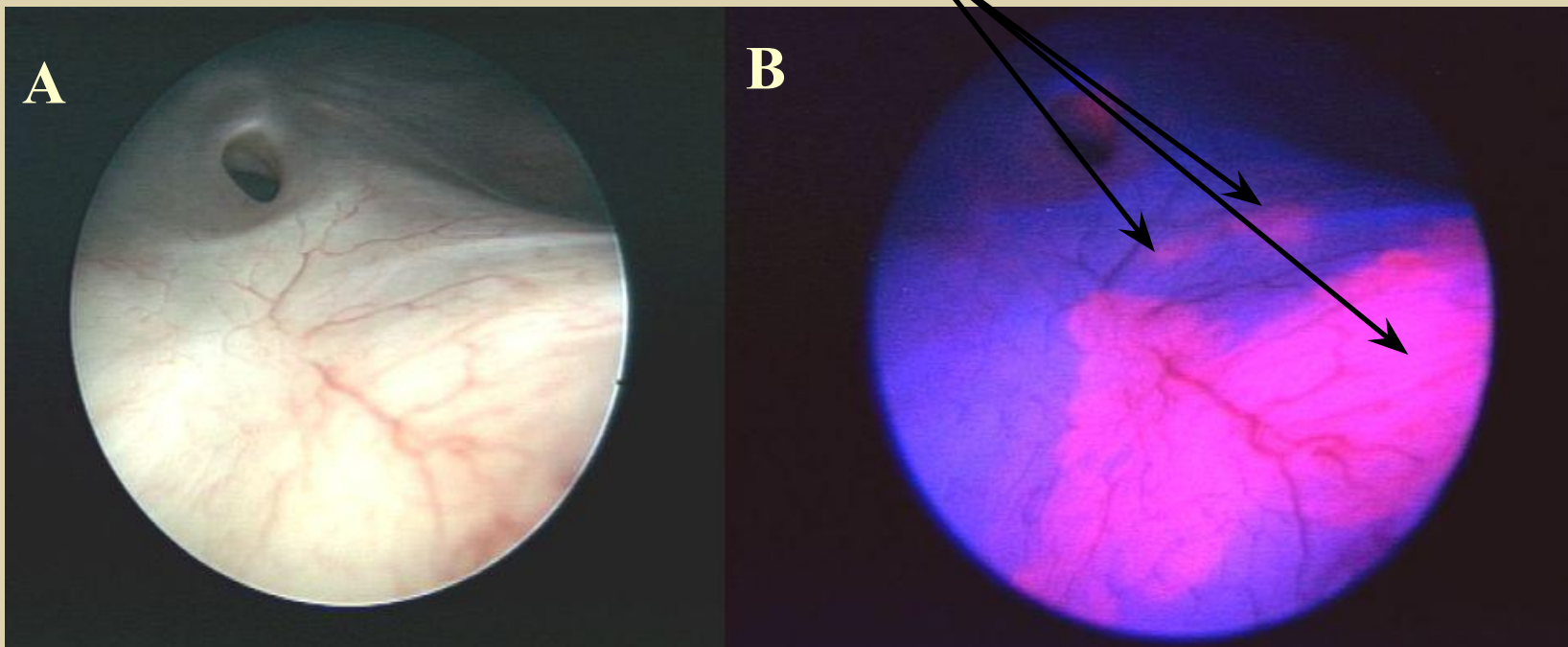
Diagnosing Bladder Cancer on the Basis of Photodynamic Effect

Bladder cancer manifestation after intravesicular introduction of 5-ALA (Alamin):

A – white lit;


B – blue lit ($\lambda = 400 \text{ nm}$),

one can see additionally detected bladder tumours



Efficacy of Clinical Use of 5-ALA (Alamin) of the Belarusian Production

- Additional malignant bladder tumours are detected in more than 18% of patients
- Obligate precancer is detected in 13% of patients

A spiral-bound notebook with a light beige, textured cover. The metal spiral binding is visible on the left side. The text is centered on the cover.

Highly Technological Methods of Treatment

Surgical Activities

Totally, there were made

2007 — 9 323 *operations*

2008 — 10 628 *operations.*

There were operated

2007 — 9 027 *patients*

2008 — 9 721 *patients*

Highly Technological Medical Interventions

- **Combined operations with resection and prosthetics of arch and chest aorta, vertebrae bodies as well as resection of atrium with alloplasty of its wall using an artificial circulation apparatus in lung cancer patients**
- **Bronchoplastic operations with resection and plasty of pulmonary artery and vena cava superior at lung cancer**
- **Intrapleural and intra-abdominal thermochemotherapy in patients with pleural mesothelioma and metastatic involvement of abdomen**
- **Pancreoduodenal resections at pancreas head cancer, with pylorus being saved**

- ❑ **Pancreatectomy under total pancreas cancer, with pylorus constrictor being saved**
- ❑ **Gastropancreatoduodenal resections under locally spread stomach carcinoma (with involvement of pancreas head)**
- ❑ **Biliary stenting at pancreas head cancer complicated with mechanical jaundice**
- ❑ **Management of liver and lung metastatic lesions using radiofrequency ablation**
- ❑ **Extended operative interventions into liver with removing 6 segments**
- ❑ **Radical cystectomy with forming artificial bladder from intestine**

- **Multicomponent management of patients with primary liver cancer and colorectal cancer with metastases in liver using preoperative chemoembolization of hepatic artery**
- **Laparoscopic radical prostatectomy**
- **Extracorporeal nephrectomy**
- **Operations under brain and skull base tumours**
- **Reconstructive and plastic operations using a microsurgical technique**
- **Photodynamic diagnosis and therapy using original Belarusian drugs (5-aminolevulinic acid, fotolon)**

High Technologies Introduced in 2008

- method of combined and radiation treatment of patients with supratentorial gliomas and a metastatic brain lesion ;
- pneumoectomy with resection and prosthetics of descending aorta;
- distal resection of pancreas with resection and angioplasty of celiac trunk;
- exenteration of pelvis at locally spread cervical cancer;
- monoblock hysterovaginavulvectomy with lymphaden-ectomy;
- fluorescent diagnosis and photodynamic therapy for precancer cervical diseases;
- subtotal laryngectomy;

- reconstruction of mandible using titanium implants;
- use of the navigation system for diagnosing and treating brain and skull base tumours;
- shunting operations under brain tumours;
- extraperitoneal videoassisted radical prostatectomy;
- extracorporeal nephrectomy with autotransplantation;
- videoassisted nephroablation;
- subtotal colectomy with forming intestine reservoir and ileoanal anastomosis;
- intersphincter proctectomy;
- stenting esophagus and trachea.

Radiofrequency Ablation of Tumours



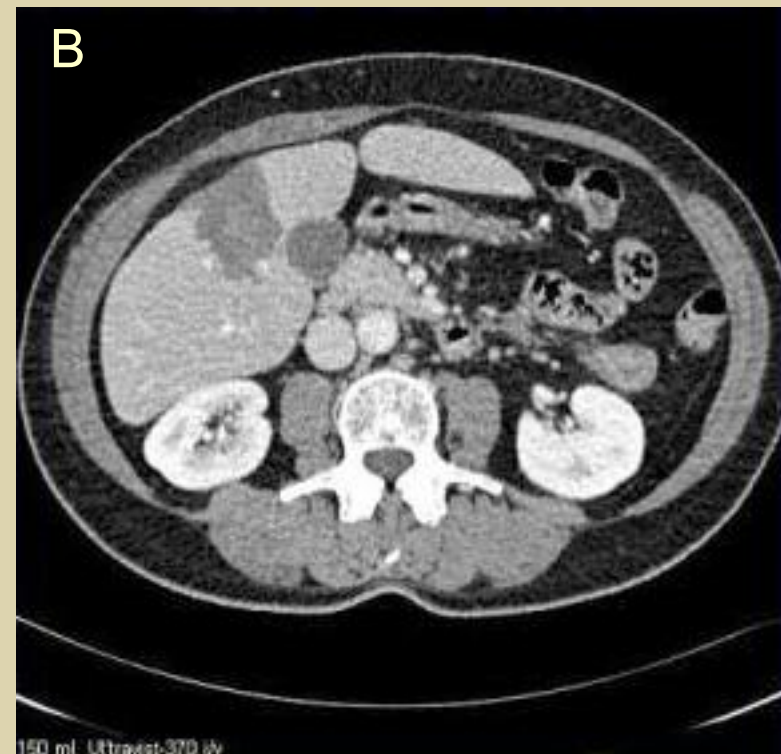
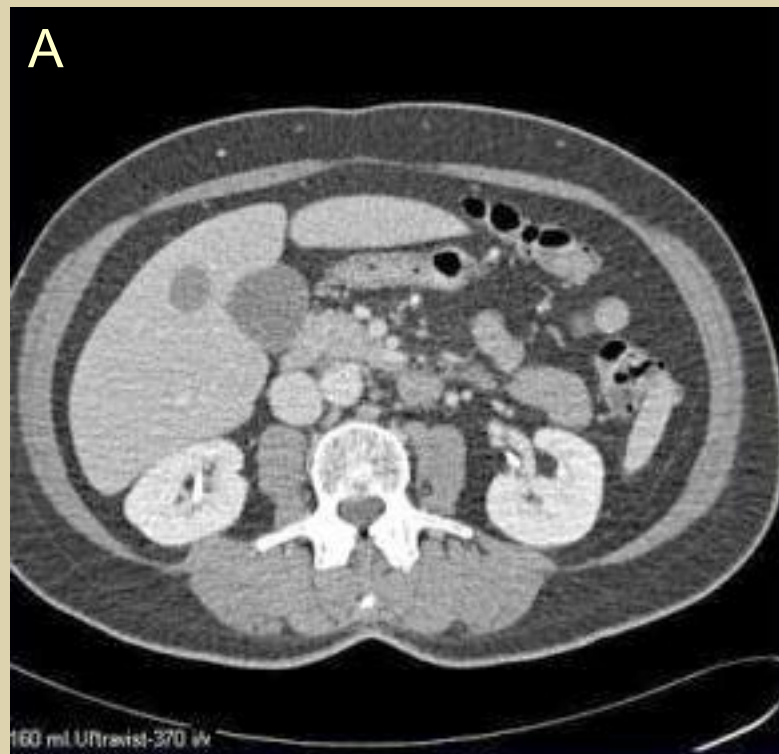
Generator

Integra Elektrotom HITT®106



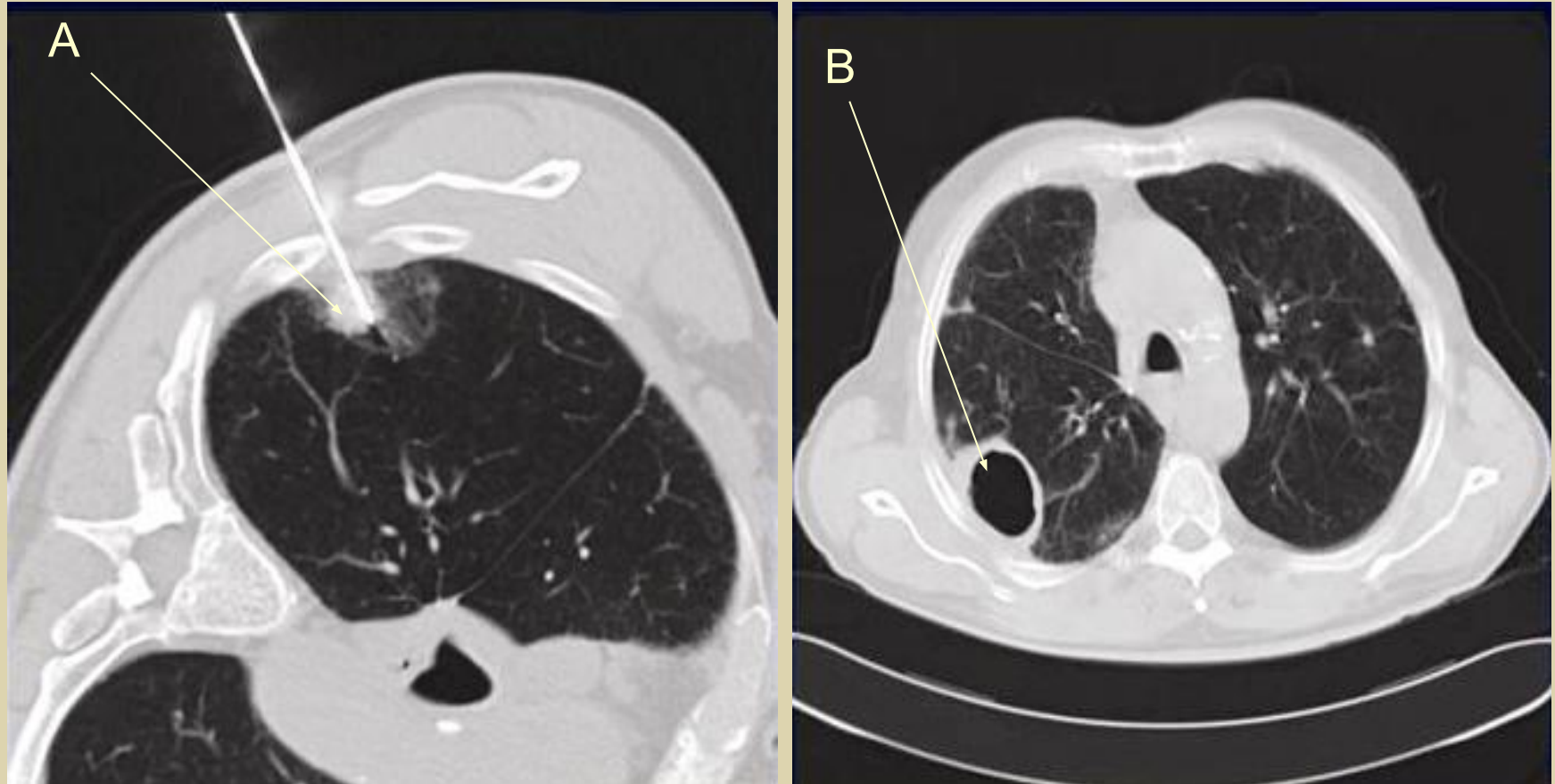
Perfused electrodes

Radiofrequency Ablation of Hepatic Tumour



Liver CT with bolus contrasting (portal phase) before (A) and after (B) radiofrequency ablation of solitary metastasis of bronchial carcinoid

Radiofrequency Ablation of Pulmonary Neoplasm



Computer tomograms during the ablation (A) and 1 month afterwards (B) of the patient with a lung cancer metastasis after lobectomy. There is an encysted cavity at the metastasis place.

Radiofrequency Ablation of Kidney Neoplasm



Endoscopic Operations

Laparoscopic: splenectomy, adrenalectomy, nephrectomy, radical prostatectomy, obstructive resection of sigmoid colon and others.

Thoracoscopic: lobectomy, thymectomy, removing posterior mediastinum, parasternal lymphadenectomy at breast cancer.

Videoassisted mediastinoscopy

100% of morphological verification of pathological changes of mediastinum lymphnodes.

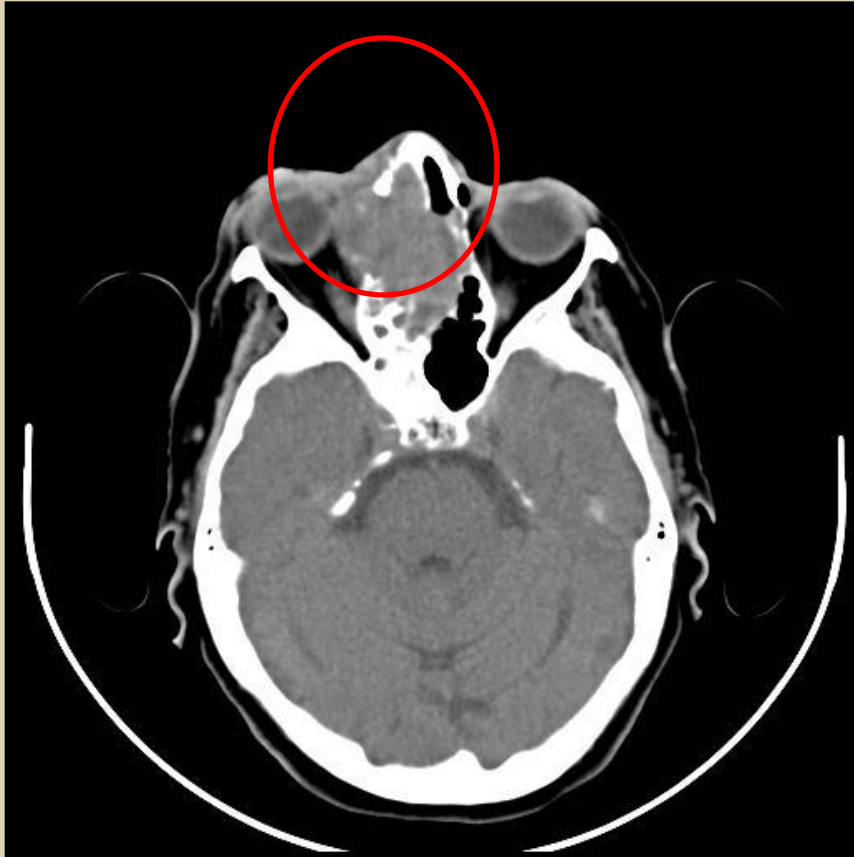
10% of changed diagnoses after mediastinoscopy

Complications – 0,32%.



OPERATIONS UNDER HEAD AND NECK TUMOURS

CRANIOFACIAL RESECTION

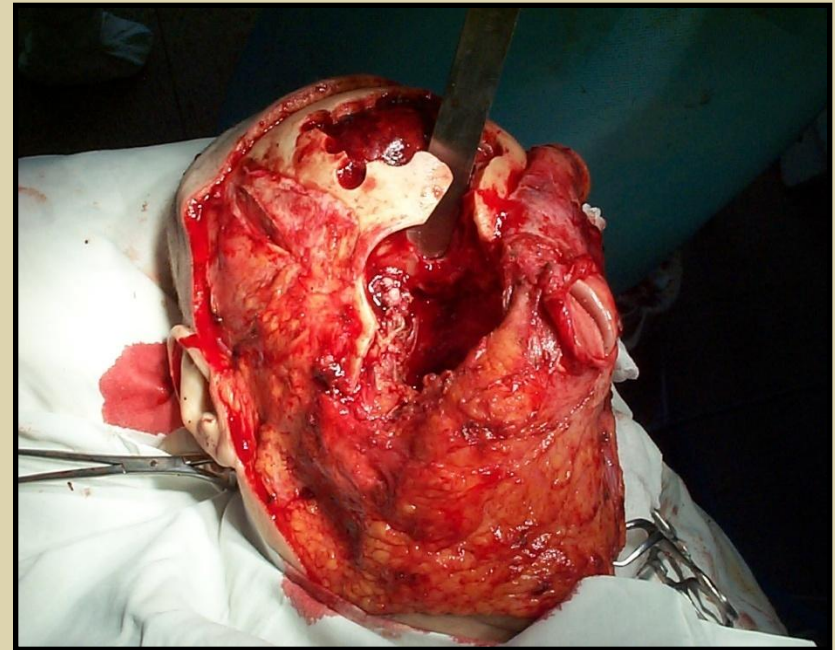


Upper maxilla cancer with growing into the orbit and spreading into the anterior cranial fossa

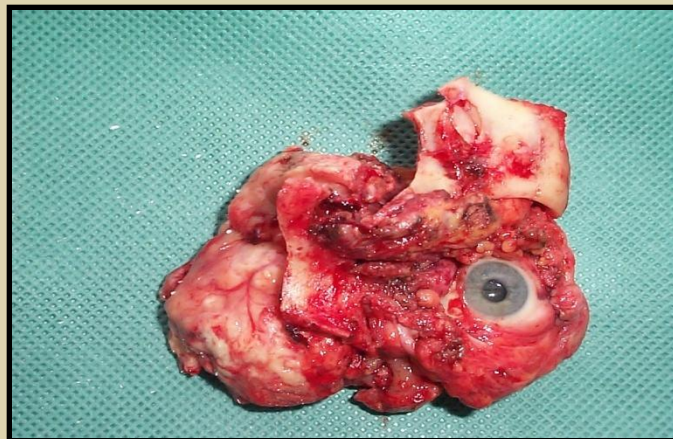
CRANIOFACIAL RESECTION



Cranial and facial stage

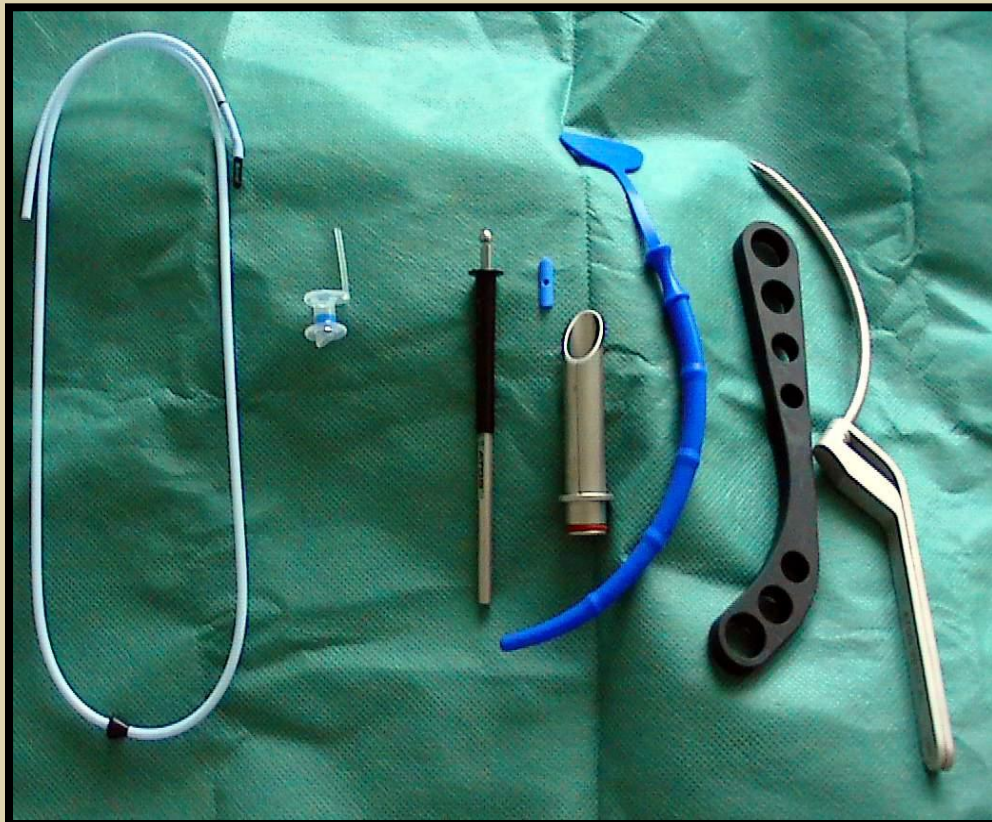


View of the wound after
removing preparation



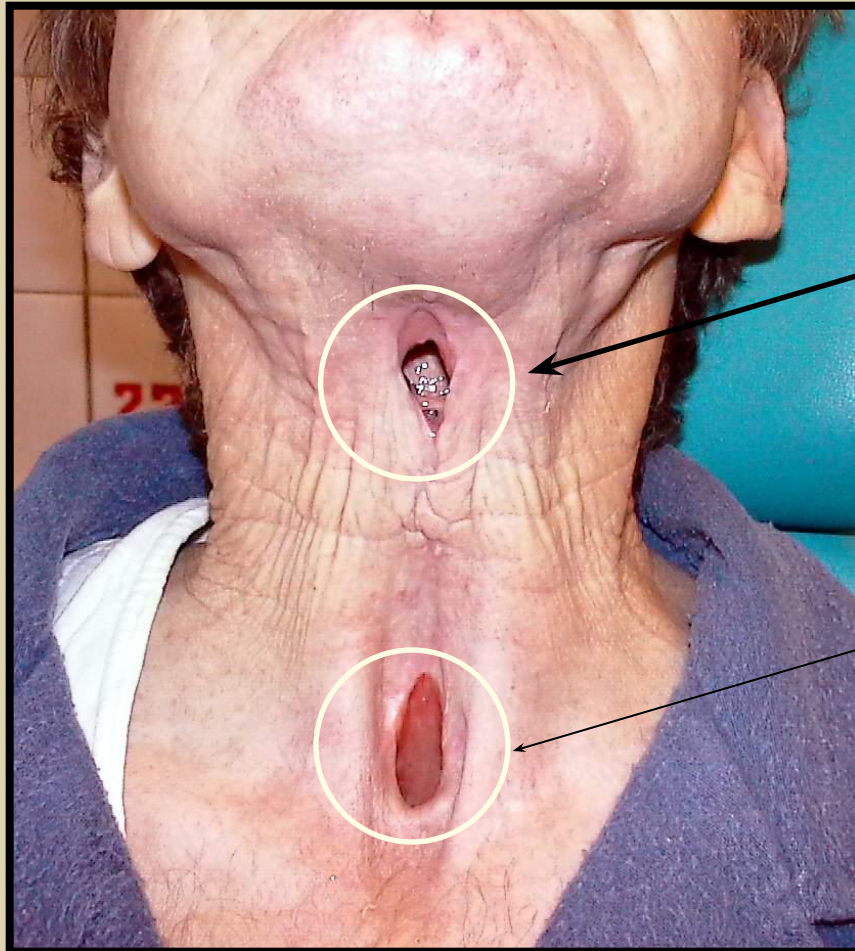
Macro-preparation

TECHNOLOGY OF TRACHEOESOPHAGEAL SHUNTING WITH VOCAL PROSTHESIS INSERTING



SET FOR INSERTING VOCAL PROSTHESES

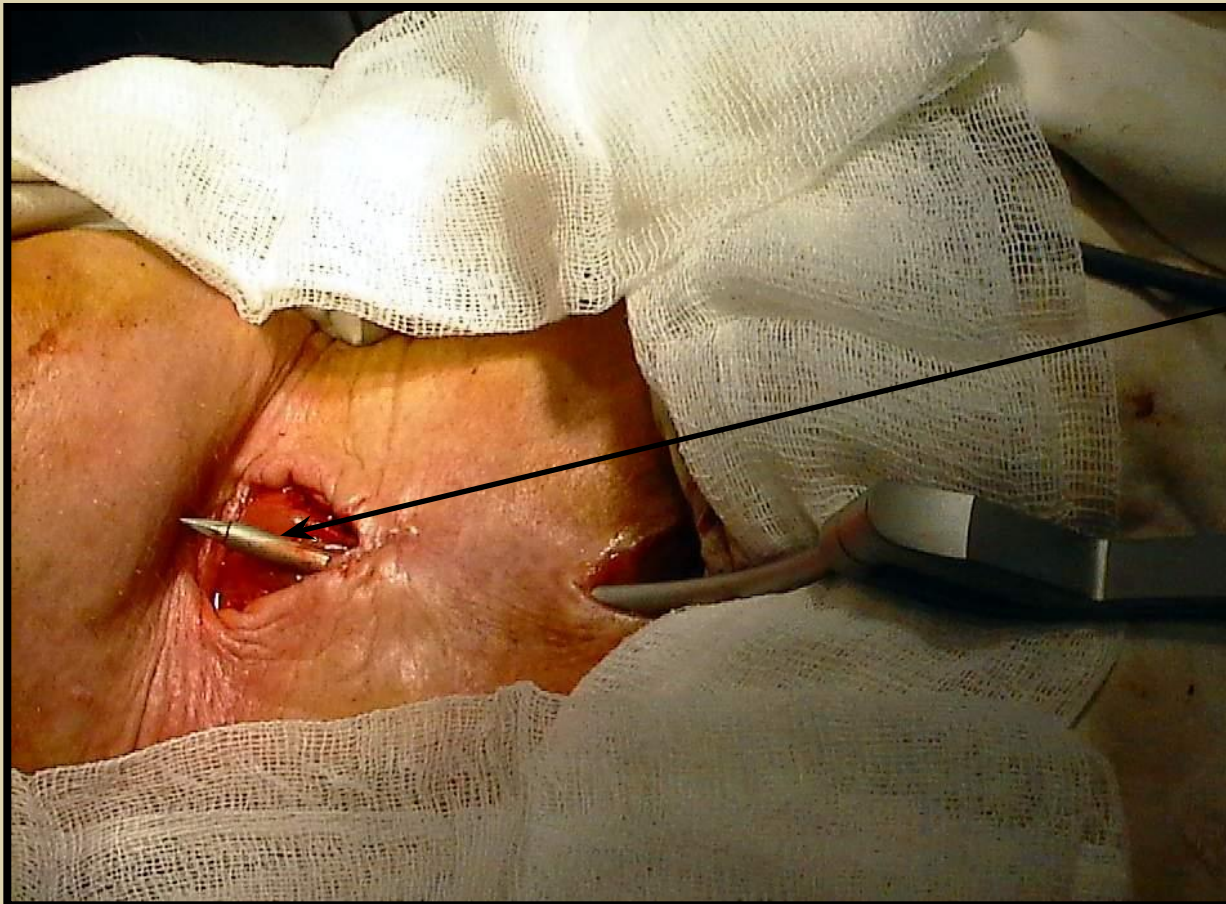
ONE-STAGE REPARATION OF VOCAL AND ESOPHAGEAL FUNCTIONS



PHARYNGOSTOMA

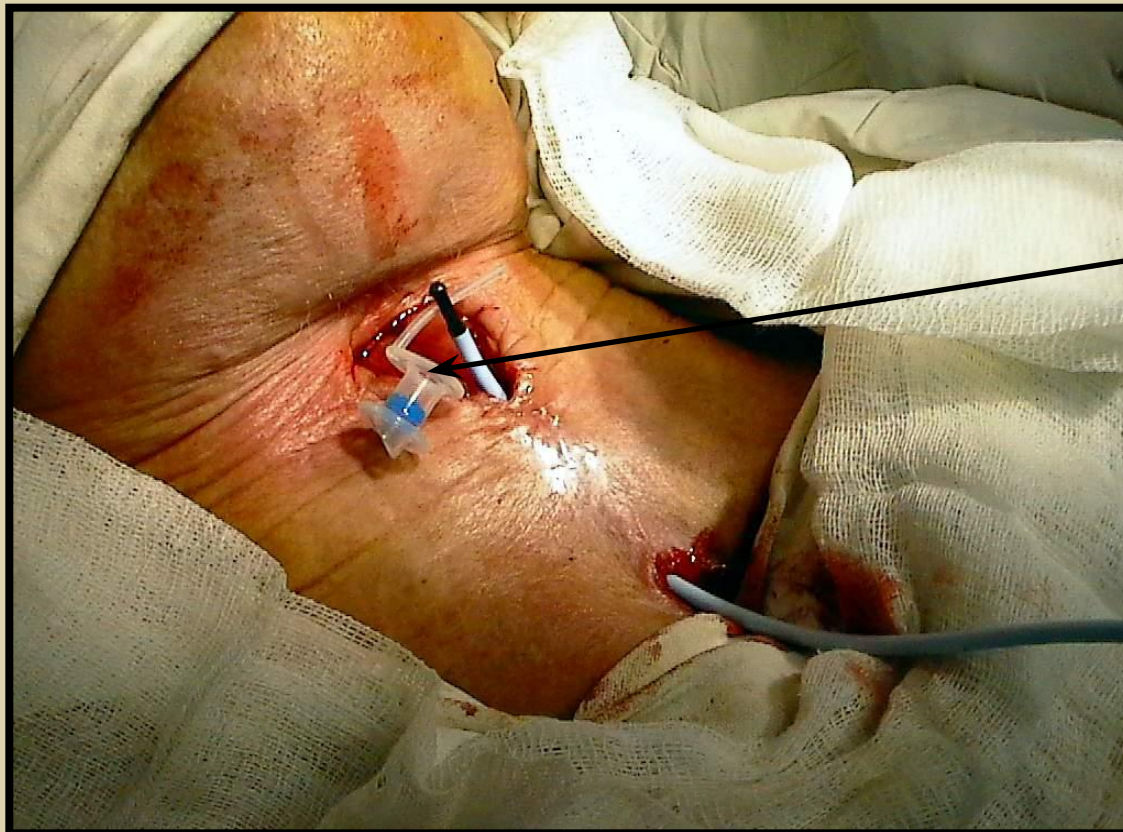
TRACHEOSTOMA

TRACHEOESOPHAGEAL ANASTOMOSIS FORMING



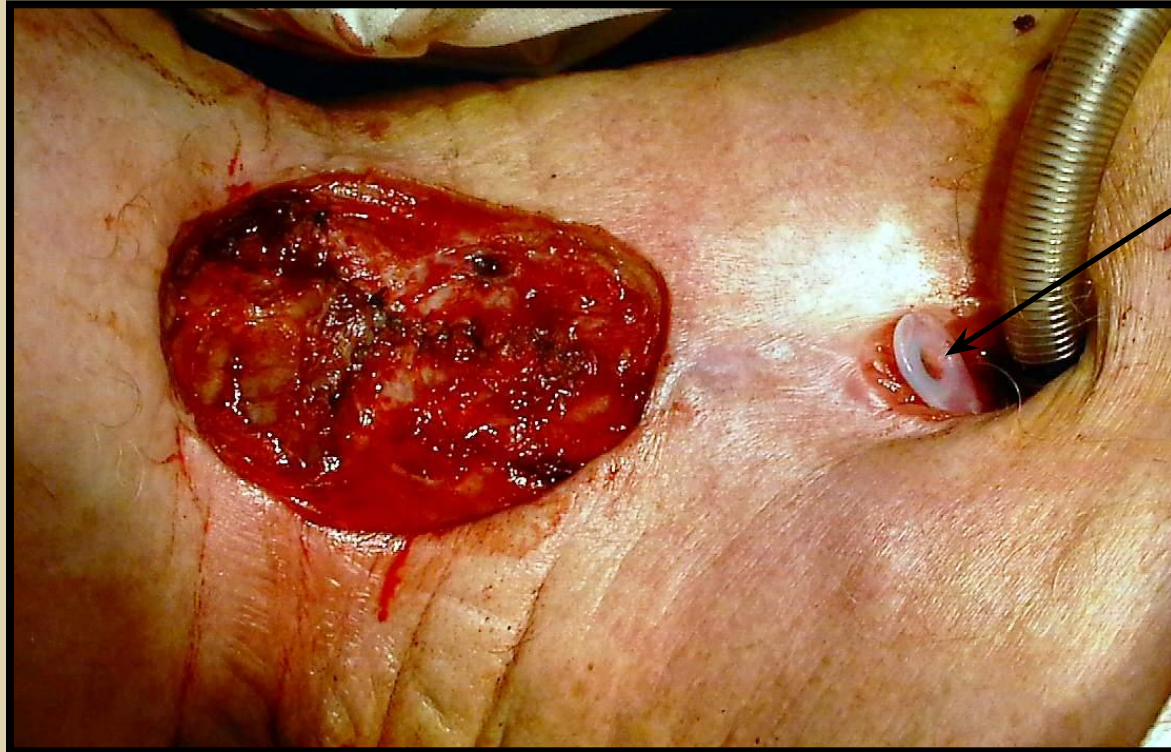
The trochar is
inserted
via pharynx

PROSTHESIS FIXATION IN CONDUCTOR



The prosthesis
is fixed
in a conductor

PHARYNX ANTERIOR WALL FORMING WITH LOCAL TISSUES



Vocal prosthesis

THE SKIN DEFECT IS REMOVED WITH SKIN AND MUSCULAR PECTORAL GRAFT



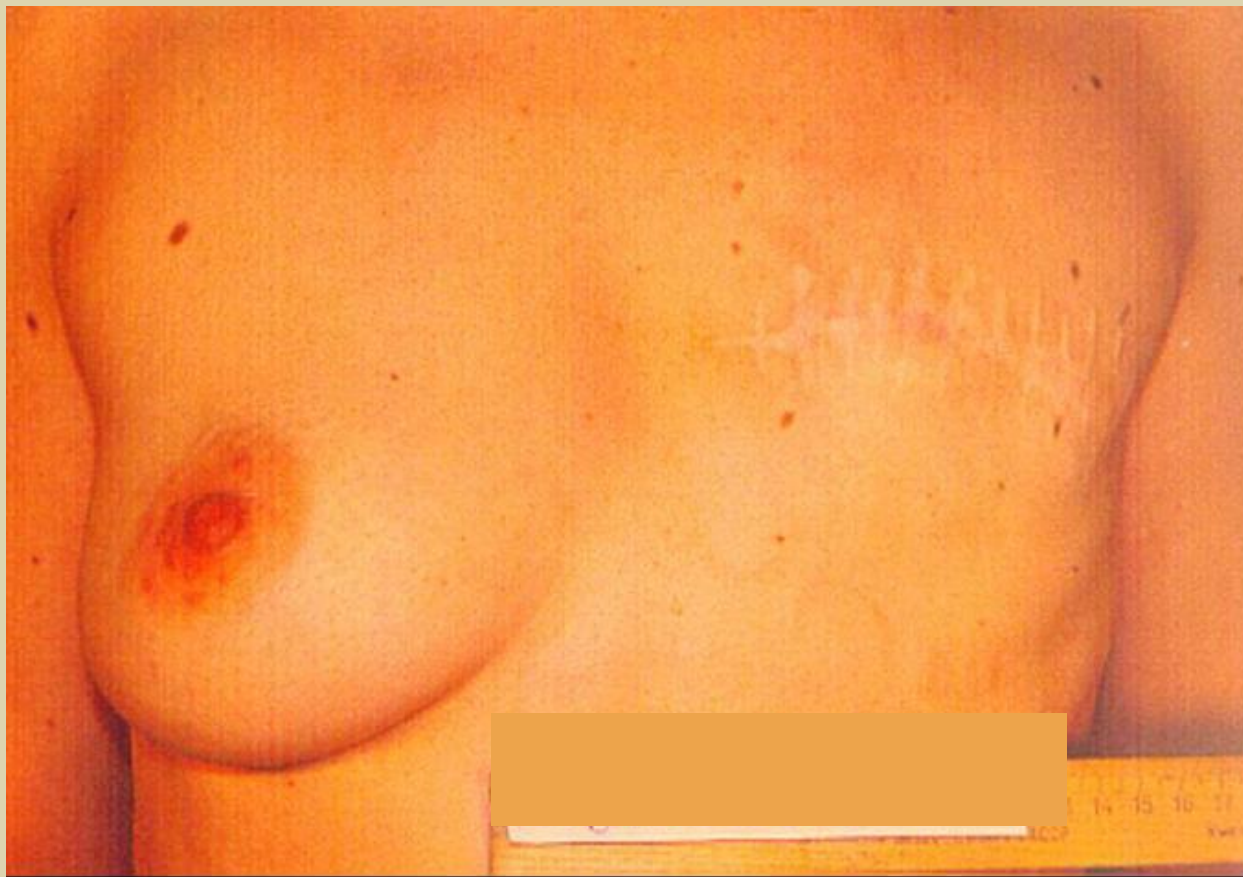
INSERTED VOCAL PROSTHESIS





Plastic Operations in Patients with Breast Cancer

DELAYED MAMMAPLASTY



Patient Z, 34 y.o.

Diagnosis: left breast cancer T2N0M0G2.

The condition after a complex treatment in 1996–1997.



The same patient.

The condition after a delayed mammoplasty with a free TRAM-graft in 1999.



The same patient.

The condition after the reconstruction of mamillary and areolar complex in 2001.

Right breast cancer T2N1M0.

The condition after bilateral subcutaneous mastectomy and one-stage mammoplasty through a combined method (the broadest back muscle + endoprosthesis)



Postmastectomy Syndrome





Plasty of Soft Tissues





Rhabdomyosarcoma of Left Forearm Soft Tissues



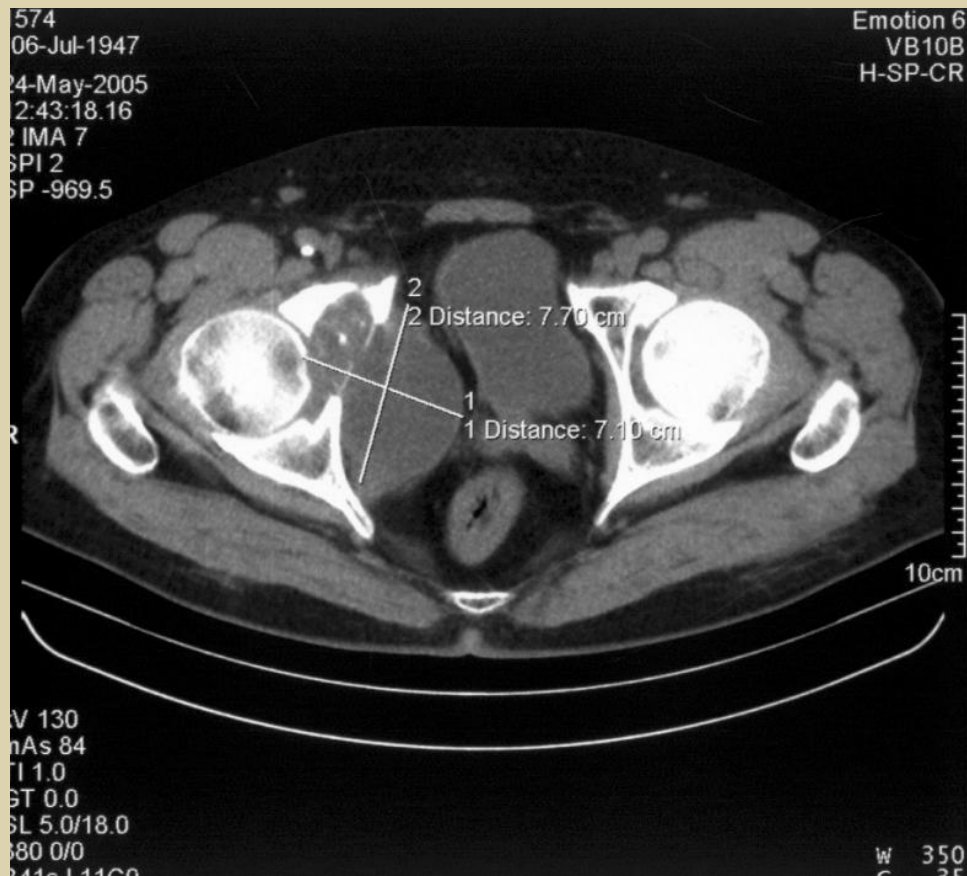
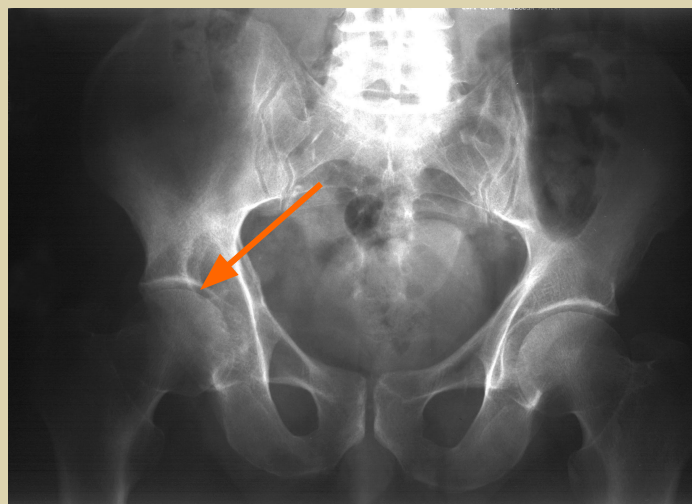
The same patient: plasty with a radial fixed vascular pedicle flap

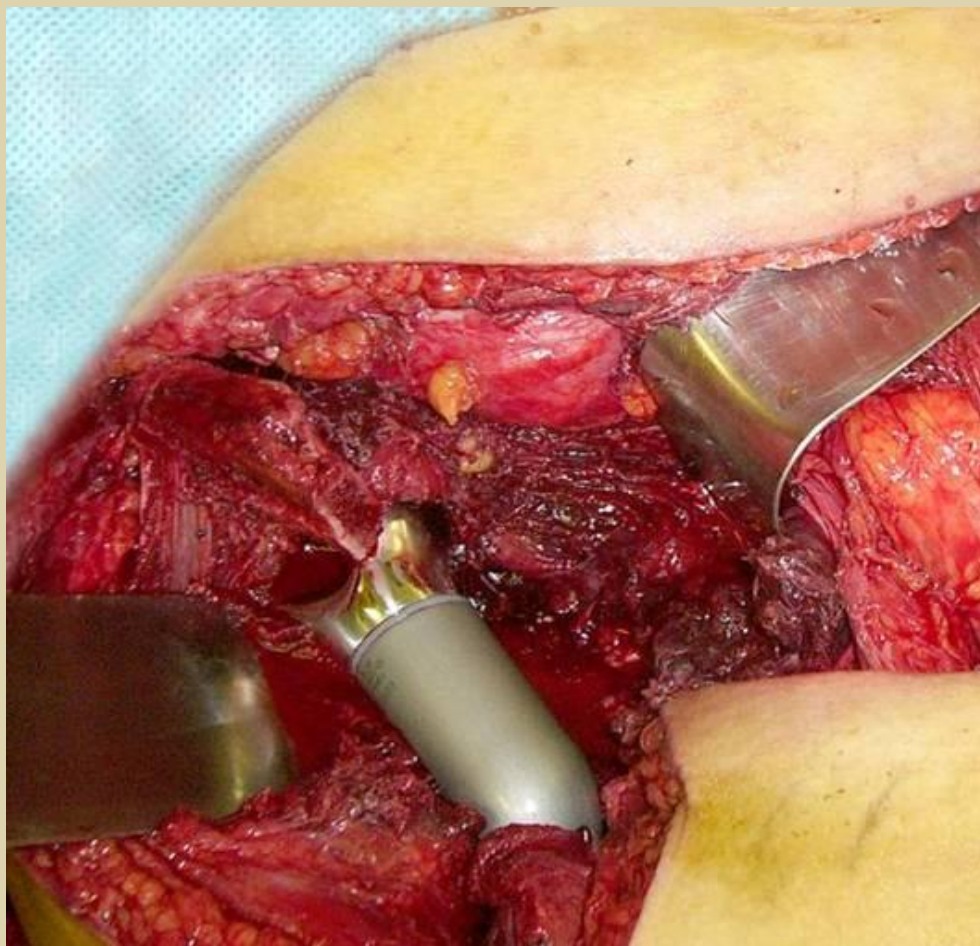




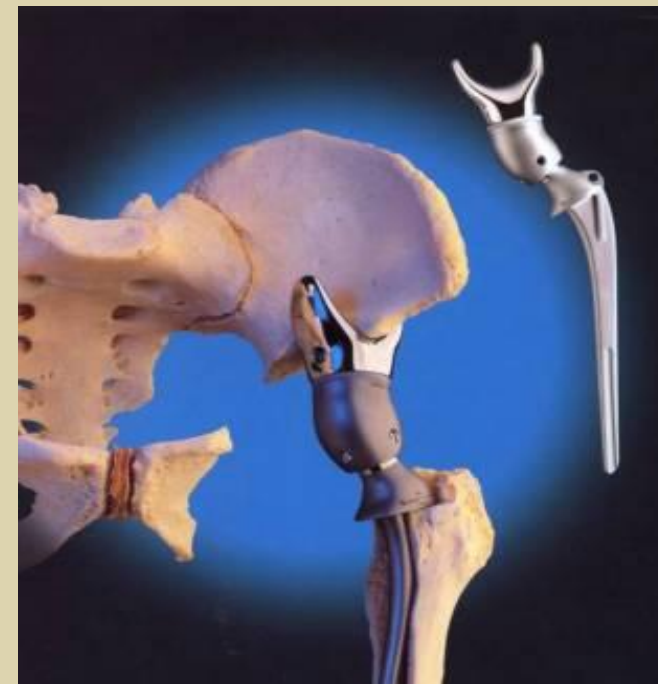
Operations Preserving Organs under Bone Tumours







Endoprosthesis with saddle-like prosthesis





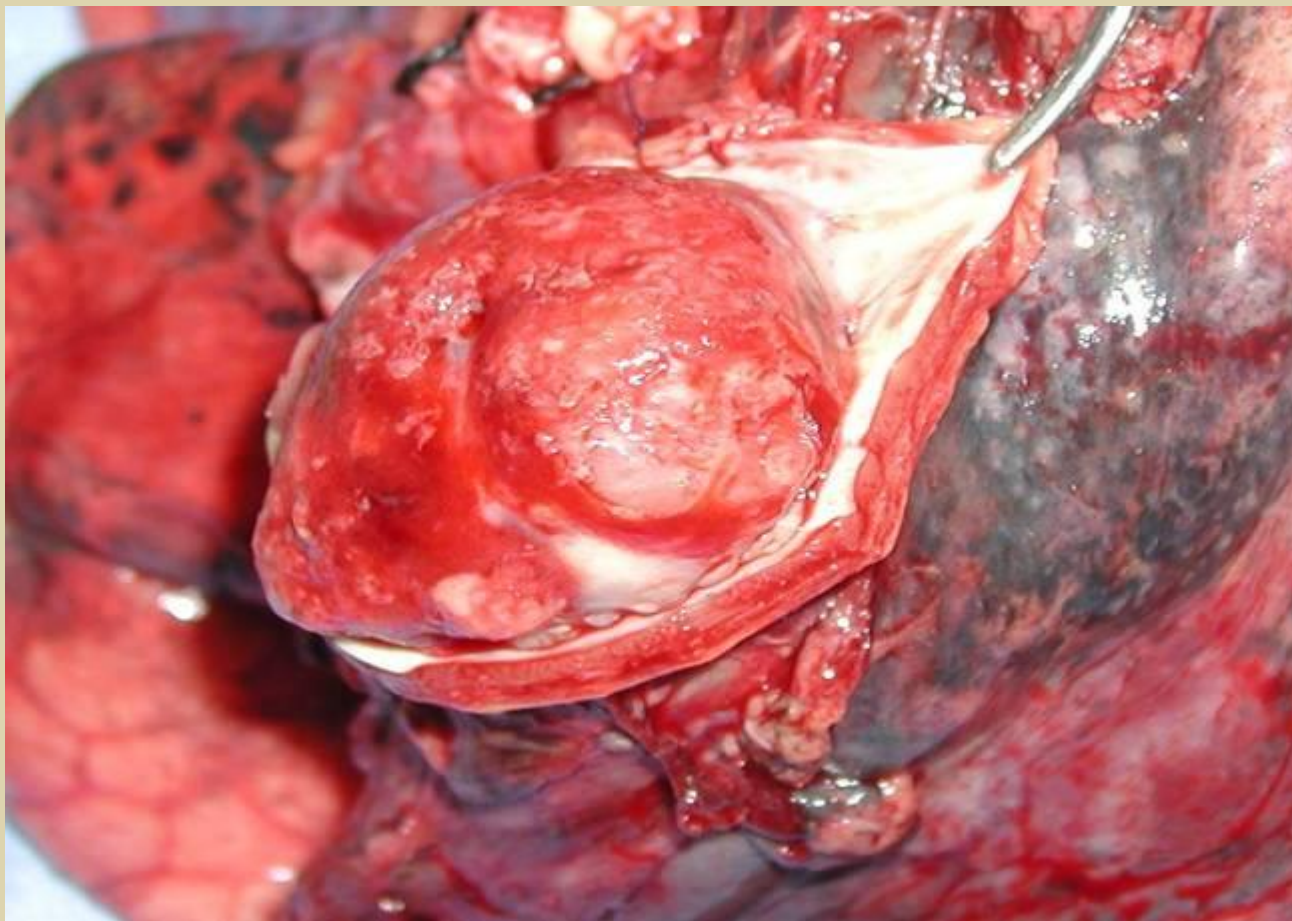


Lung Cancer and Mediastrium Tumours

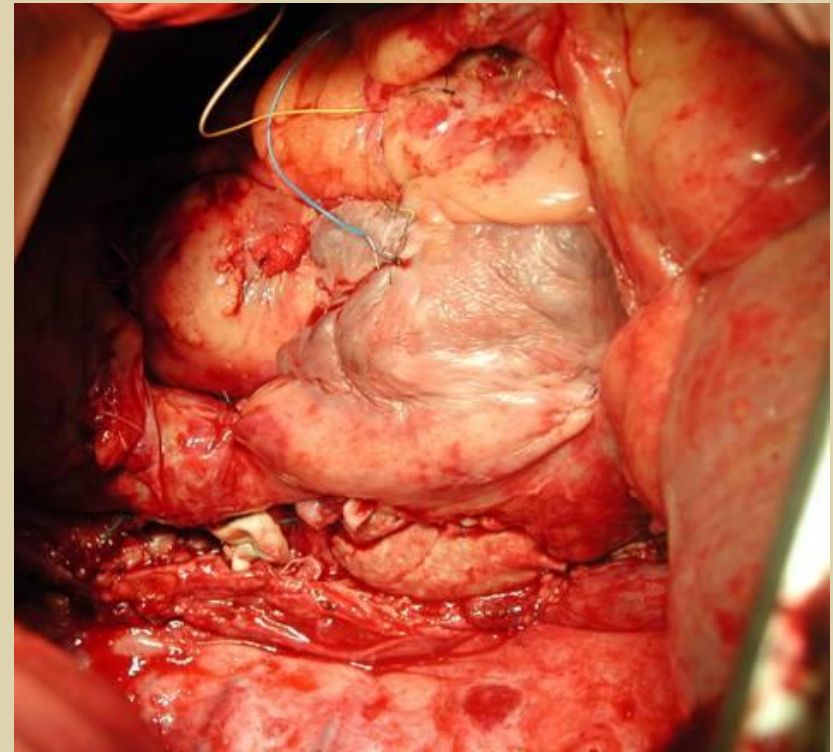
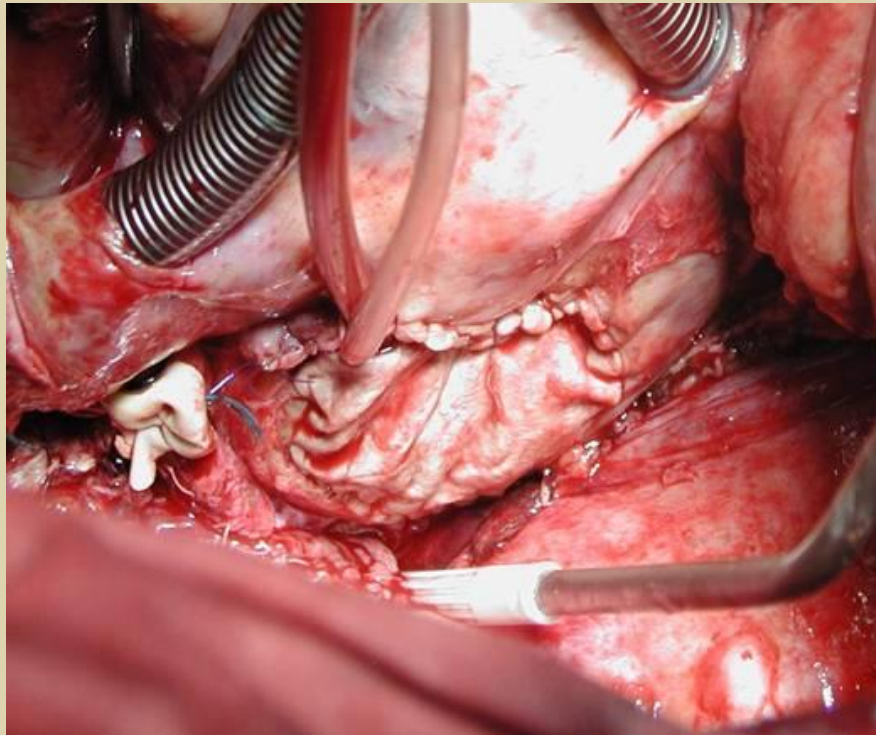
Lung Tumour Invading Left Atrium Lumen



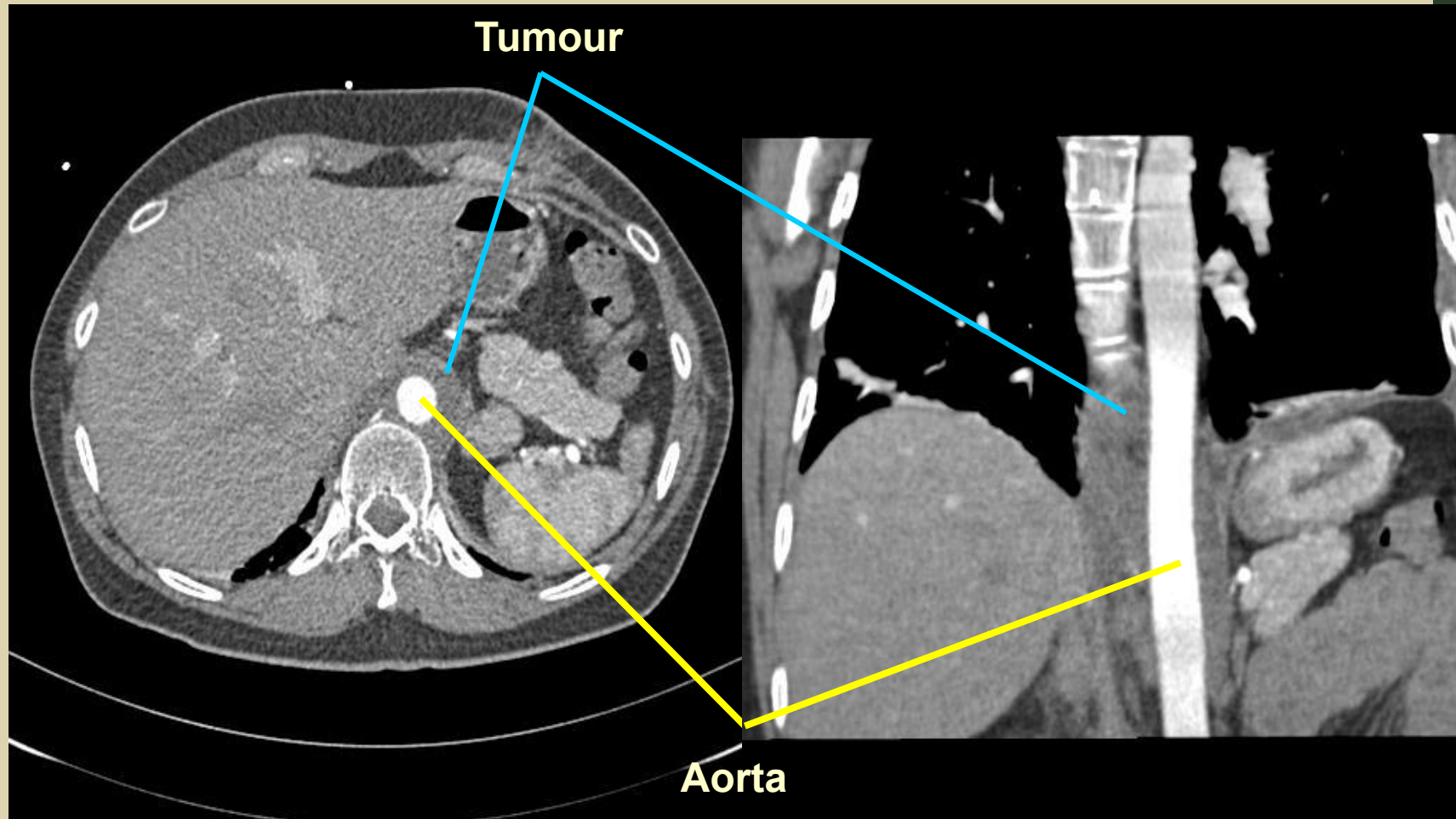
Tumour in Left Atrium Lumen



The lung is removed, the left atrium wall defect is substituted with xenopericardium



MSCT before Operation



Detecting Site of Thoracic and Abdominal Aorta with Tumour

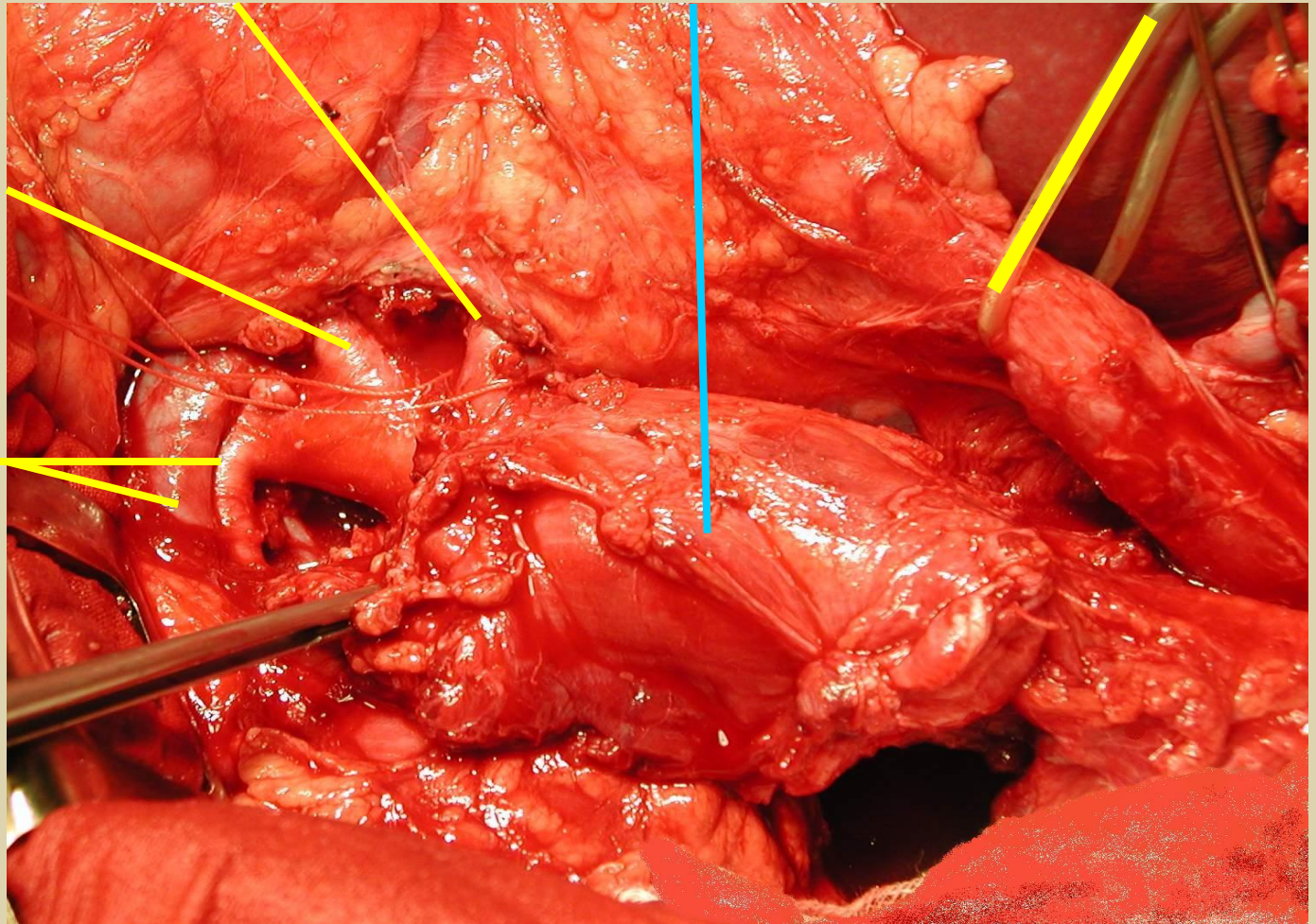
Celiac trunk

Aorta tumour

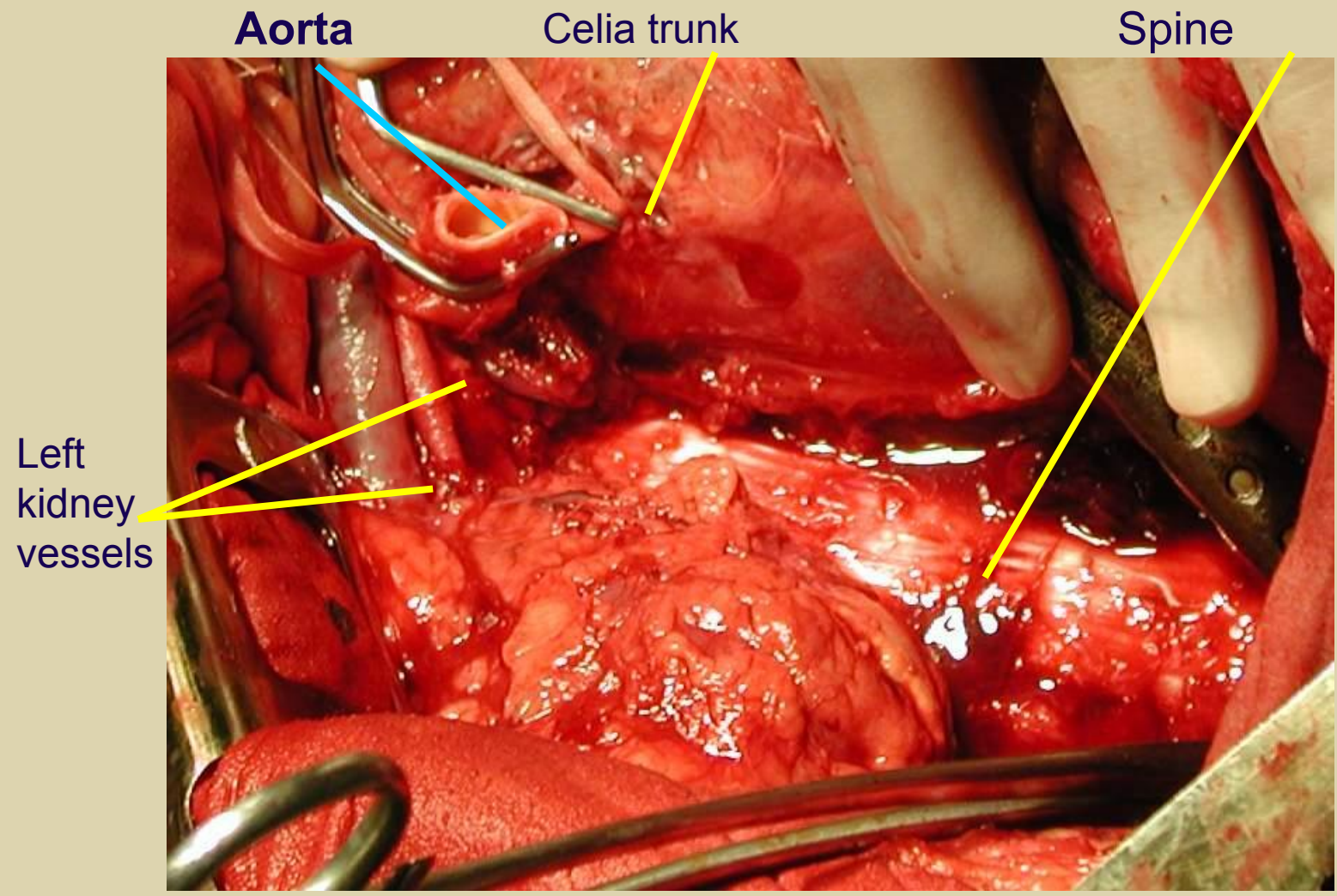
Esophagus

SMA

Left
kidney
vessels



The site of aorta with tumour is resected.



The prosthesis is made to aorta.

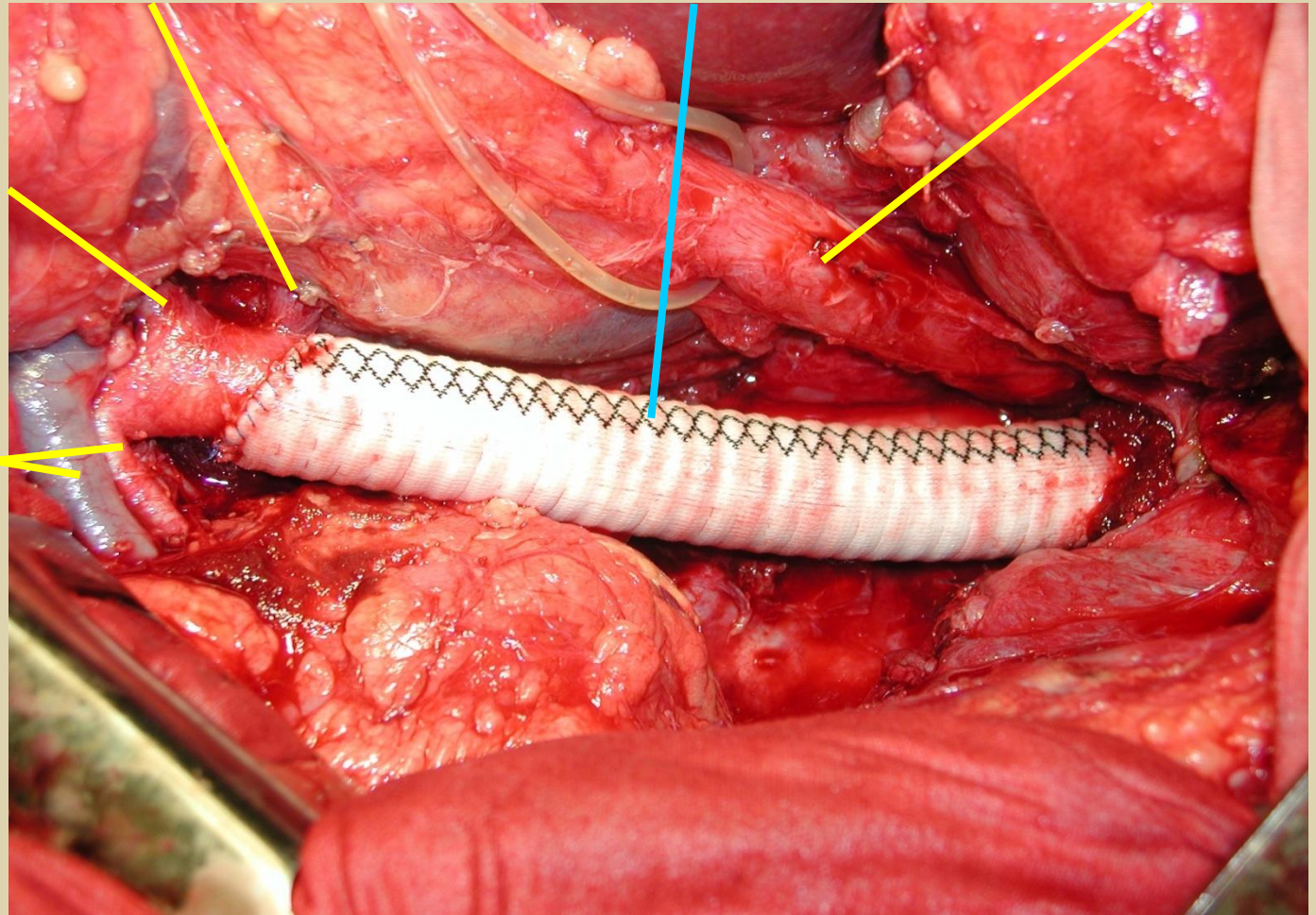
Celia trunk

Aorta prosthesis

Esophagus

SMA

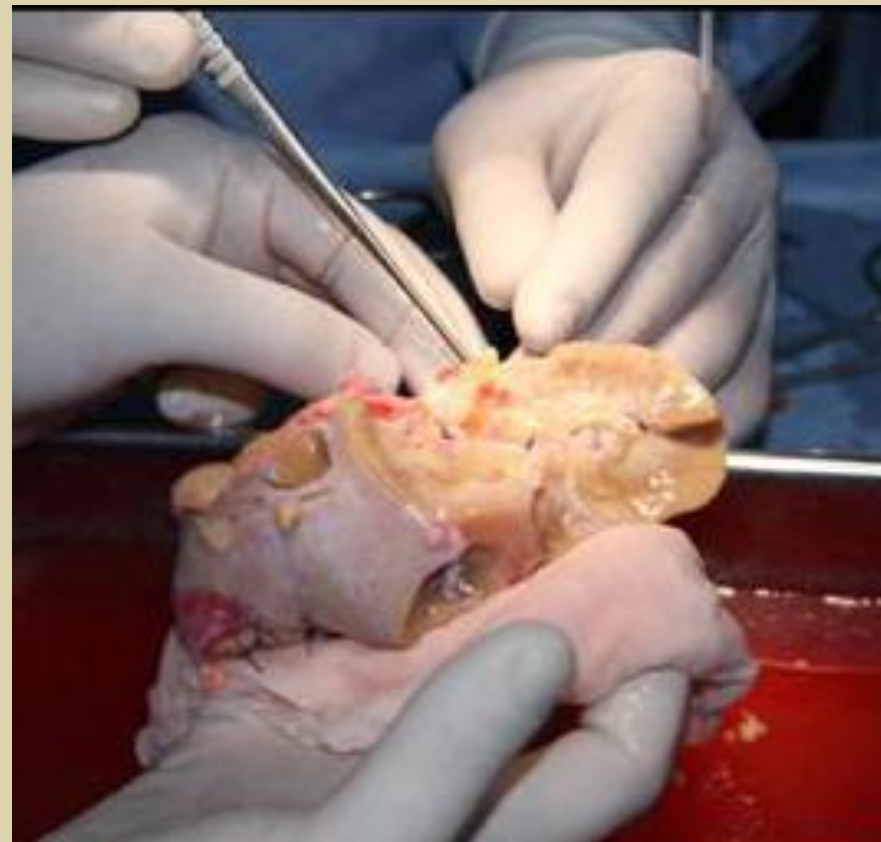
Left
kidney
vessels

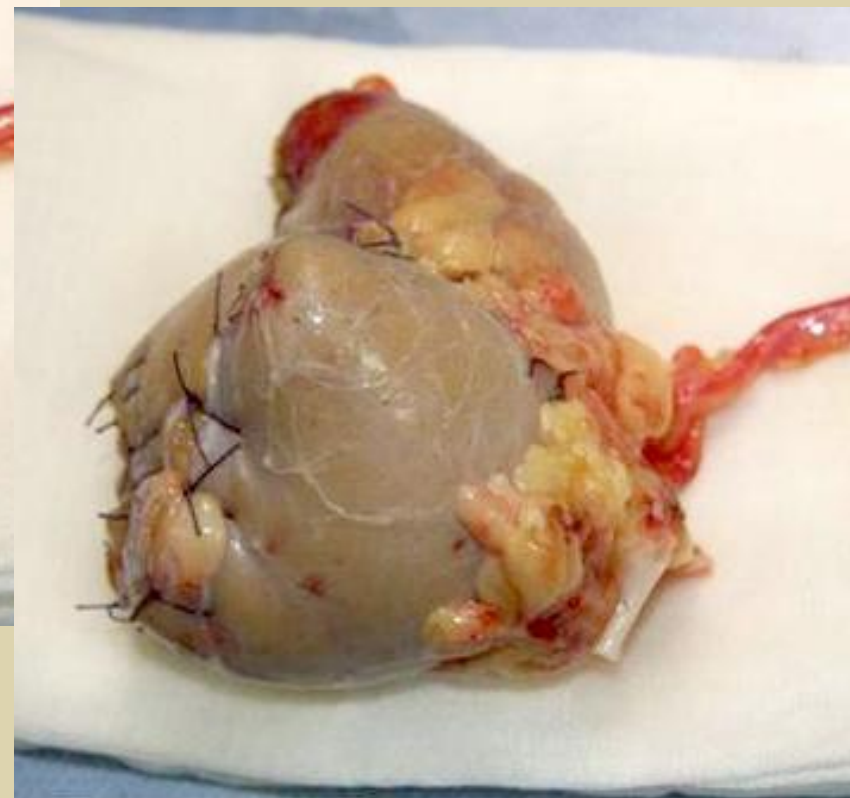


Macropreparation



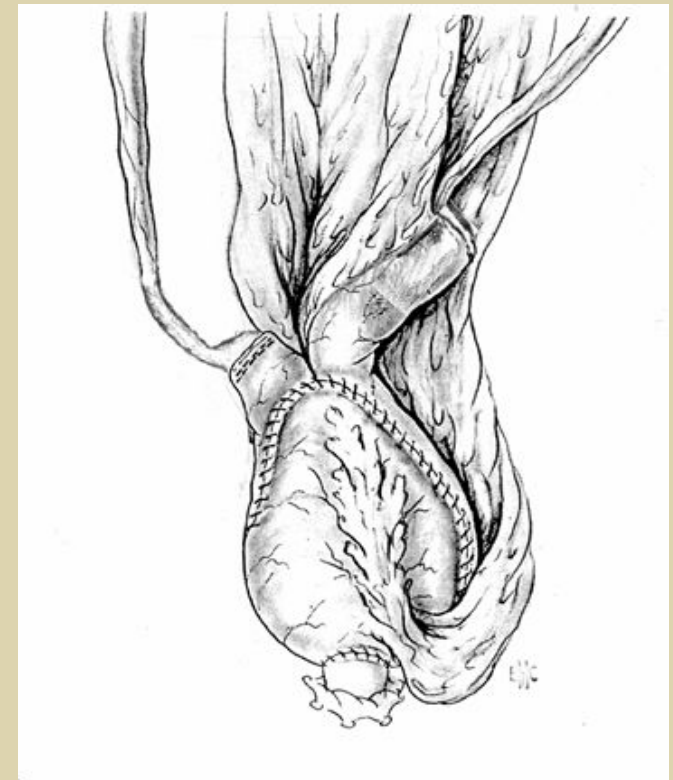
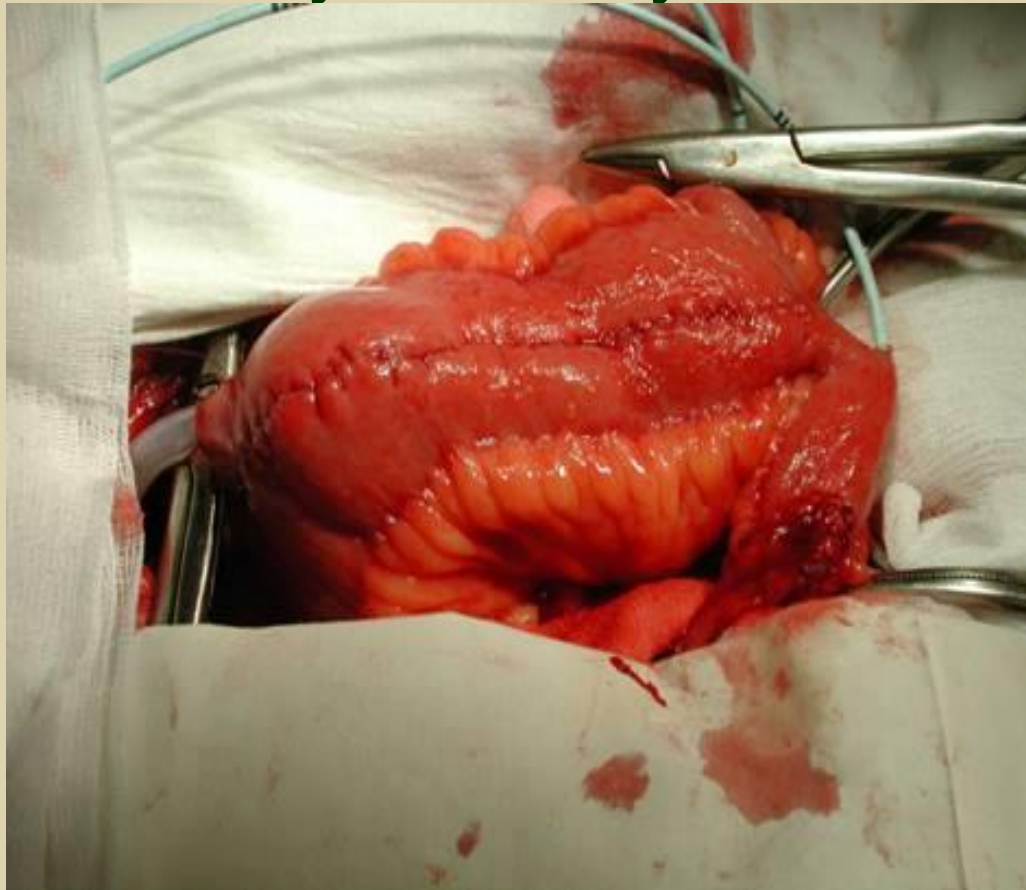
Extracorporeal nephrectomy with autotransplantation





View of reconstructed kidney

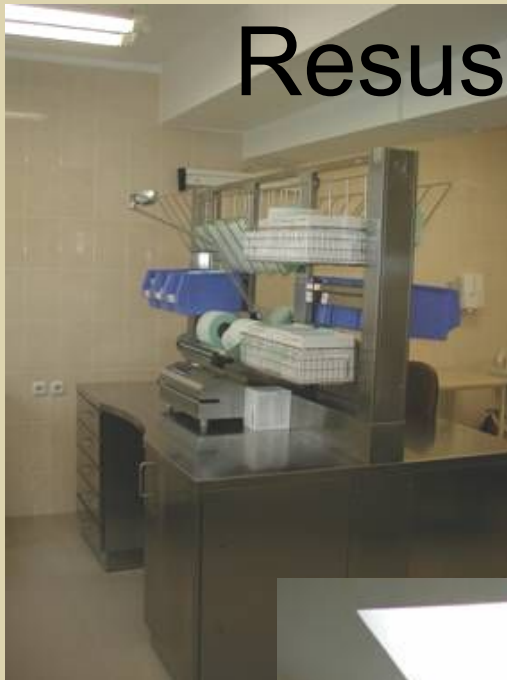
Ileocystoplasty according to R. Hautmann (Modified) after Radical Cystectomy due to Bladder Cancer



Operating Block



Resuscitation Department



The apparatus “Artificial Kidney”



Procedure of extracorporeal
detoxication using the apparatus
«Multifiltrat»





Radiotherapy

Material and Technical Basis of Remote Radiotherapy

No	Title of apparatus	Mark of apparatus	Producer	Exploitation start
1.	Linear accelerator	Trilogy	Varian (USA)	2008
2.	Linear accelerator	Clinac-230 0CD	Varian (USA)	2005
3.	Linear accelerator	Mevatron KD-2	Simens (Germany)	1996
4.	Gamma-therapeutic apparatus	Teratron	Canada	2008
5.	Gamma-therapeutic apparatus	Rocus-AM	Russia	1992



Material and Technical Basis of Short Focus and Contact Radiotherapy

No	Title of apparatus	Mark of apparatus	Producer	Exploitation start
1.	Apparatus for short focus radiotherapy	X-ray-TA 01	Russia	1997
2.	Apparatus for contact radiotherapy	Microselectron HDR-old	Nucletron (Holland)	1990
3.	Apparatus for contact radiotherapy	Microselectron PDR	Nucletron (Holland)	1995
4.	X-ray-topometric complex for contact radiotherapy IBU	Microselectron HDR	Nucletron (Holland)	2008

Material and Technical Basis for Preradiation Preparation

No	Title of apparatus	Mark of apparatus	Producer	Exploitation start
1.	X-ray simulator	Acquity	Varian (USA)	2005
2.	X-ray simulator	Simulix	Neucletron (Holland)	1998
3.	System for planning	Eclipse	Varian (USA)	2005
4.	System for planning	Oncentre Masterplan	Neucletron (Holland)	2008
5.	System for planning	Plato	Neucletron (Holland)	1995
6.	System for planning	Prazur	Russia	1992
7.	Computer tomograph	Lightspeed	General Electrics (USA)	2005

Material and Technical Basis (Auxiliary Devices and Dosimetry)

№	Title of apparatus	Producer	Exploitation start
1.	System for making individual blocks	Holland	2008
2.	Fixing appliances and devices	Sivco (USA)	2005
3.	Set of dosimetric equipment	Canberra Paccard (Austria)	2005

Radiotherapeutic Complex

Linear accelerator with 2 photon energies and 6-8 energies of electrons with a many-plane diaphragm, with a mobile system of getting tomographic images through X-ray bundle according to the procedure “Cone-beam CT” for localizing a target, verifying an irradiation plan and posing a patient (IGRT)





High Technologies in Radiotherapy

- **Three-dimensional conformal radiotherapy**
- **Radiotherapy with modulating dose intensity**
- **Stereotaxic radiotherapy / radiosurgery**
- **Four-dimensional conformal radiotherapy**

Brachytherapy Using an Integrated X-ray and Topometric Complex (IBU)



Brachytherapy of prostate tumours with high dose power controlled through TRUZI and planning in the SWIFT- system online



Hyperthermia



Equipment for Photodynamic Therapy and Diagnosis



«Kamin-Video»

«Metalaz-M»



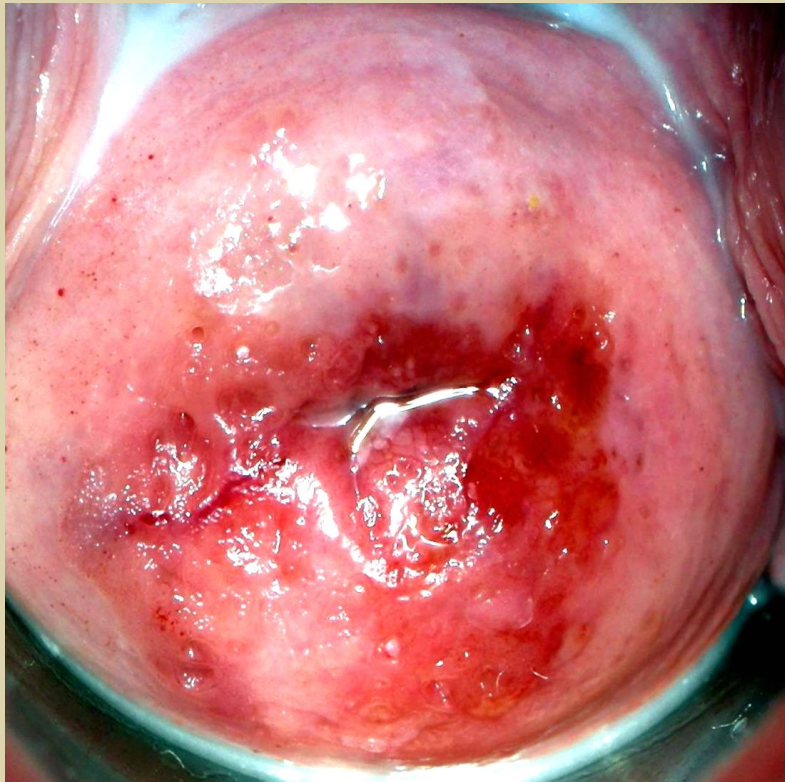
«Lesa-6»

«LD-680»

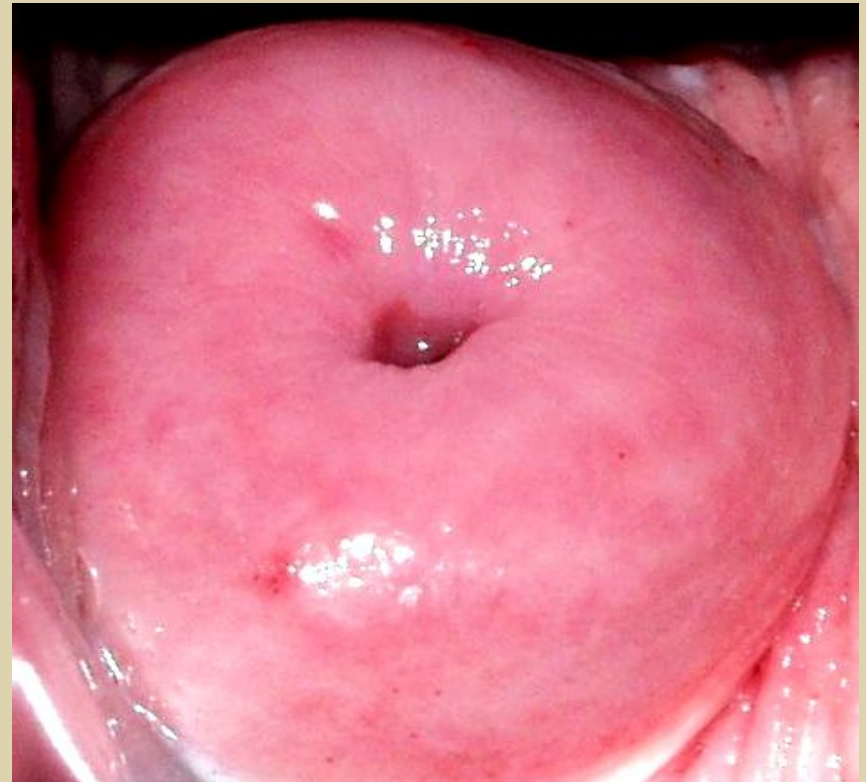


Photodynamic Therapy under Cervical Dysplasia

Patient C., 34 y.o., CIN III. 26.10.07. – PDT

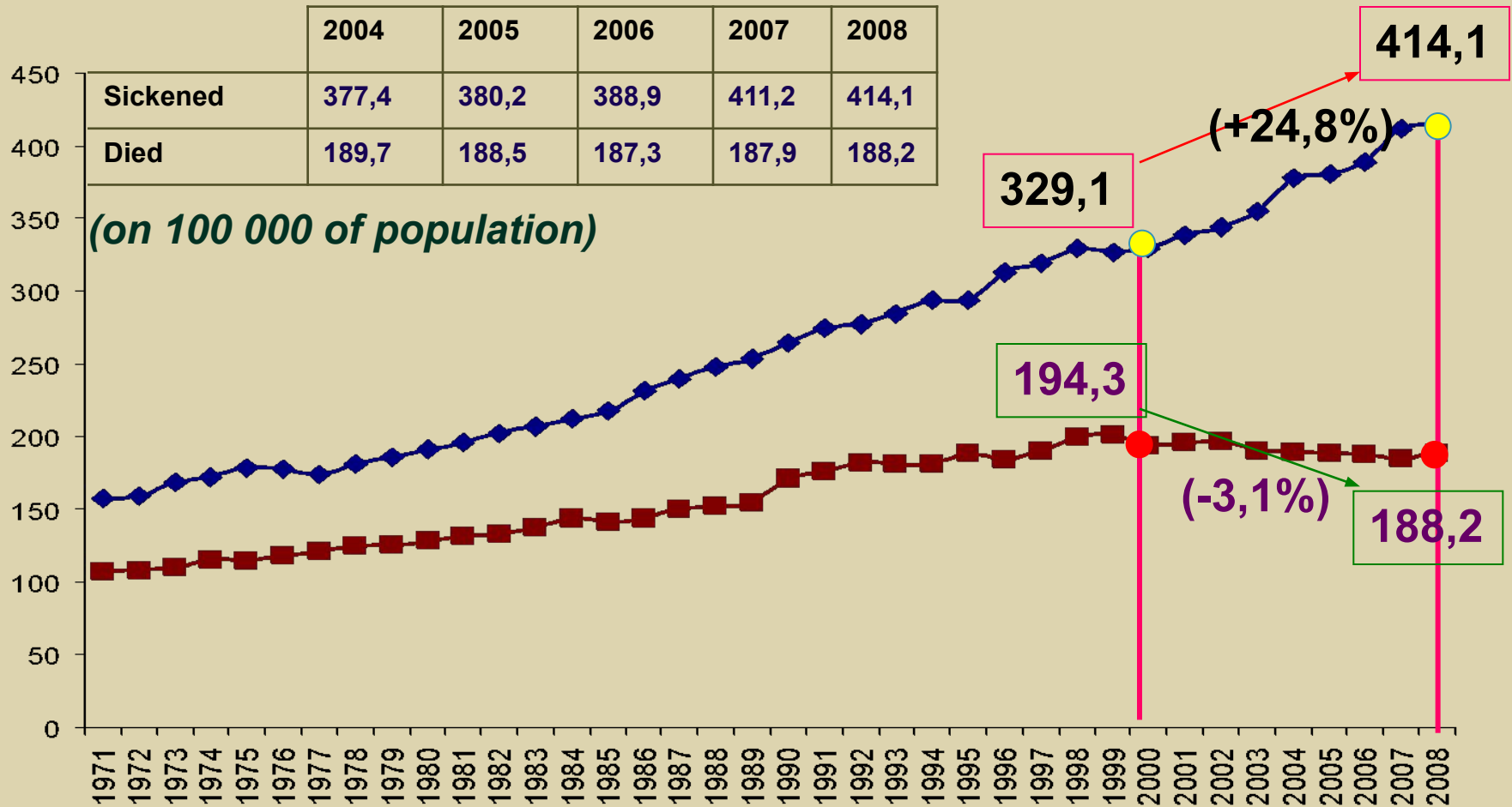


Before treatment




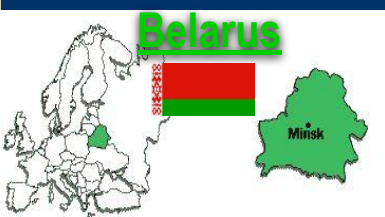
6 months afterwards

Dynamics of Malignant Neoplasm Morbidity and Mortality in the Republic of Belarus



Data of the Cancer-Register. Data of the National Committee on Statistics of Belarus

Correlation of the Died due to Malignant Neoplasms to the Number of the Sickened (2004)

Region	Number of the sickened	Number of the died	Number of the died/ Number of the sickened
 <p>Europe</p>	2 886 800	1 711 000	59%
 <p>European Union</p>	2 060 400	1 161 300	56%
 <p>Belarus</p>	32 798	17 892	55% (2004)
	38 655	18 234	47% (2008)

