

Lung cancer

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- Lung cancer = bronchogenic carcinoma - include tumors of lung and bronchi
- In 1912 all cases of lung cancer worldwide were documented, it was 374 cases **x** in 2018 according to WHO there are 2 093 876 new cases of lung cancer in the world
- Smoking is still a main risk factor

Introduction

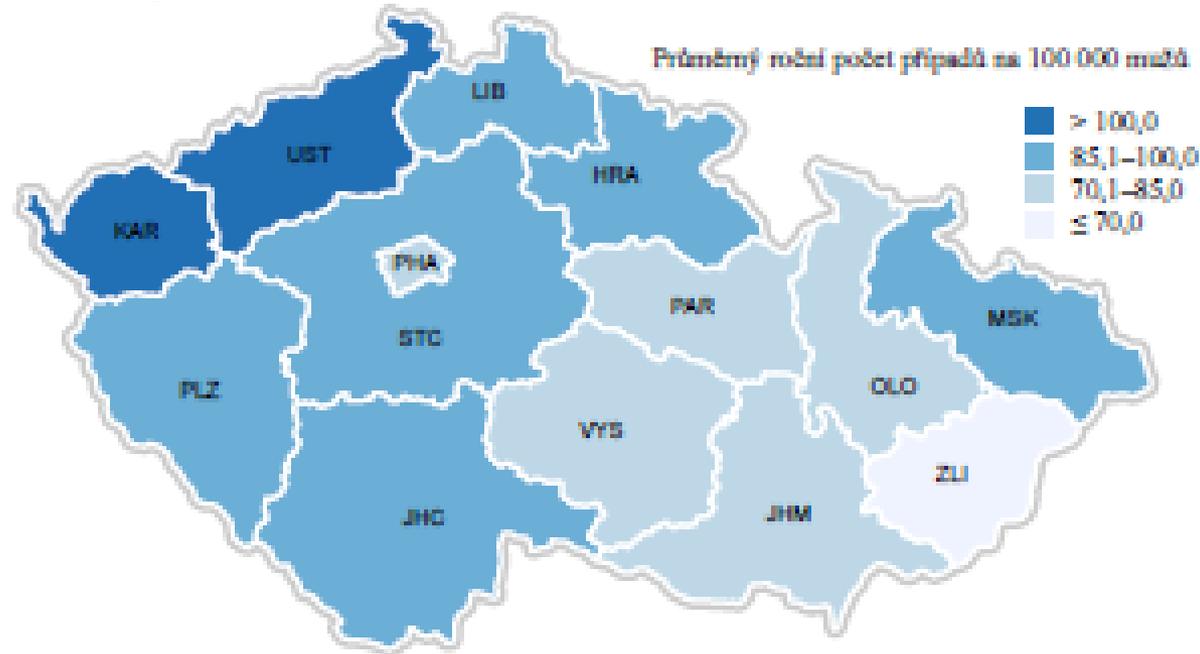
- The highest incidence and mortality from oncological diagnosis in men and women in the Czech Republic
- Incidence 6 782 cases (4478, 2304)
- While incidence in men decreased, in women it is still increasing (!)

Demography in CR (2016)

- Lung cancer is most common in 7th decenium, the bigger increase of incidence was in 2014 around 55 years
- A lot of cases are diagnosed in the locally advanced and metastatic stages (IIIB a IV), 5-year survival is 10%
- Some areas of our country have higher incidence because of mining expecially

Demografic data 2014

Incidence¹ ZN průdušnice, průdušky a plic (C33, C34) u mužů
v krajích České republiky v období 2010–2014



Distribution in the Czech republic

T_x	Tumor in sputum/bronchial washings but not be assessed in imaging or bronchoscopy
T₀	No evidence of tumor
T_{is}	Carcinoma in situ
T₁	≤ 3 cm surrounded by lung/visceral pleura, not involving main bronchus
T_{1a(mi)}	Minimally invasive carcinoma
T_{1a}	≤ 1 cm
T_{1b}	> 1 to ≤ 2 cm
T_{1c}	> 2 to ≤ 3 cm
T₂	> 3 to ≤ 5 cm or involvement of main bronchus without carina, regardless of distance from carina or invasion visceral pleural or atelectasis or post obstructive pneumonitis extending to hilum
T_{2a}	>3 to ≤4cm
T_{2b}	>4 to ≤5cm
T₃	>5 to ≤7cm in greatest dimension or tumor of any size that involves chest wall, pericardium, phrenic nerve or satellite nodules in the same lobe
T₄	> 7cm in greatest dimension or any tumor with invasion of mediastinum, diaphragm, heart, great vessels, recurrent laryngeal nerve, carina, trachea, oesophagus, spine or separate tumor in different lobe of ipsilateral lung
N₁	Ipsilateral peribronchial and/or hilar nodes and intrapulmonary nodes
2	Ipsilateral mediastinal and/or subcarinal nodes
3	Contralateral mediastinal or hilar; ipsilateral/contralateral scalene/supraclavicular
M₁	Distant metastasis
M_{1a}	Tumor in contralateral lung or pleural/pericardial nodule/malignant effusion
M_{1b}	Single extrathoracic metastasis, including single non-regional lymphnode
M_{1c}	Multiple extrathoracic metastases in one or more organs

	No	N1	N2	N3
T1	IA	IIB	IIIA	IIIB
T2a	IB	IIB	IIIA	IIIB
T2b	IIA	IIB	IIIA	IIIB
T3	IIB	IIIA	IIIB	IIIC
T4	IIIA	IIIA	IIIB	IIIC
M1a	IVA	IVA	IVA	IVA
M1b	IVA	IVA	IVA	IVA
M1c	IVB	IVB	IVB	IVB

The TNM Classification

- The most useful classification of lung cancer reflects its biological properties is into:

Non-small cell lung cancer (**NSCLC**)

Small cell lung cancer (**SCLC**)

Classification

- 80% of all lung cancers
- TNM classification
- Histological types – squamous cell carcinoma, adenocarcinoma, large cell carcinoma
- Some types of carcinomas can be mixed (squamous/adeno, NSCSL/SCLC)
- Biological features: slow growth, lower sensitivity to chemo and radiotherapy

NSCLC

- 20% of all lung cancers
- Stage – limited disease or extensive disease (ED)
- No further histological subclassification

- Biological features: rapid growth, huge tendency to metastasise early (usually bones and brain), paraneoplastic signs, sensitivity to chemo and radiotherapy
- Usually central tumours, can cause vena cava superior syndrome

SCLC

- The most important is well done history and physical examination of a patient!
- History:
family history, other oncological diseases, smoking, professional risks, cough, hemoptysis, chest pain, dyspnoe, dysphagia, recurrent pneumonias

Lung cancer - Patients history

We can observe:

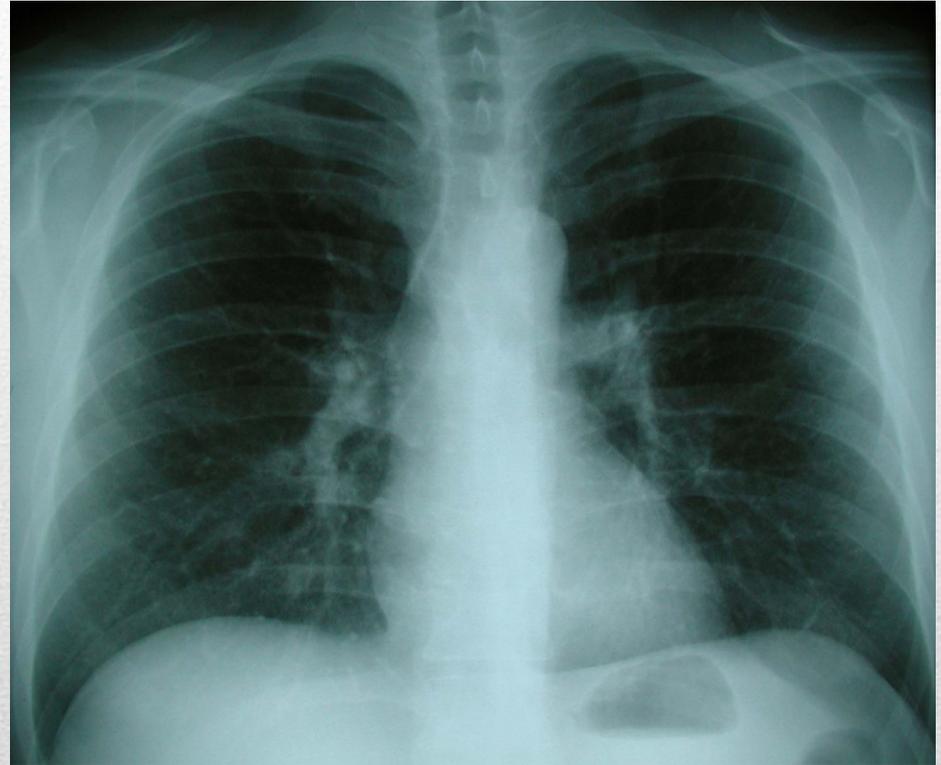
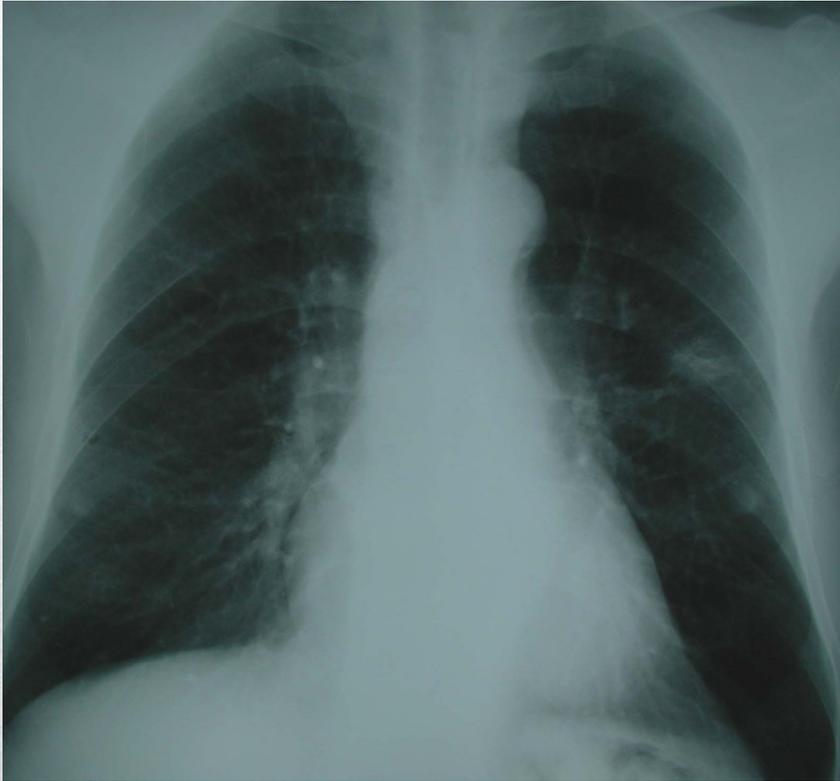
- Cyanosis, ikterus
- Edema of extremities, vena cava syndrome
- Dyspnoe, stridor
- Peripheral lymfadenopathy
- Rarely Claude-Bernard-Horner syndrome
- Any kind of paraneoplastic syndrome
- Physiological breathing, weakened or non-audible, wheezes, dull percussion

Lung cancer – Physical examination

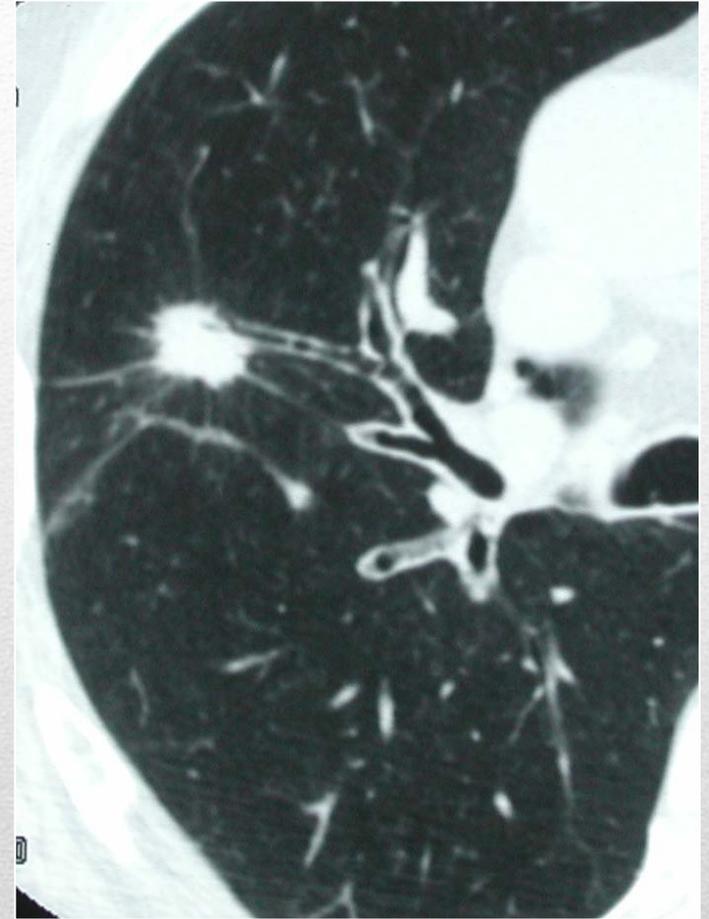
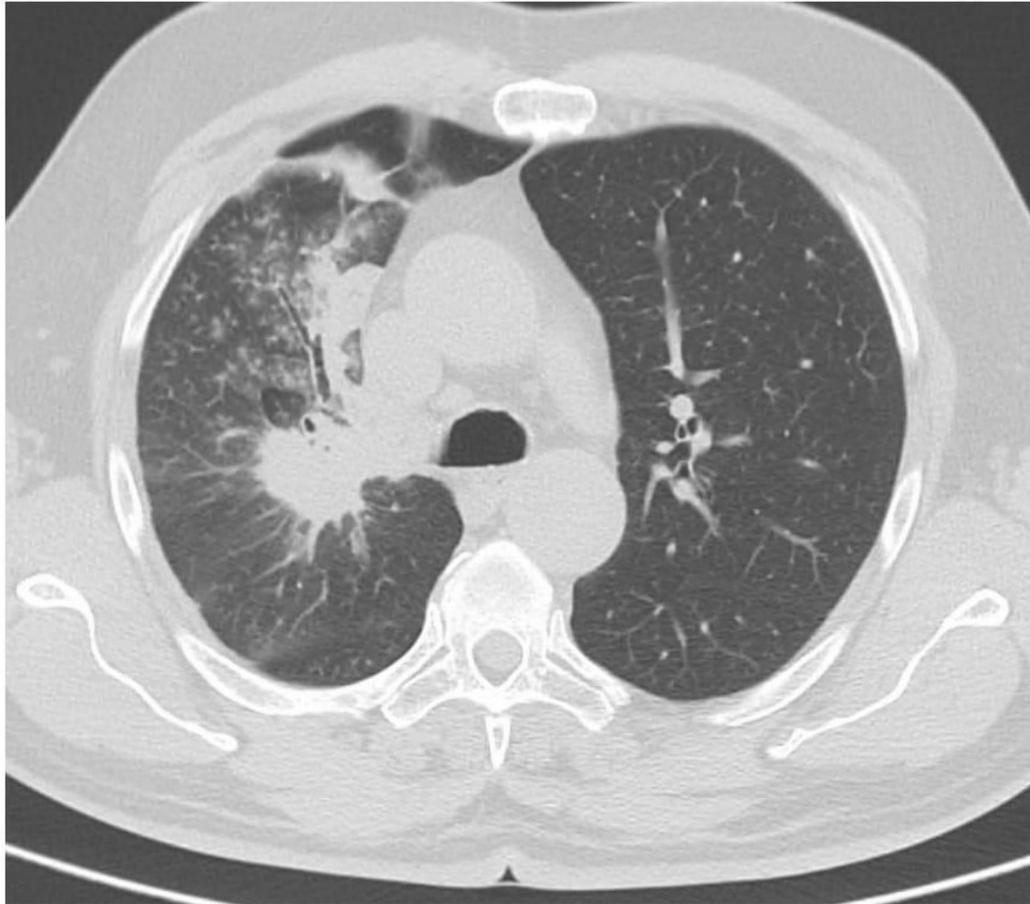
- Postero-anterior and lateral chest X-rays
- CT scan of lung and abdomen
- Bronchoscopy and its modifications
- Transparietal puncture biopsy
- Thoracoscopy (VATS or mediastinoscopy)
- Cytological examination of pleural fluid
- MR of a brain (SCLC), scintigraphy of bones (SCLC)

- **Final diagnosis is always based on histological or cytological findings**

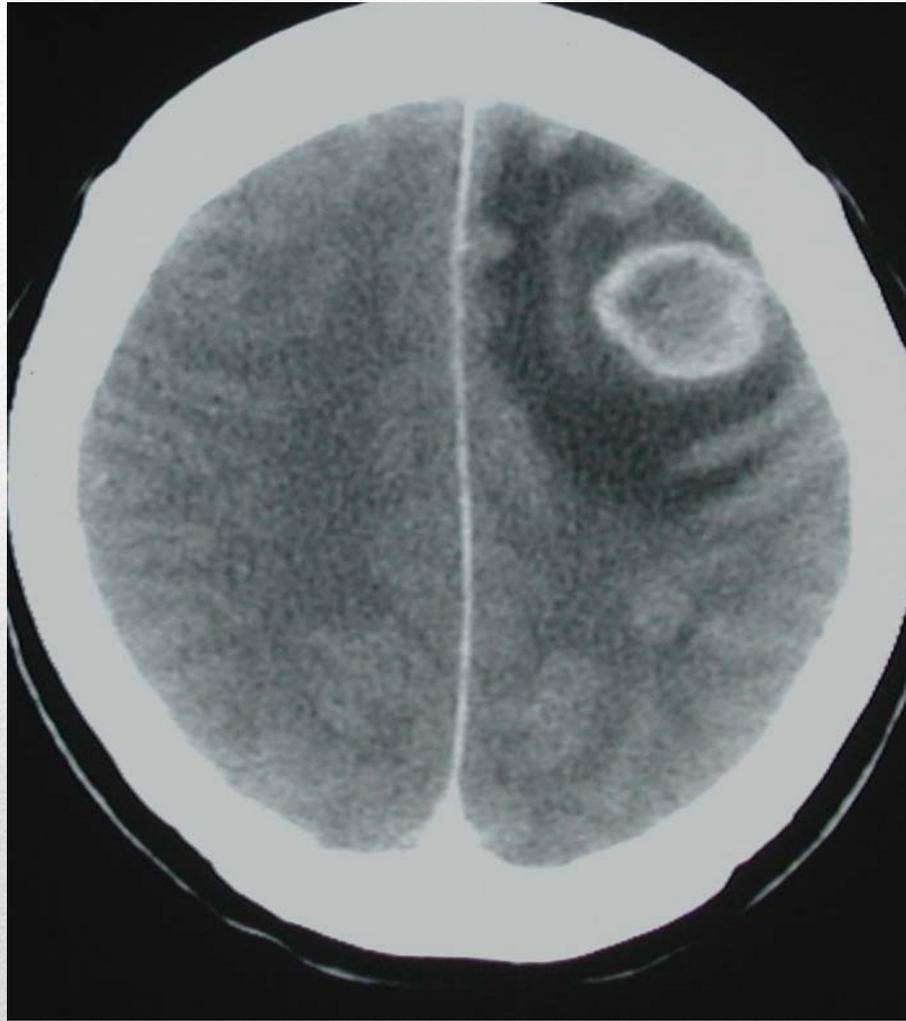
Diagnosis



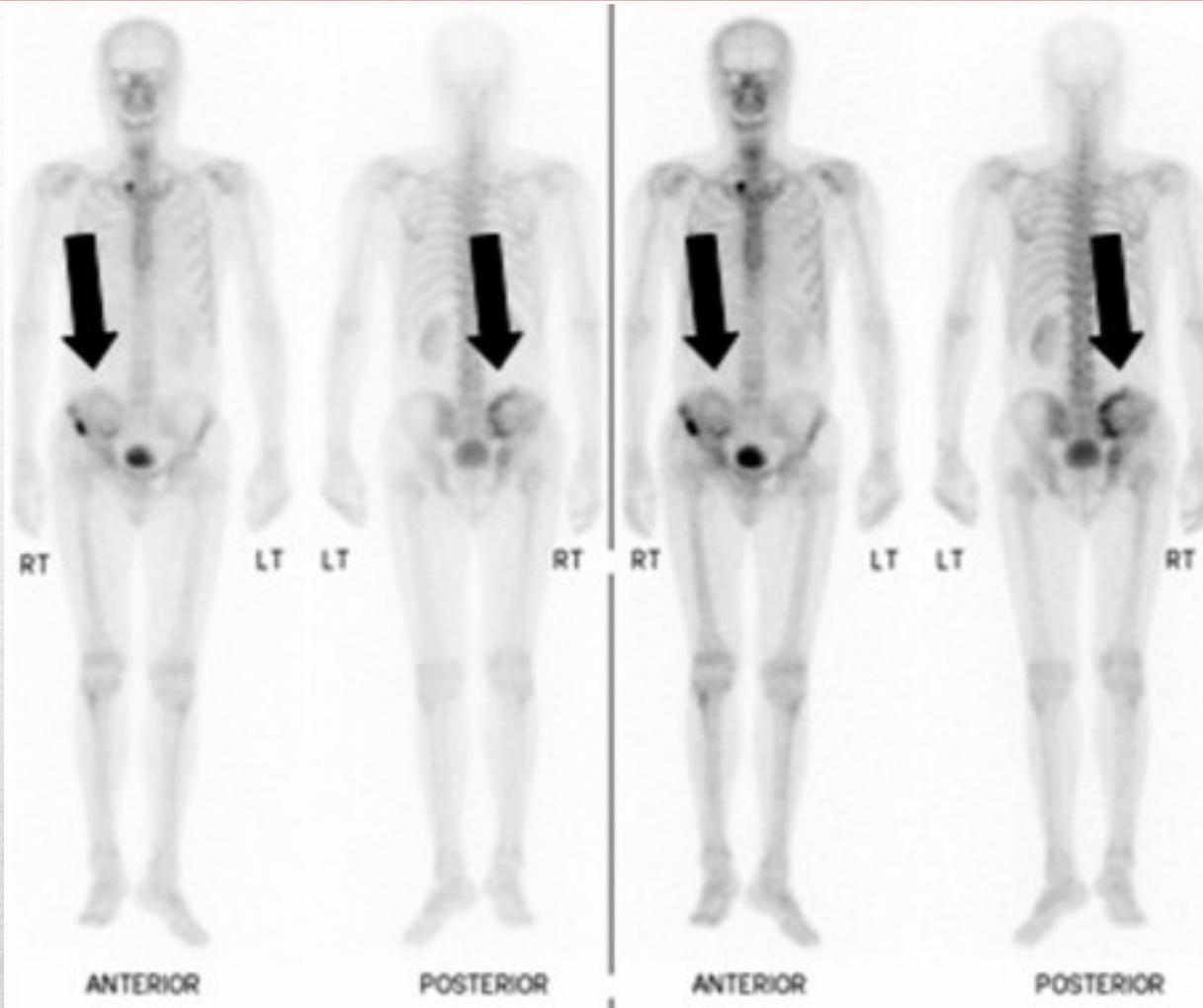
X-rays



CT scans



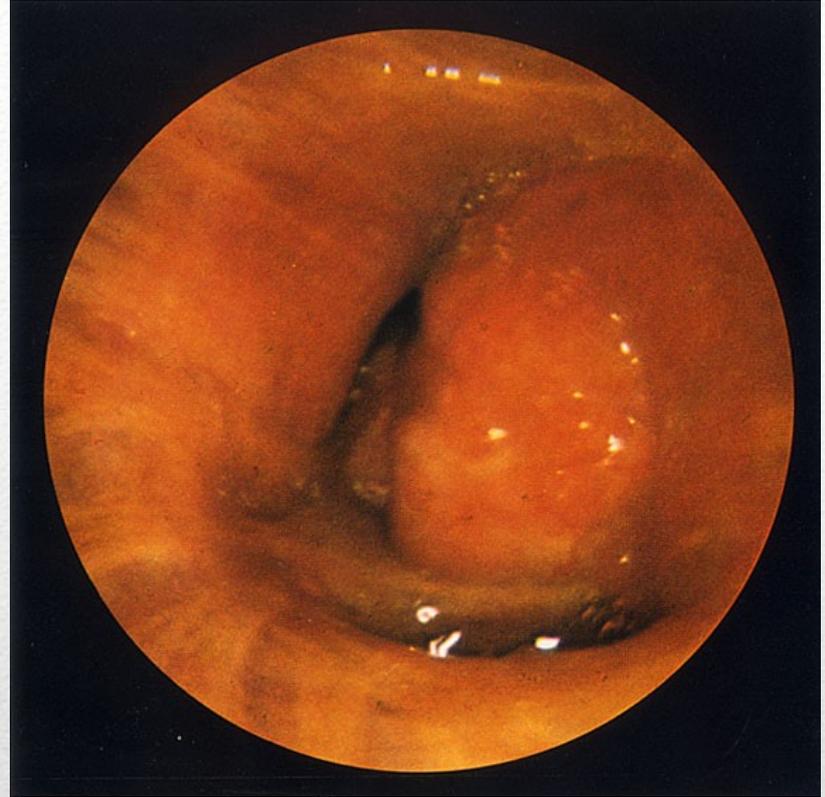
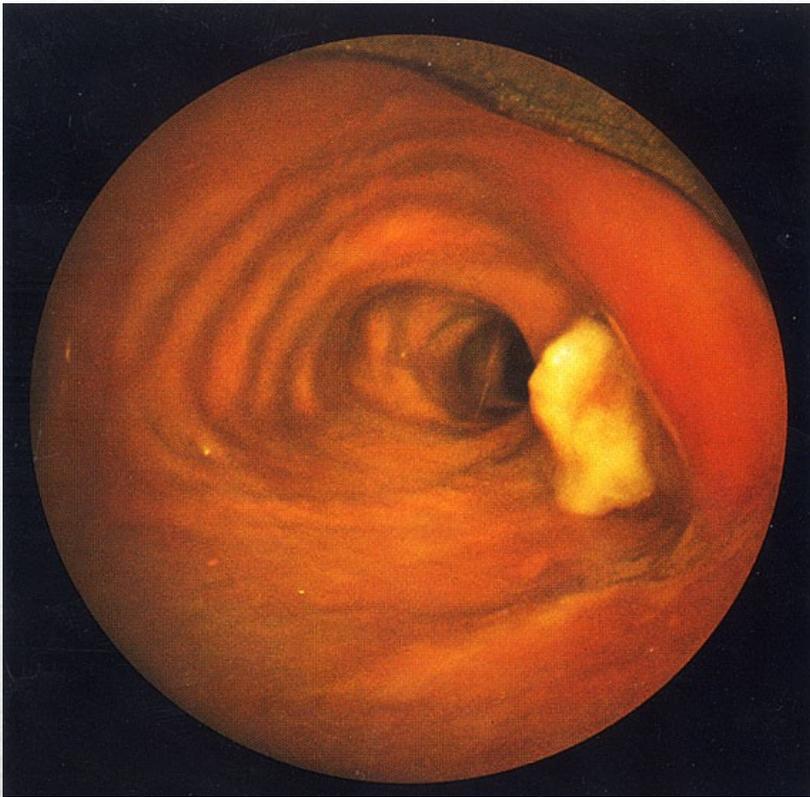
MRI of the brain



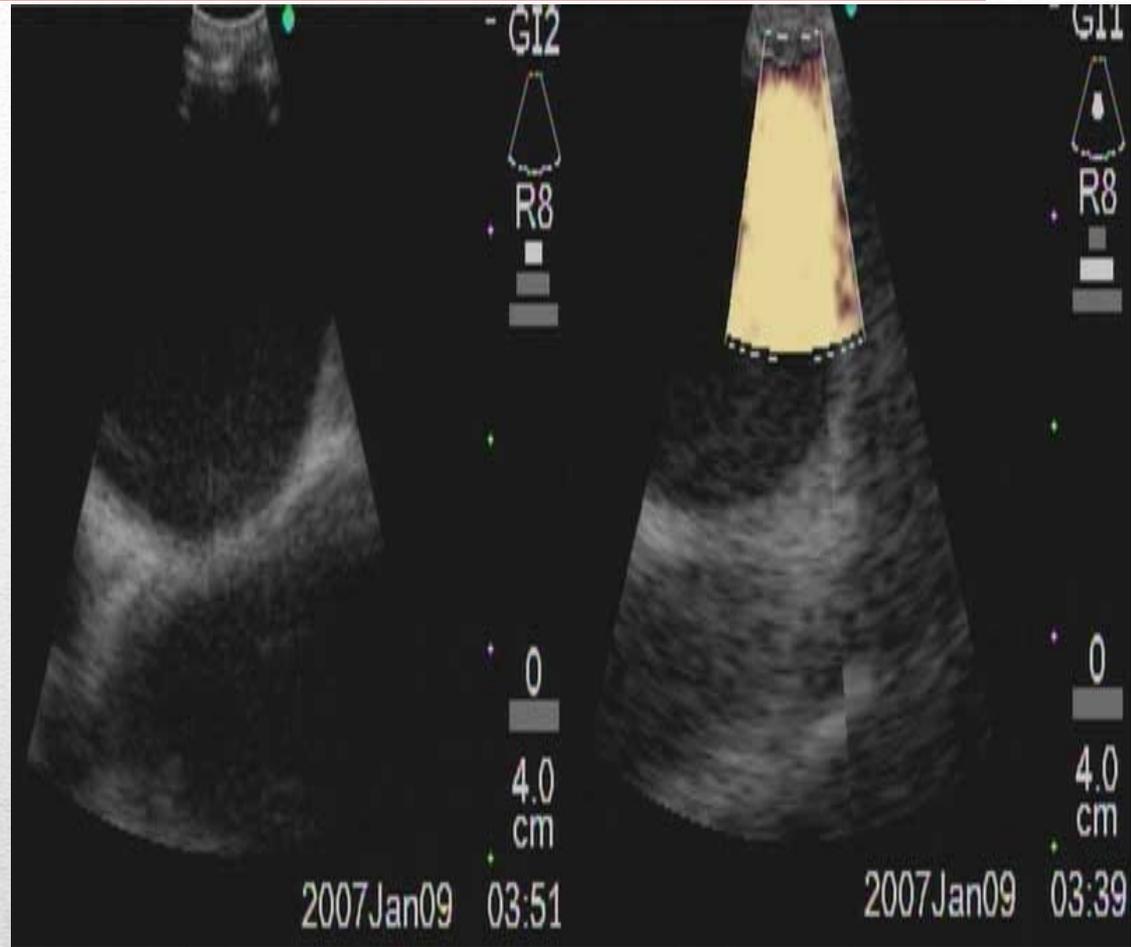
Scintigraphy of bones



Bronchoscopy before and today



Endobronchial finding



EBUS

- Are important in a monitoring of the disease not for the diagnosis
- NSCLC:
CEA (cancer embryonal antigen)
CYFRA 21-1 (fragment of cytokeratine 21)
SCC Ag (squamos cell antigen)
- SCLC:
NSE (neuron specific enolase),
Pro GRP (pro-gastrine realising peptide)

Tumor markers

According to the clinical stage of the disease (and performance status of the patient):

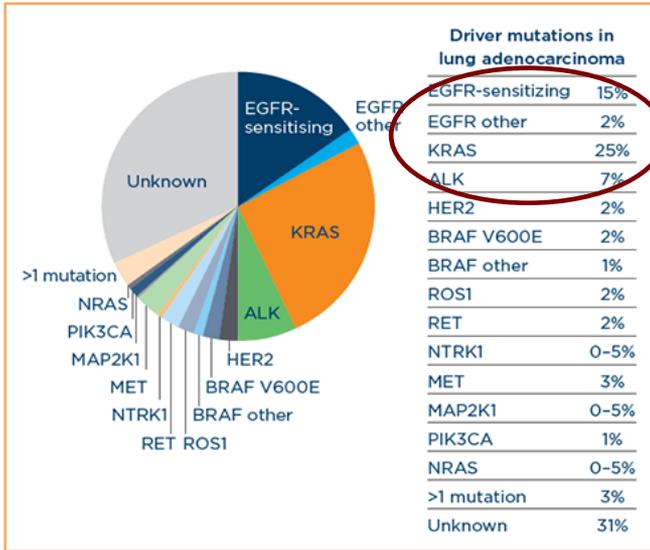
- Curative for I-III A (operation or curative radiotherapy)
- Palliative for IIIB-IV (chemo or radiotherapy)
- Supportive for anyone (management of the symptoms)

Oncological treatment

- Adjuvant chemotherapy - following a radical surgery (stage IB, IIA, IIB, IIIA)
- Neo-adjuvant chemotherapy before surgery (IIIA, IIIB)
- Chemotherapy + radiotherapy concurrently or following (IIIB)
- Chemotherapy alone (IIIB, IV)

Treatment of NSCLC

DRIVER MUTATIONS IN LUNG ADENOCARCINOMA



DRIVER MUTATIONS IN SQUAMOUS CELL LUNG CANCER

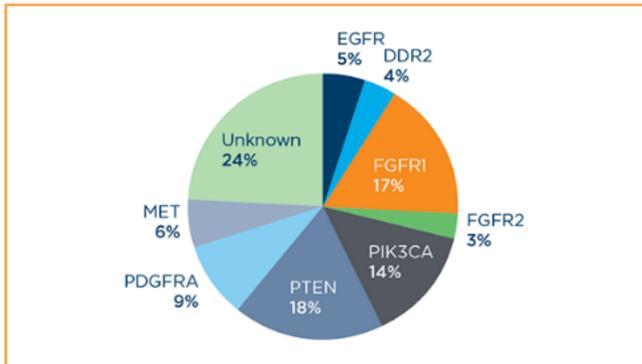
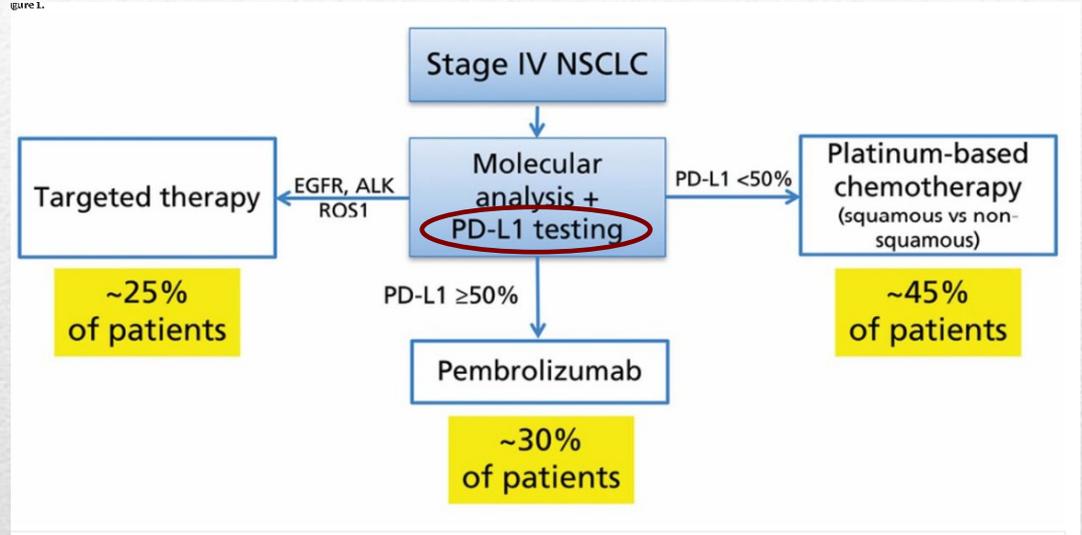


Figure 1.

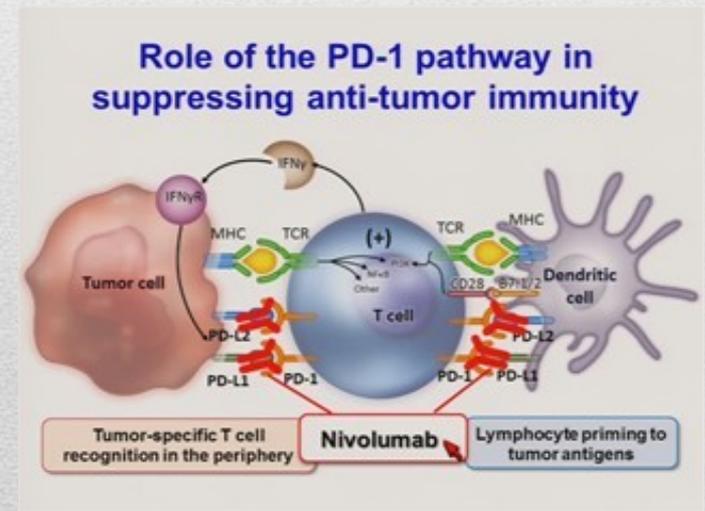


Mutation analysis of NSCLC

- **Adenoca without driver mutation:**
 - pemetrexed (Alimta®) + cisplatin
 - Bevacizumab (VEGFR inhibitor) + chemo
- **Adenoca EGFR +:**
 - TKI s (gefitinib, erlotinib, afatinib, osimertinib)
- **Adenoca ALK+:**
 - ALK inhibitors (crizotinib, alectinib)
- **Adenoca PD-L1 more than 50%:**
 - Immunotherapy (pembrolizumab, nivolumab in the further lines)
- **Squamous carcinoma:**
 - Standard chemo

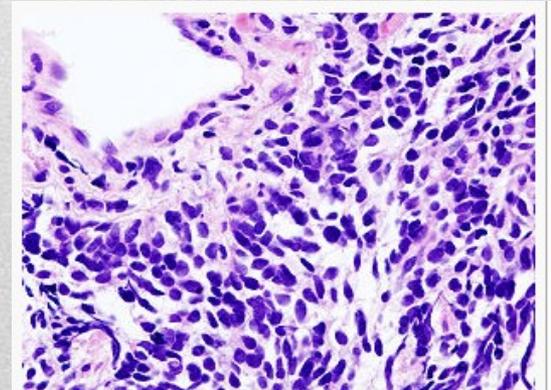
Treatment of NSCLC

- New type of treatment in last 5 years
- Attack a blocage of PD-1 receptor at T-cells by PD-L1 ligand at the surfice of tumor cells
- Indication: NSCLC stage IV according to expression of PD-L1
- Contraindication: autoimunity, high dose of steroids
- Various side effects, so called pseudoprogression



Immunotherapy

- The same from 1970 s
- Limited disease: chemo+ radiotherapy of the chest
- Extensive disease: standard chemotherapy (platine+etoposid, hycamtin in the second line)
- Immunotherapy for SCLC in progress (?)



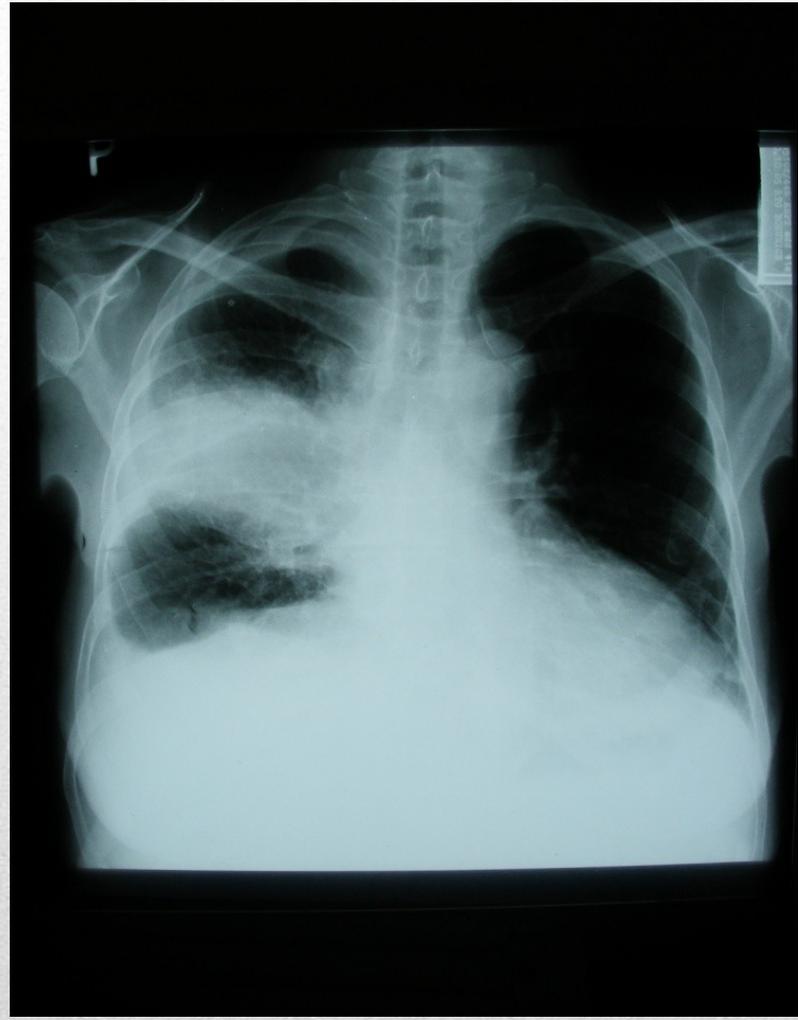
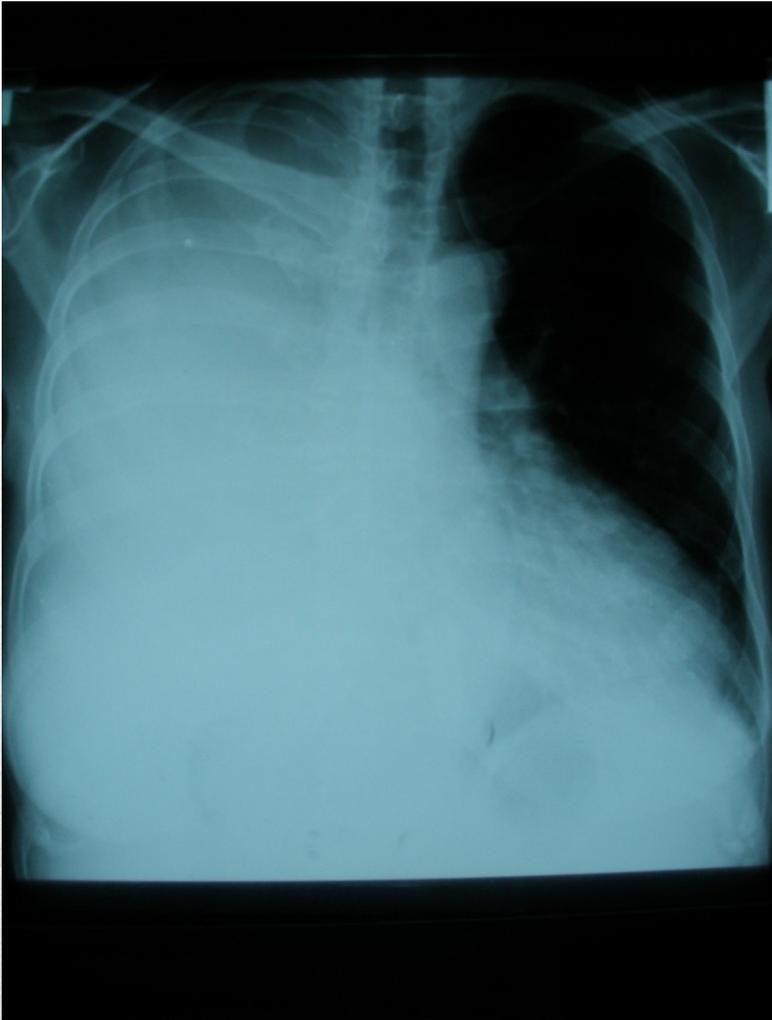
SCLC - Treatment

- Stage of disease
- Performance status
- Weight loss
- Paraneoplastic signs
- Comorbidities
- Sociodemographic characteristics

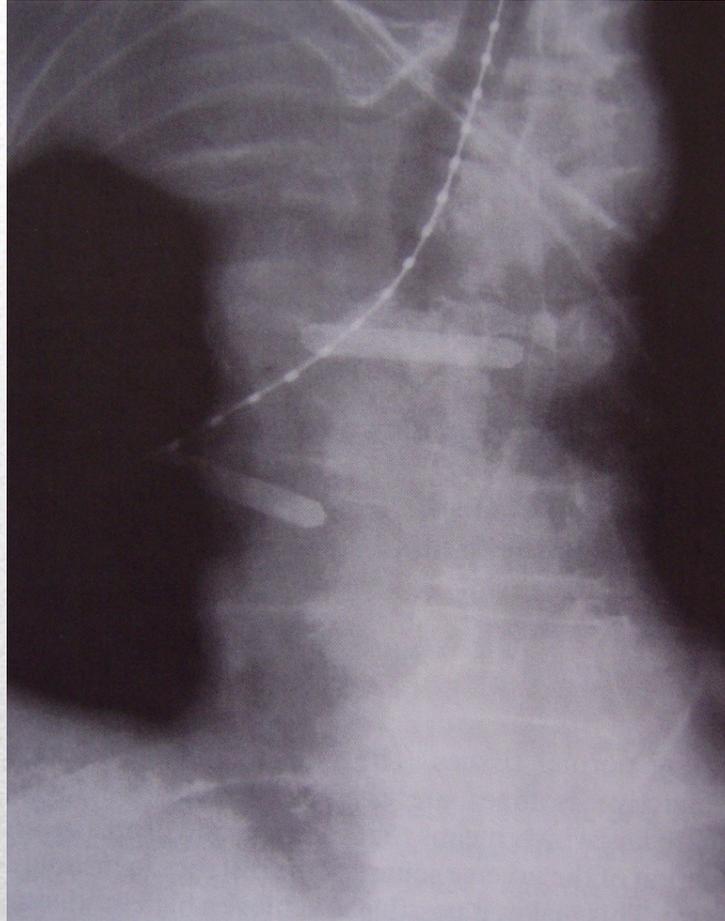
Bad prognostic factors

- Opioid's, antitussives and others
- Palliative radiotherapy of bone, brain metastasis or malignant lymphadenopathy
- Management of malignant pleural effusion (pleural punctions, drainage, pleurodesis, tunelized catheter, pleuroscopy)
- Treatment of symptomatic tumour obstruction (endobronchial treatment, laser therapy, stents)

Palliative treatment



Laser therapy



Brachytherapy

- New biological drugs – TKI s (dacotinib), ALK inhibitors (brigatinib)
- Immunotherapy – atezolizumab for NSCLC and SCLC ?
- Cyber-knife of brain metastasis, protontherapy
- Improvement of palliative care (hospices, mobile hopsice care)

Future?



Thank you for your attention
