# Prof. F. Rasmussen

Lets start !

# Case 1

- 27 years old man with severe Rheumatoid arthritis comes to your clinic with a complain of tiredness, dry cough, weight loss and night sweat.
- What will you do ?
- Bonus information: He started etanercept 2 month ago.

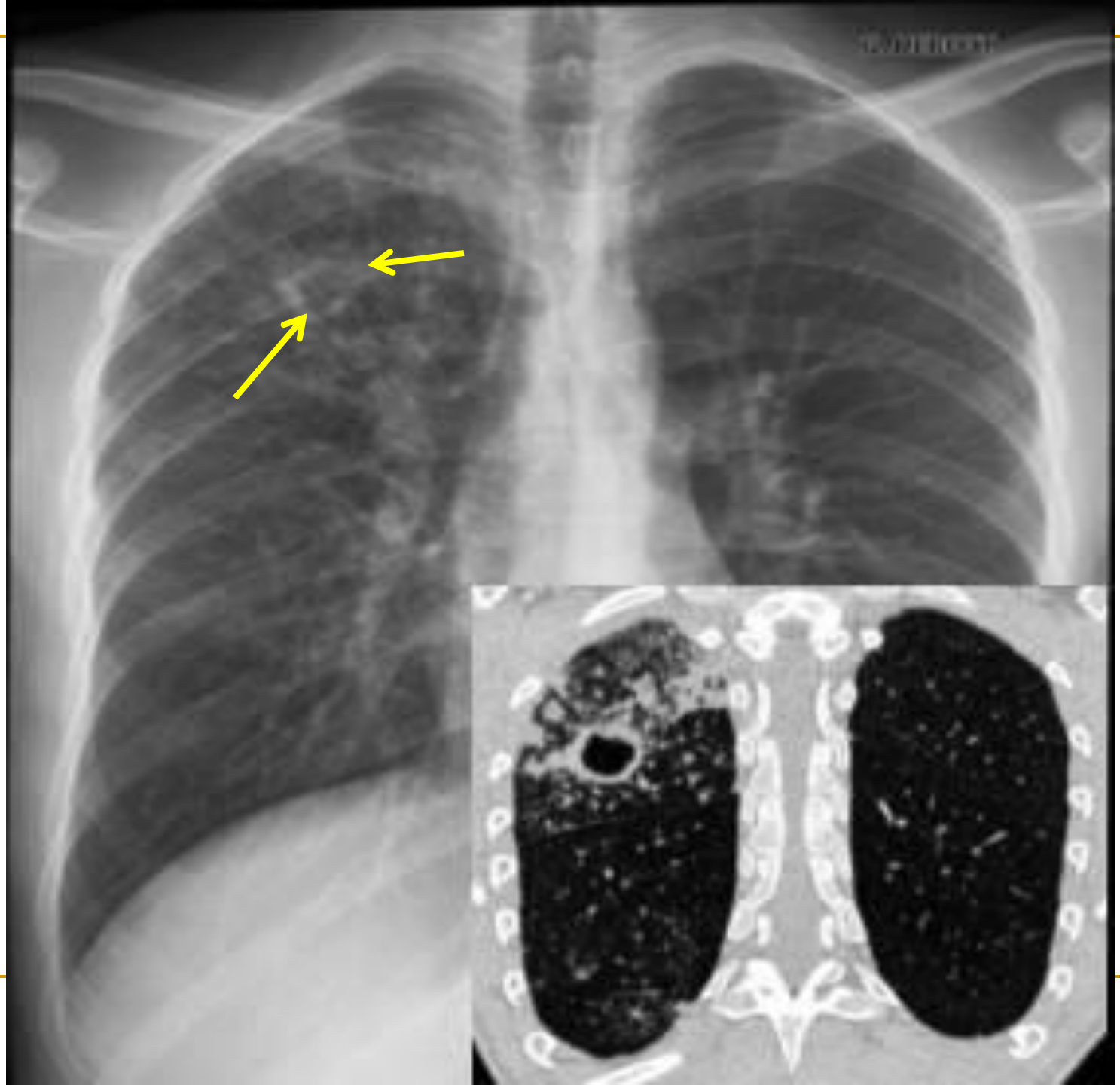
# Case 1

- Rheumatoid arthritis and TNF alfa treatment !!
- Think infection !

# Case 1 But...

# What will you have to do ?

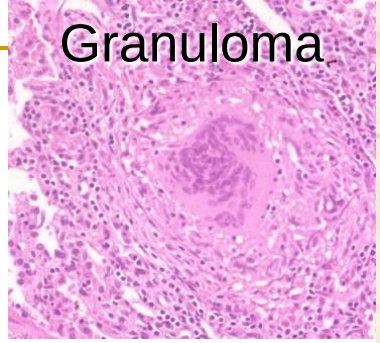
- Make a diagnosis !!
- Anamnesis
  - More information: How long, fever ?, Is weight loss real, sweating, haemoptysis, medicine ??
  - Smoking history
- Tests (starters !!)
  - Blood tests
  - X-Ray
  - Probably sputum culture

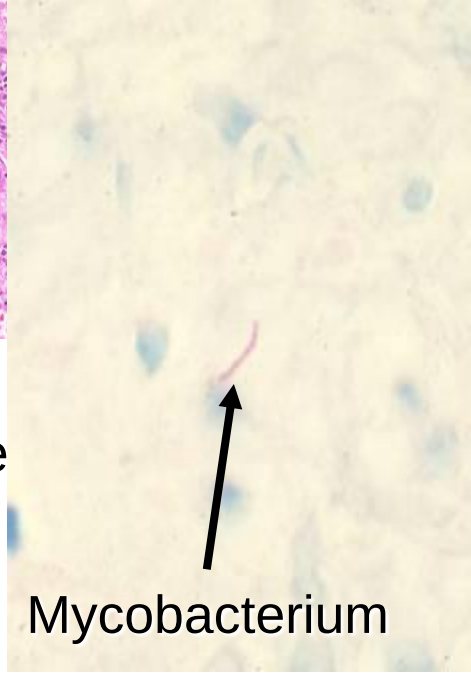


Symptoms: weight loss, fever, haemoptysis

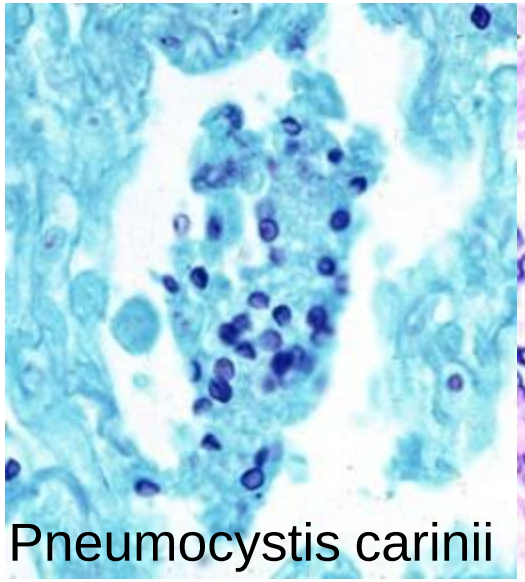
X-Ray: Infiltration (caverna)

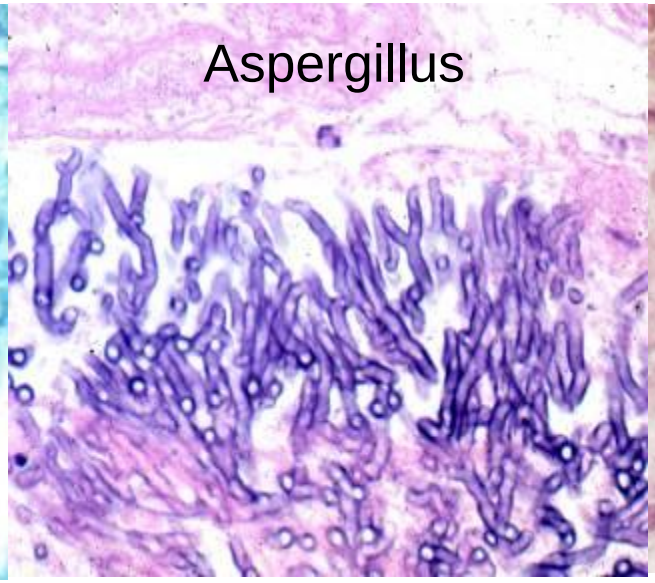
TB

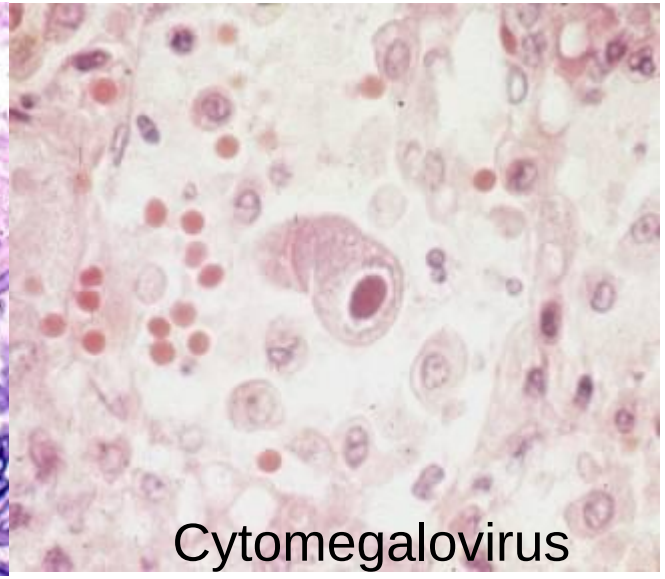



- Case 1 (most likely)
- Secondary tuberculosis infection
  - (mostly through reactivation) in a previously sensitize individual due to a newly started immunosupression.
  - Also think in this case:
  - “regular“ pneumonia
  - Other opportunistic pneumonias
    - Aspergillus, Pneumocystis carinii, Cytomegalovirus



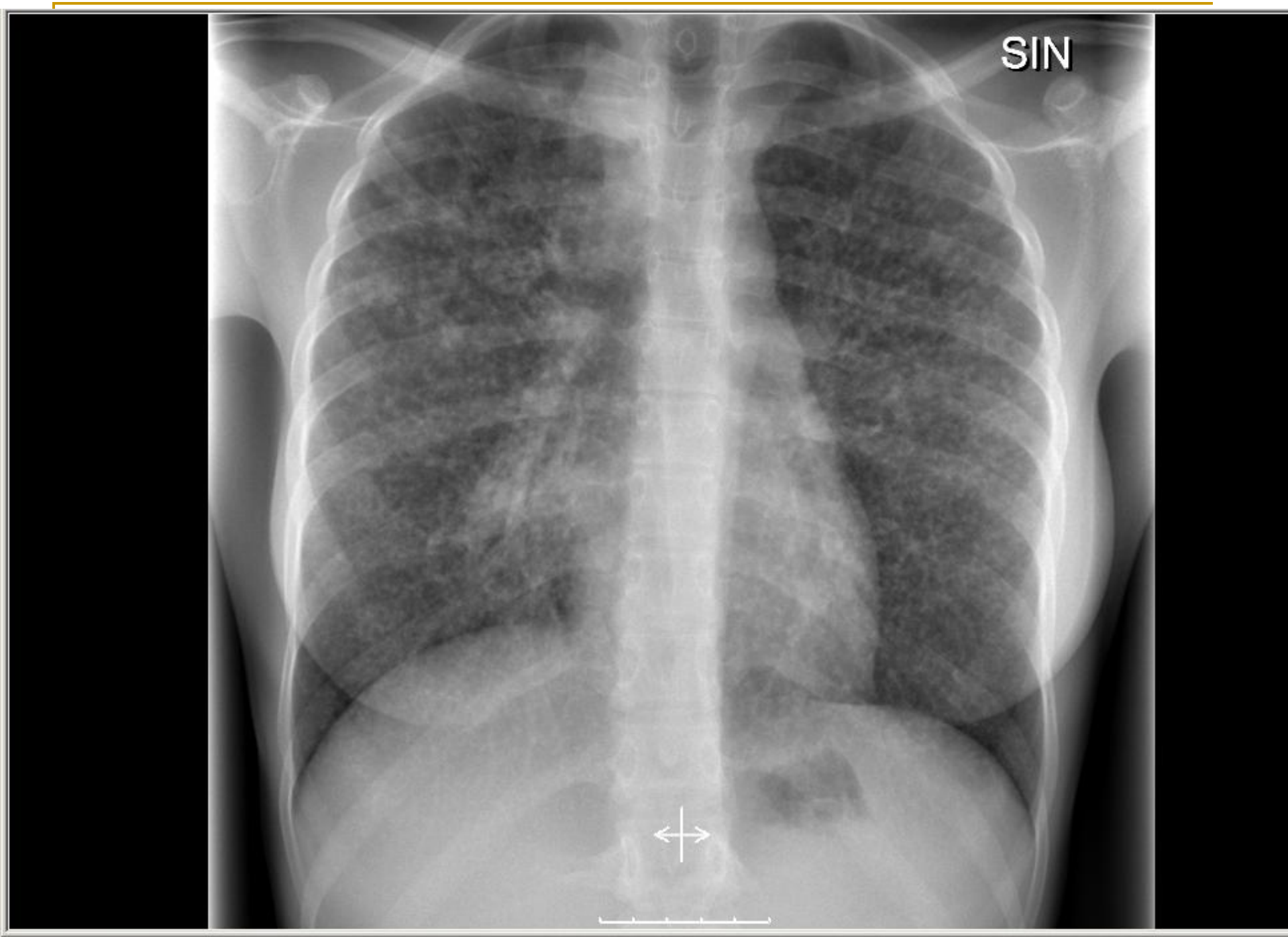
# Mohamed,Sahro Abdisalaan

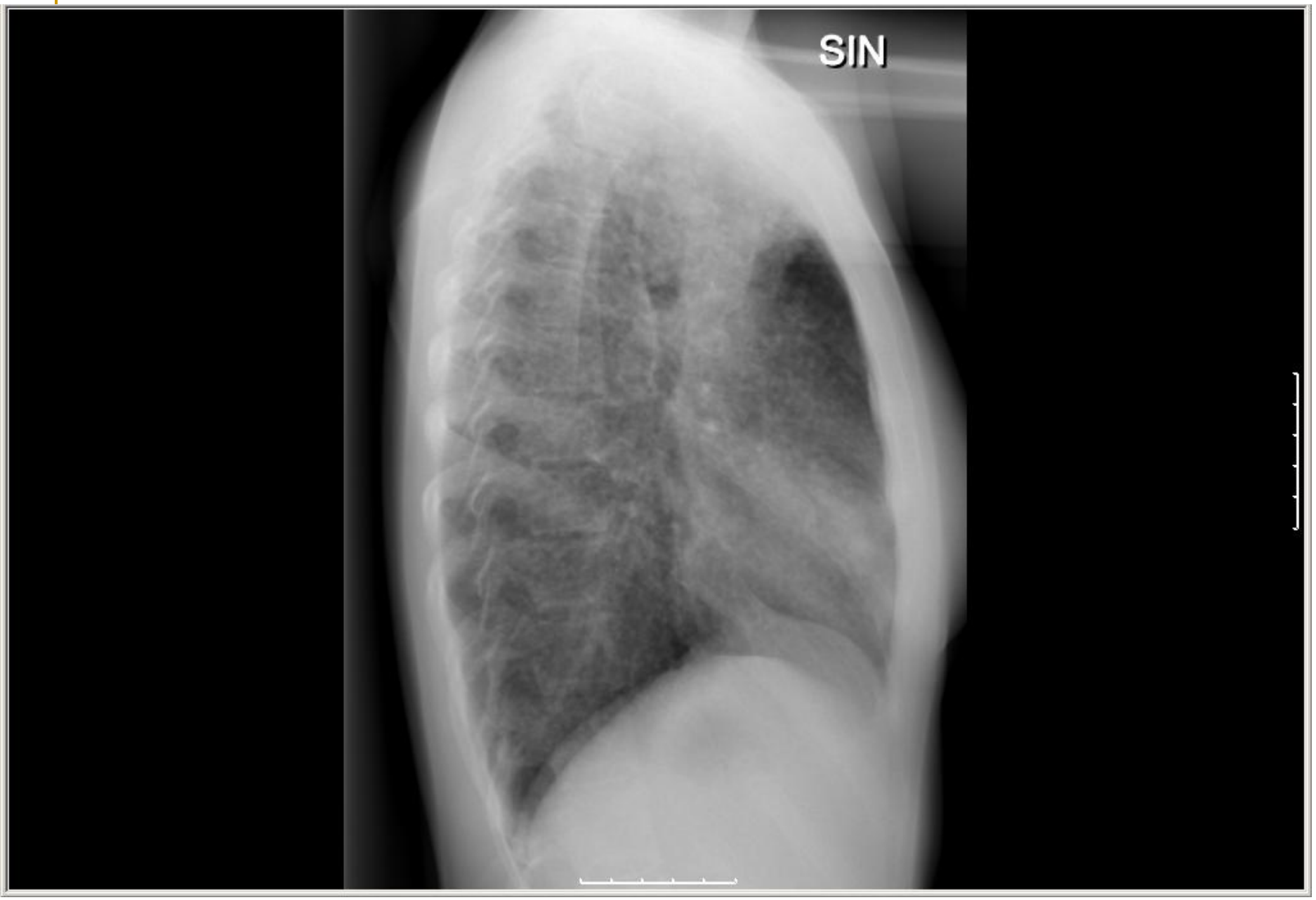
30.08.06 time 09.49
Mohamed,Sahro Abdisalaan
The Pt. came from Somalia 4 yrs ago.
Pt. is primary sent by her doctor to the audiological department in the hospital because ofte impared hearing for evaluation.
Medical history : The women has no tinnitus feel swell and do not want this evaluation. Operation in Mogadisio as 4 yrs old its not clear for what and why.
Objective Findings (audiolog wrote): clear cut decreased hearing on left side normal  right side do not think a hearing apparatus will help. That Diskrimination is perfect and due to a mastoidektoctomia, I think must Likely  it was present already due to the coklear ”procedure i Mogadiscio.

The patients has cough and some temperature we send her for evaluation to the lung department.

- At lung department: 2 month ago start with cough and temp 37-38.
- Also some dyspnea. Nausea for some time and weight loss from 44kg to 38kg in aprox 2month.
- Temp. 36,8.  BT 85/60.  Puls 116.  SAT 96 %. weight 38 kg. Other than thin looks OK.
- STp: normal; STc: normal

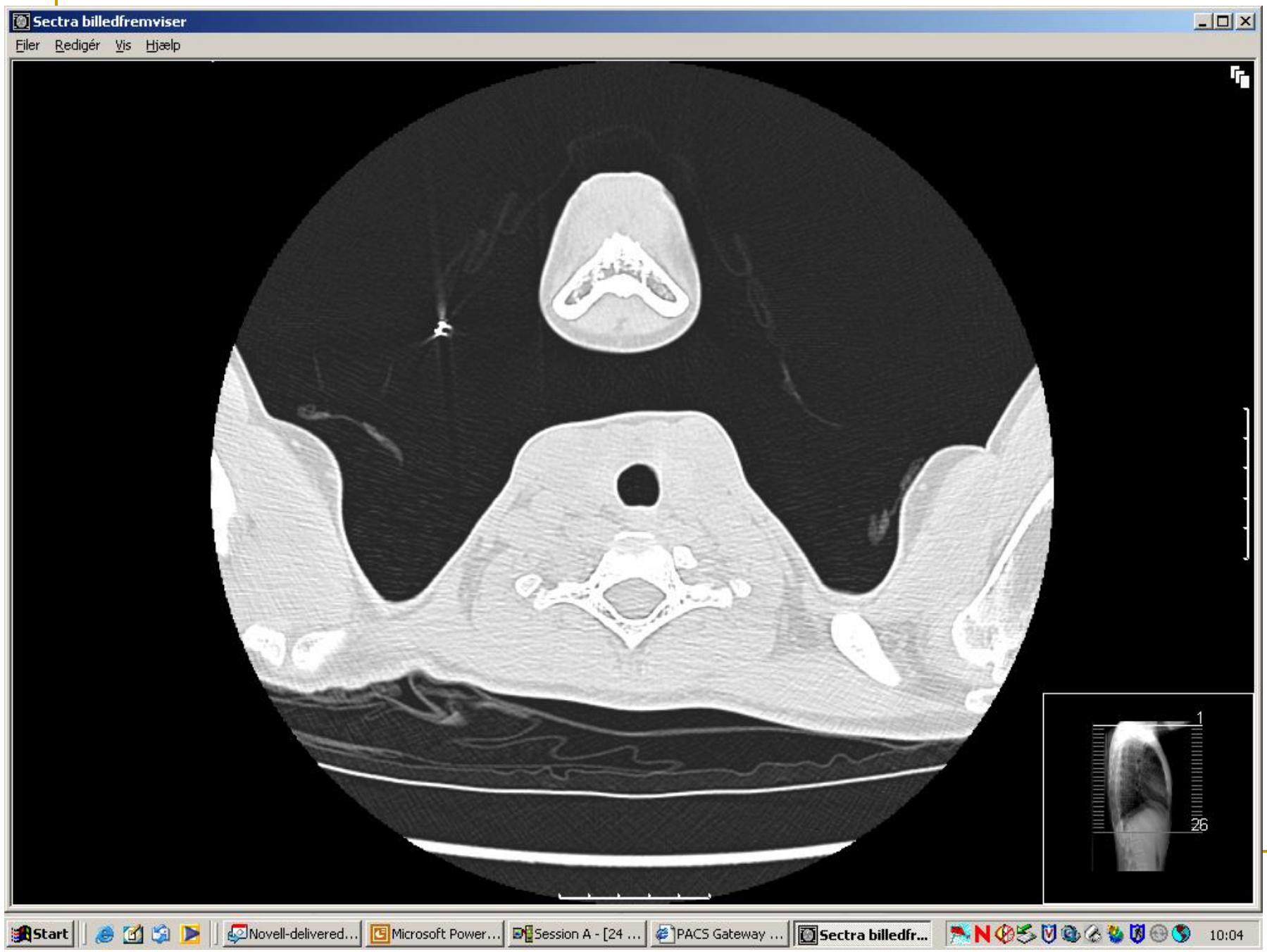
- Supplement
- In her school last year 2 TB cases but not the same class.
- Abnormal Blood test: CRP 6.2, s-albumin 32 g/l, LDH 530, fibrinogen 16,6, IgA 8.72.


SIN


SIN

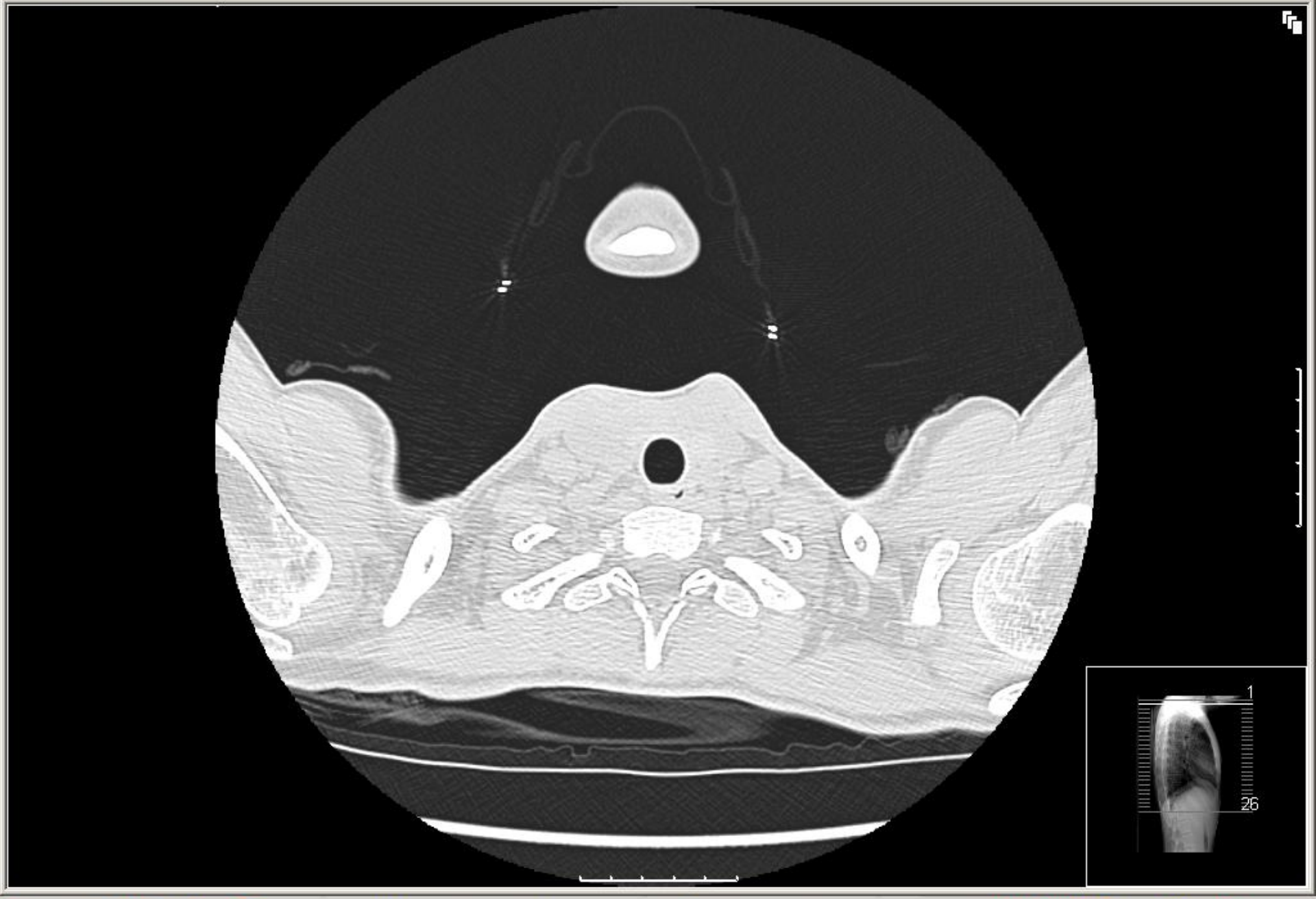
# X-Ray

- RD:
- Infiltratio pulmonis bilateralis
- Ectasia mediastini superioris dx. obs. pro
- Miliar tuberkulose obs. pro

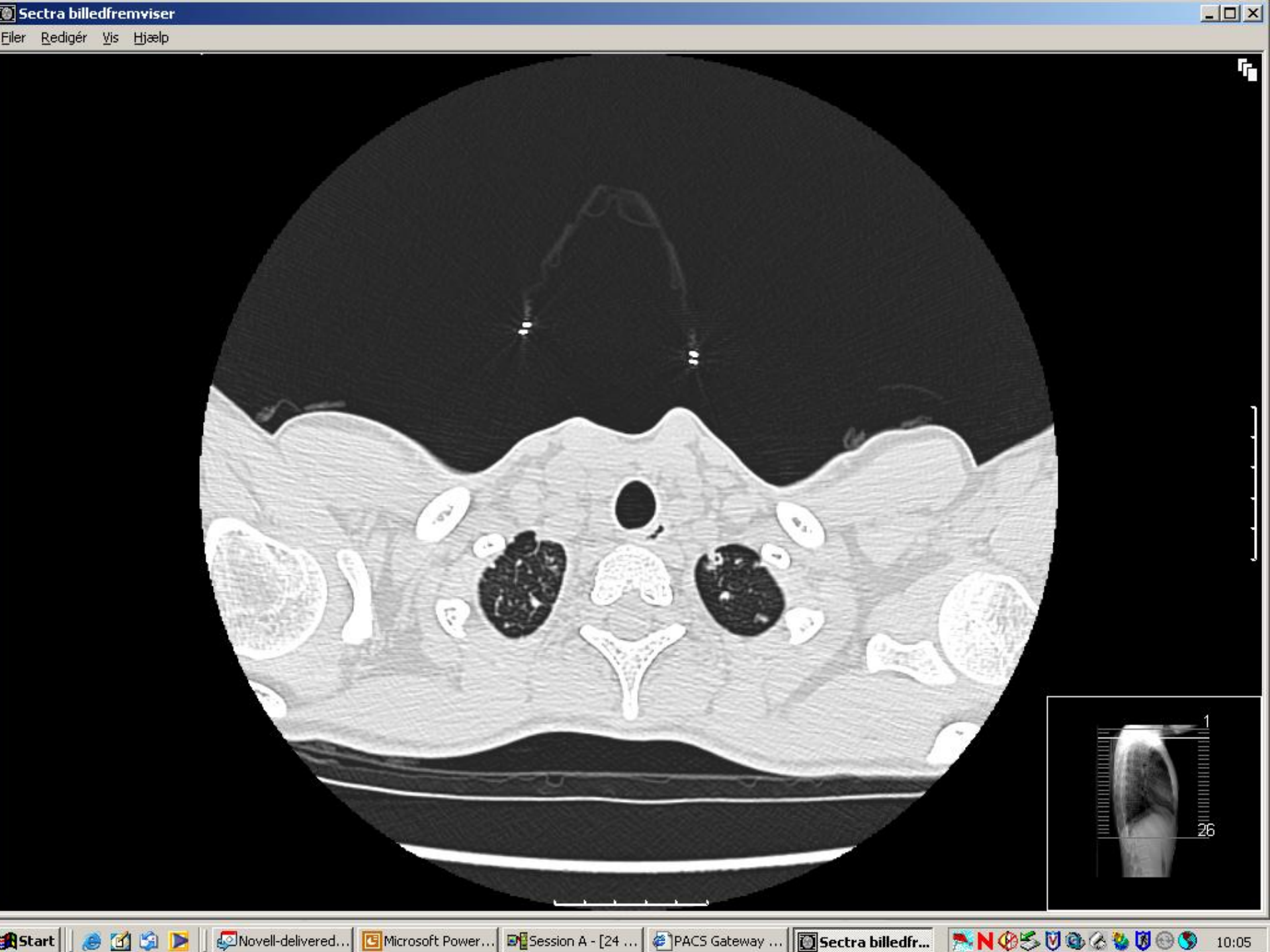

Sectra billedfremviser
Filer Redigér Vis Hjælp
1
26
Start
Novell-delivered...
Microsoft Power...
Session A - [24 ...
PACS Gateway ...
Sectra billedfr...
10:04

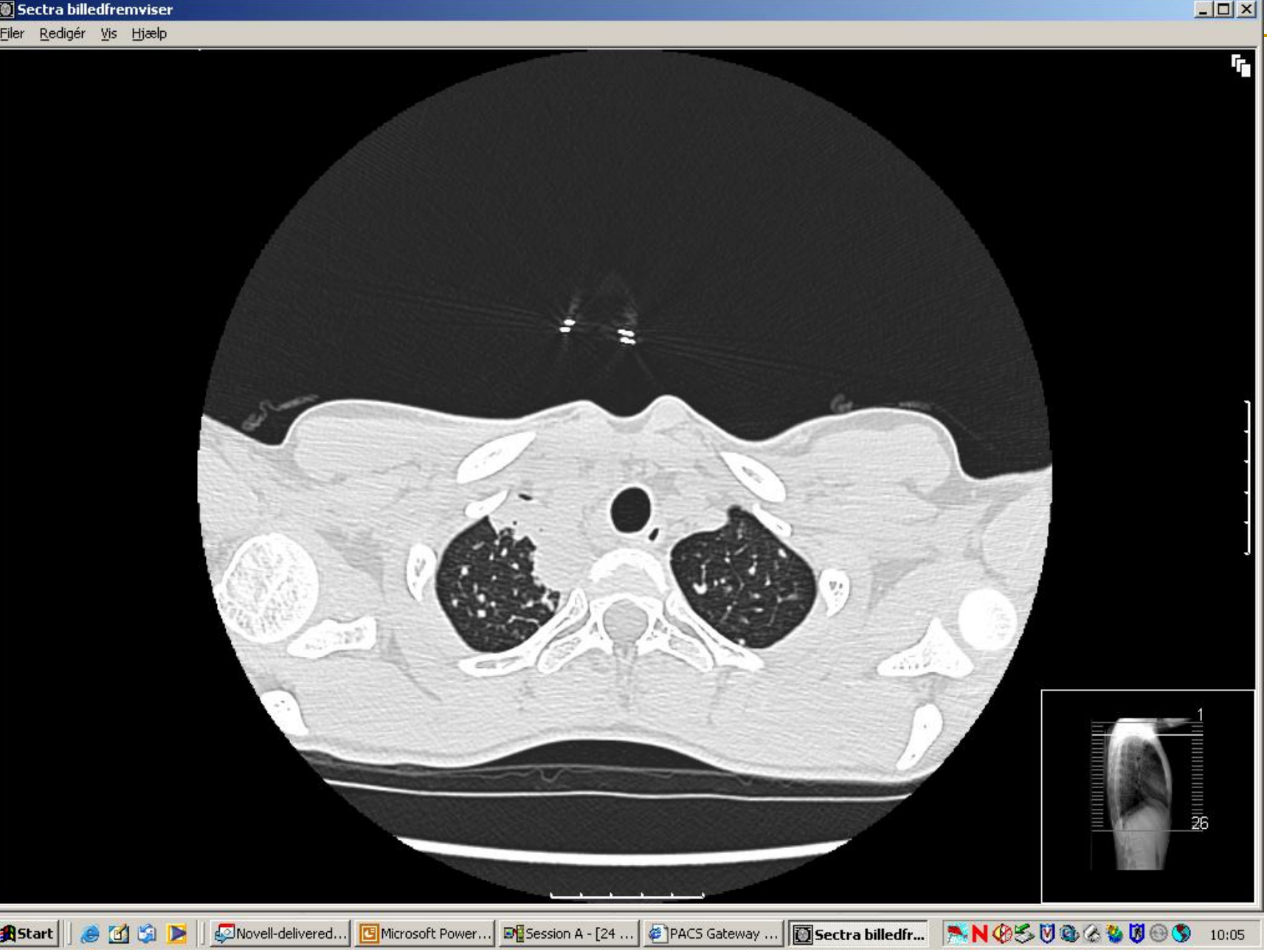
Sectra billedfremviser

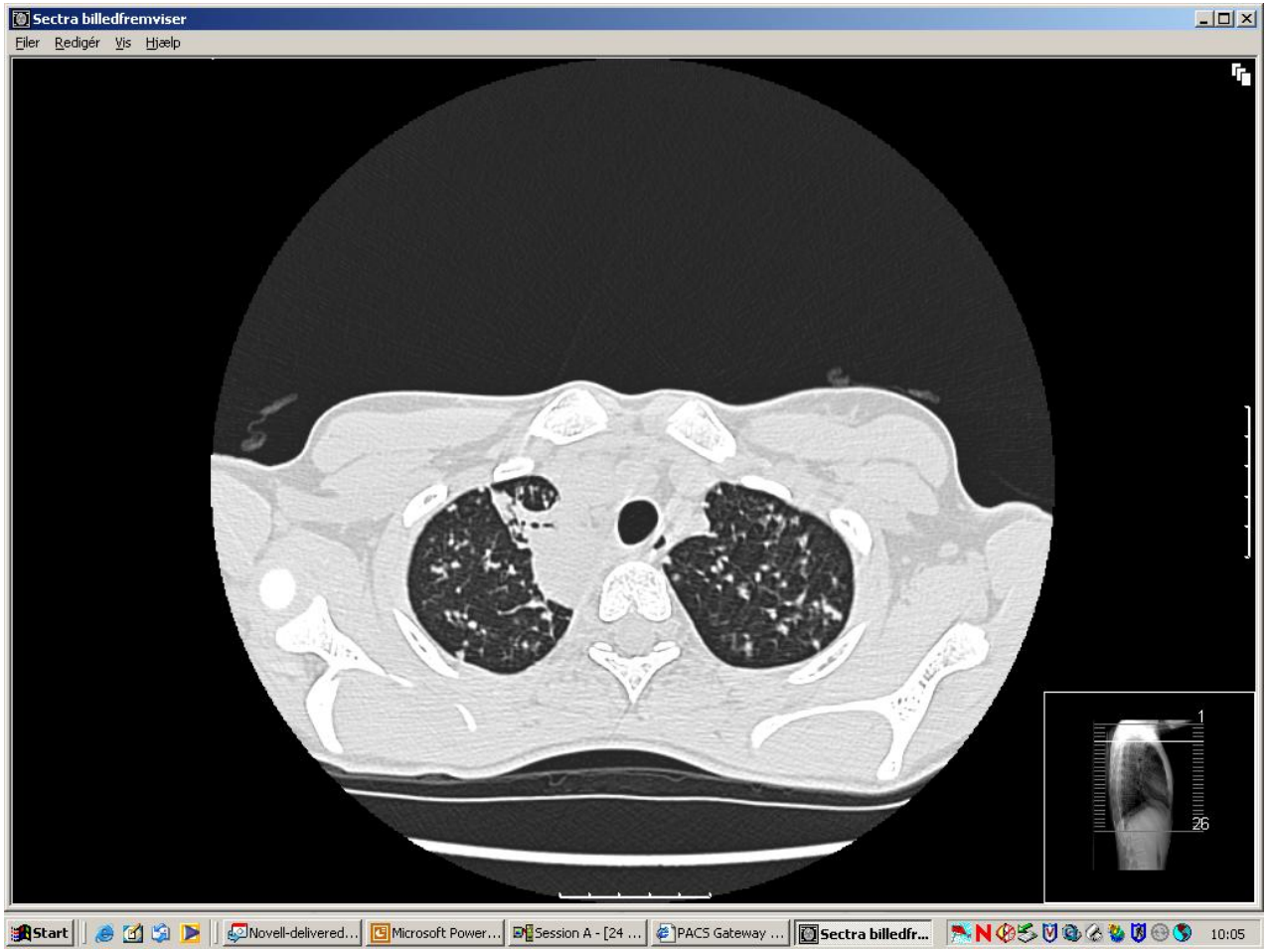
Filer Redigér Vis Hjælp

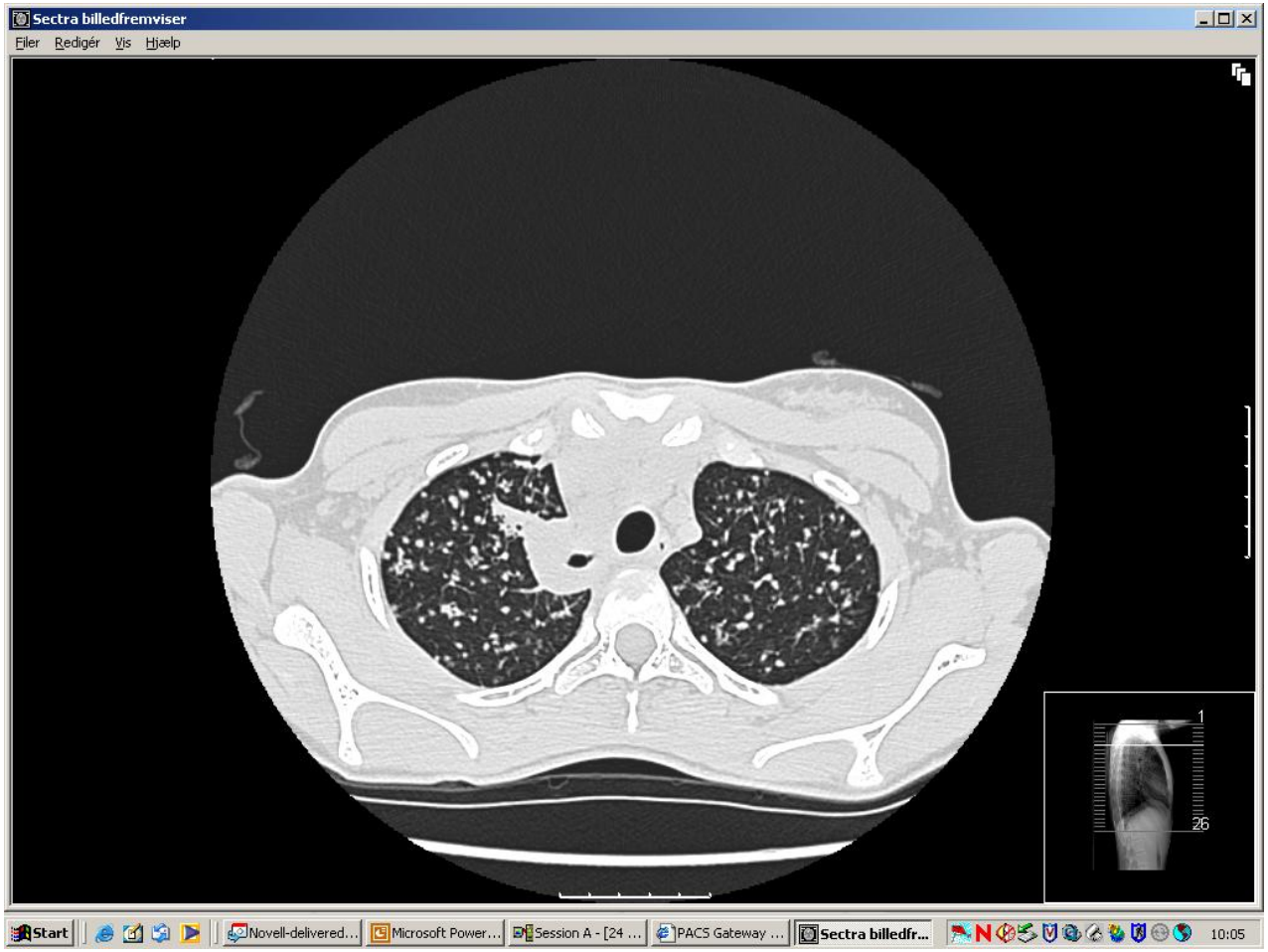


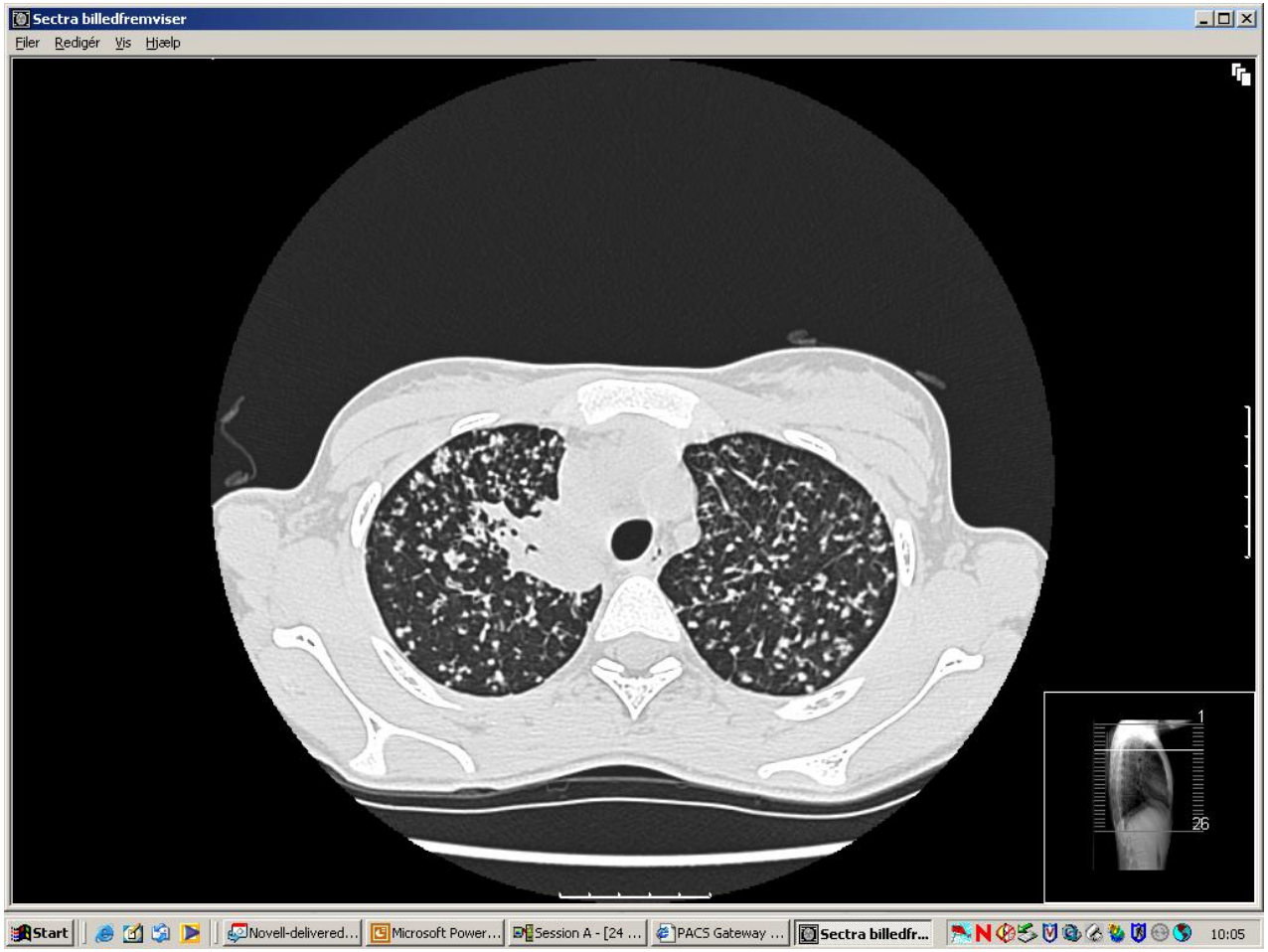

Start | Novell-delivered... | Microsoft Power... | Session A - [24 ... | PACS Gateway ... | Sectra billedfr... | 10:05

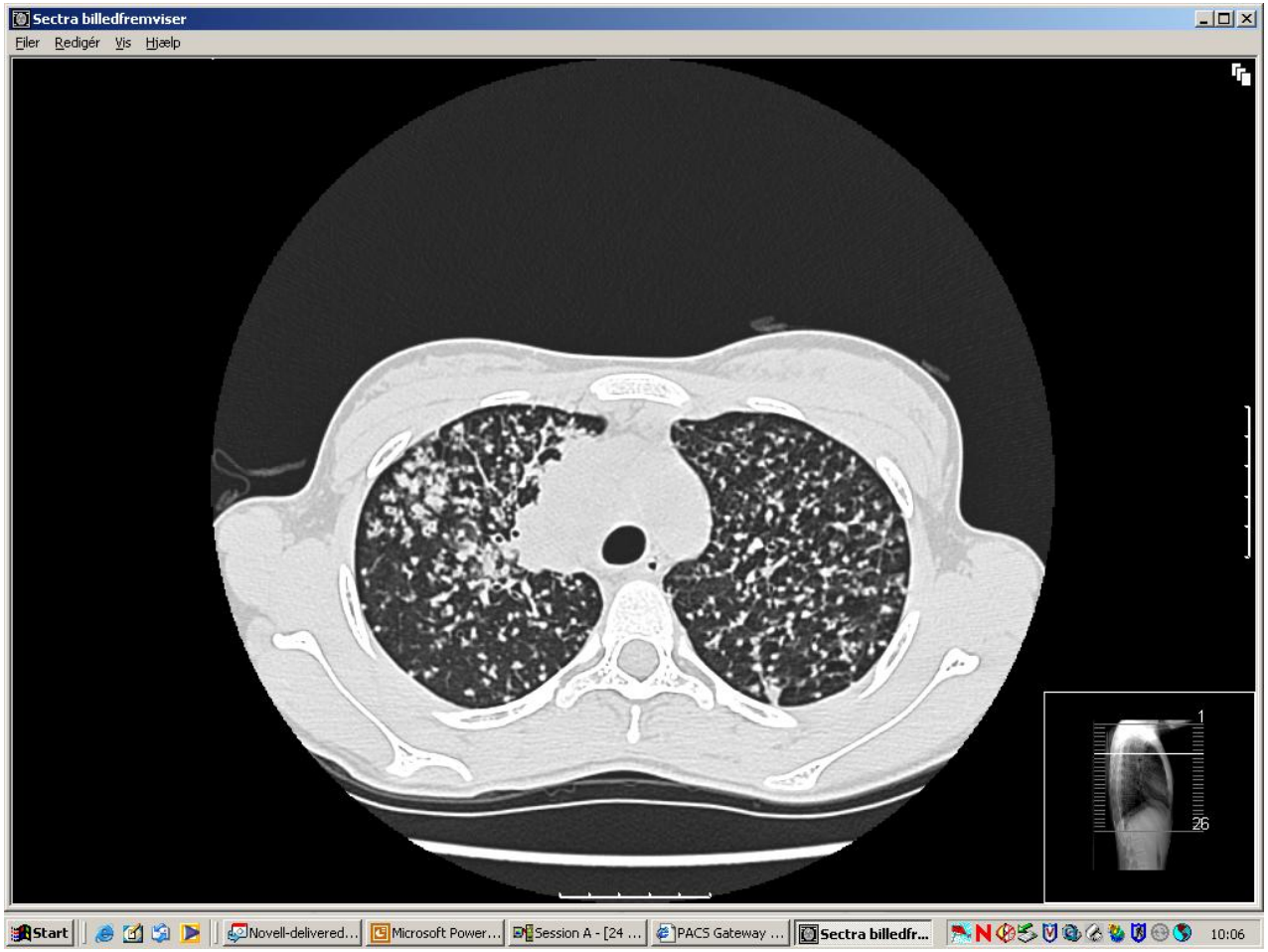

Sectra billedfremviser
Filer Redigér Vis Hjælp
1
26
Start
Novell-delivered...
Microsoft Power...
Session A - [24 ...
PACS Gateway ...
Sectra billedfr...
10:05


Sectra billedfremviser
Filer Redigér Vis Hjælp
1
26
Start
Novell-delivered...
Microsoft Power...
Session A - [24 ...
PACS Gateway ...
Sectra billedfr...
10:05


Sectra billedfremviser
Filer Redigér Vis Hjælp
1
26
Start
Novell-delivered...
Microsoft Power...
Session A - [24 ...
PACS Gateway ...
Sectra billedfr...
10:05

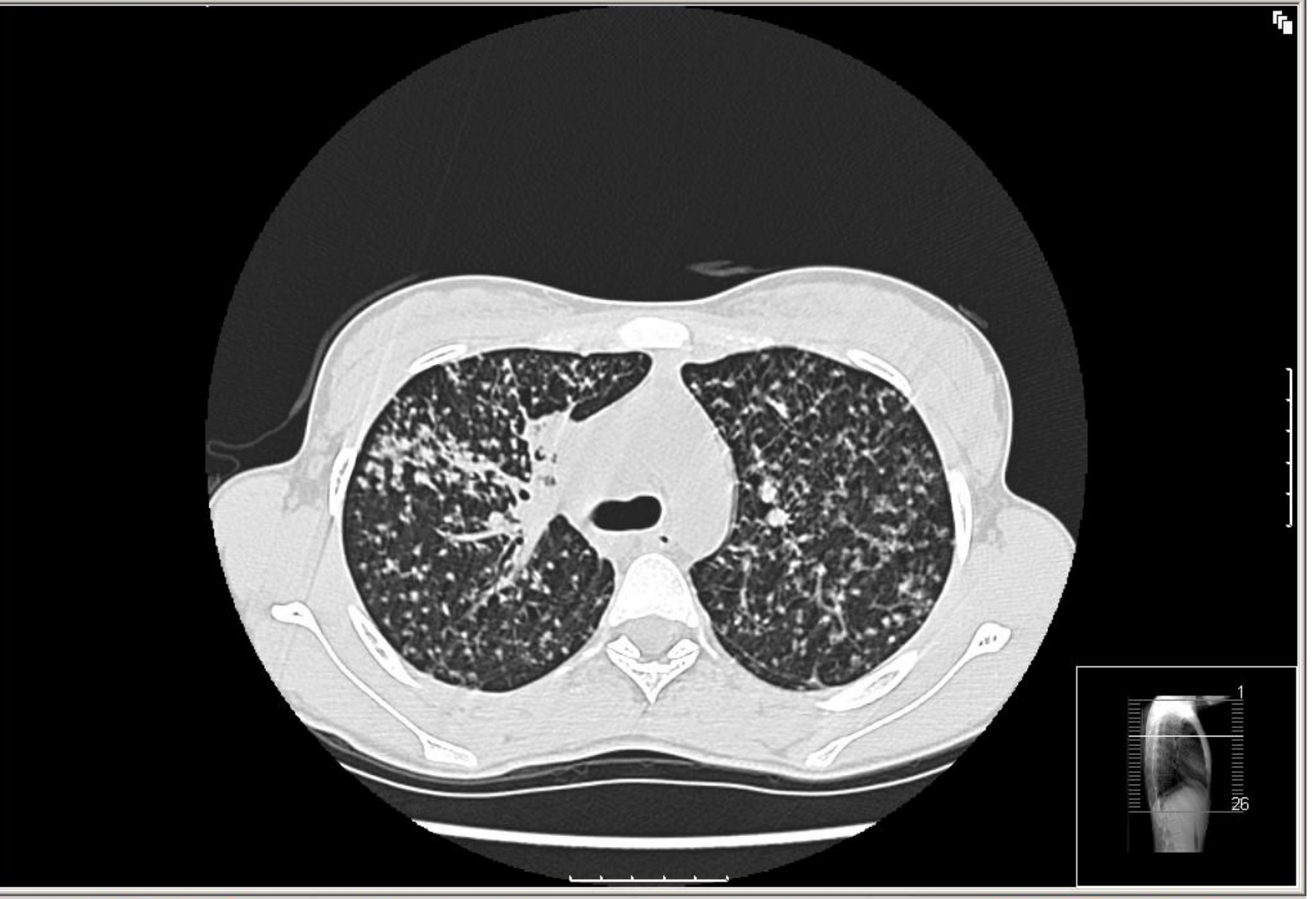

Sectra billedfremviser
Filer Redigér Vis Hjælp
1
26
Start
Novell-delivered...
Microsoft Power...
Session A - [24 ...
PACS Gateway ...
Sectra billedfr...
10:05


Sectra billedfremviser
Filer Redigér Vis Hjælp
1
26
Start
Novell-delivered...
Microsoft Power...
Session A - [24 ...
PACS Gateway ...
Sectra billedfr...
10:05


Sectra billedfremviser
Filer Redigér Vis Hjælp
1
26
Start
Novell-delivered...
Microsoft Power...
Session A - [24 ...
PACS Gateway ...
Sectra billedfr...
10:06

Sectra billedfremviser

Filer Redigér Vis Hjælp



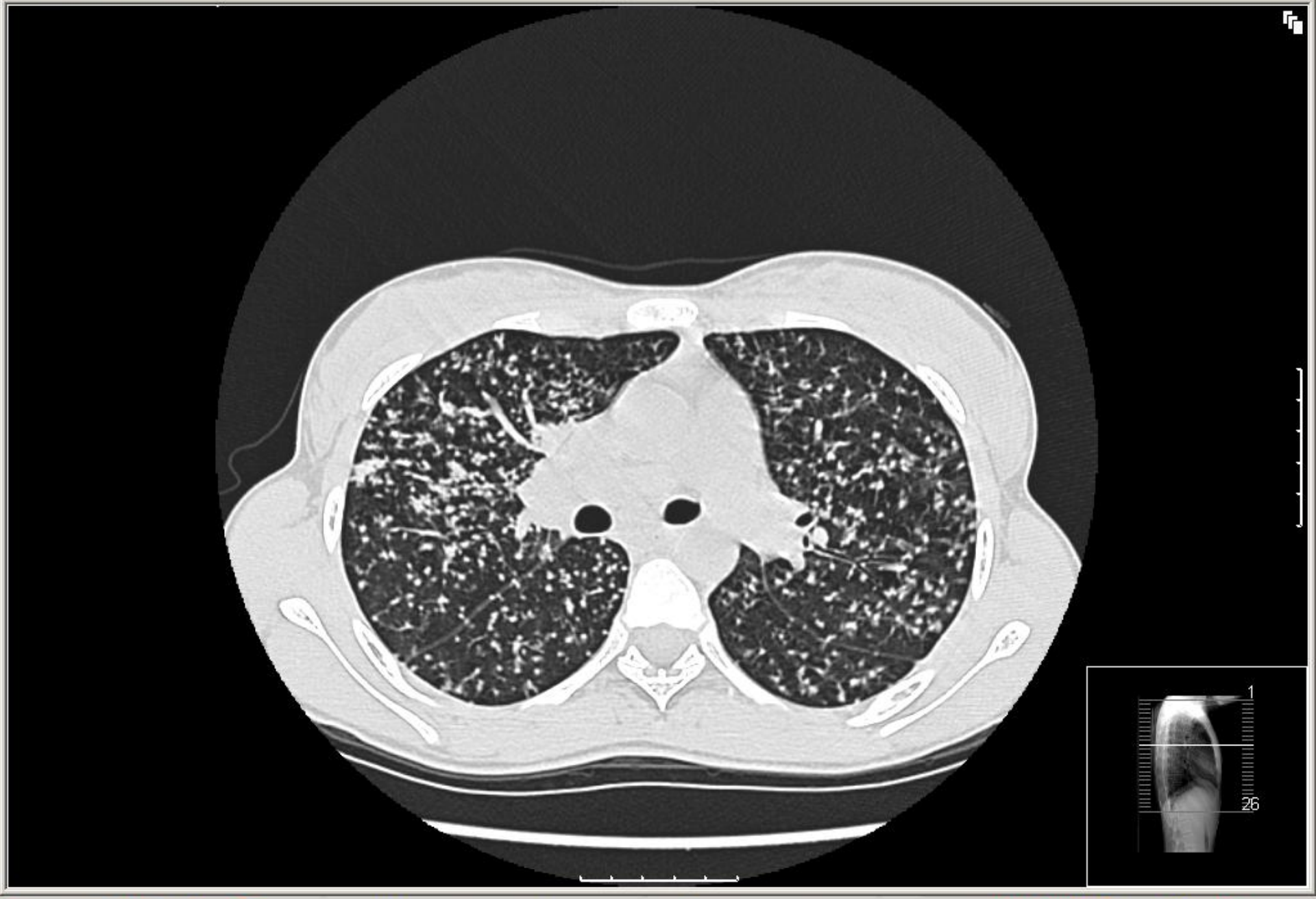

Start | Novell-delivered... | Microsoft Power... | Session A - [24 ... | PACS Gateway ... | Sectra billedfr... | 10:06

Sectra billedfremviser
Filer Redigér Vis Hjælp
1
26
Start
Novell-delivered...
Microsoft Power...
Session A - [24 ...
PACS Gateway ...
Sectra billedfr...
10:06

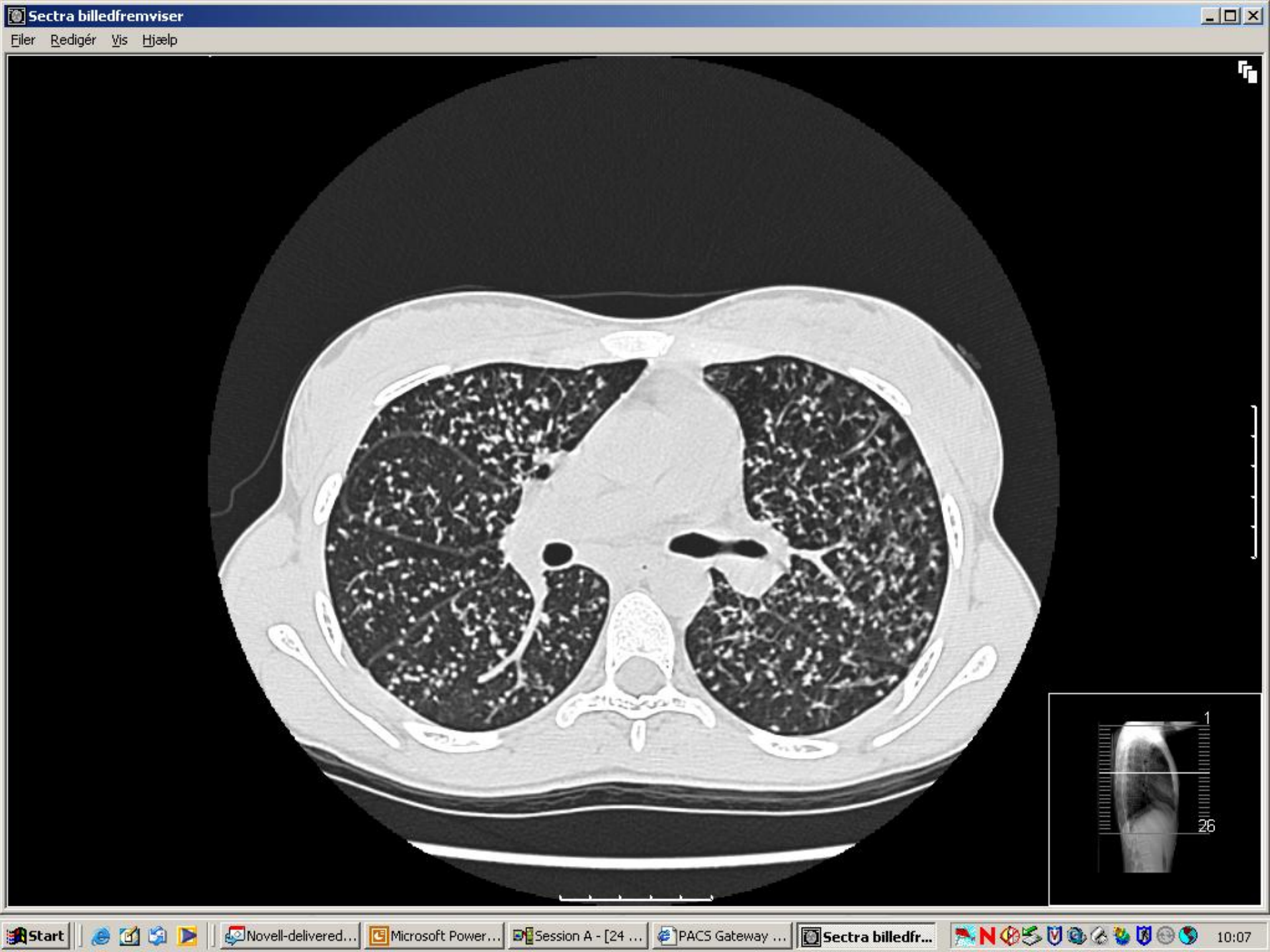
Sectra billedfremviser
Filer Redigér Vis Hjælp
1
26
Start
Novell-delivered...
Microsoft Power...
Session A - [24 ...
PACS Gateway ...
Sectra billedfr...
10:06

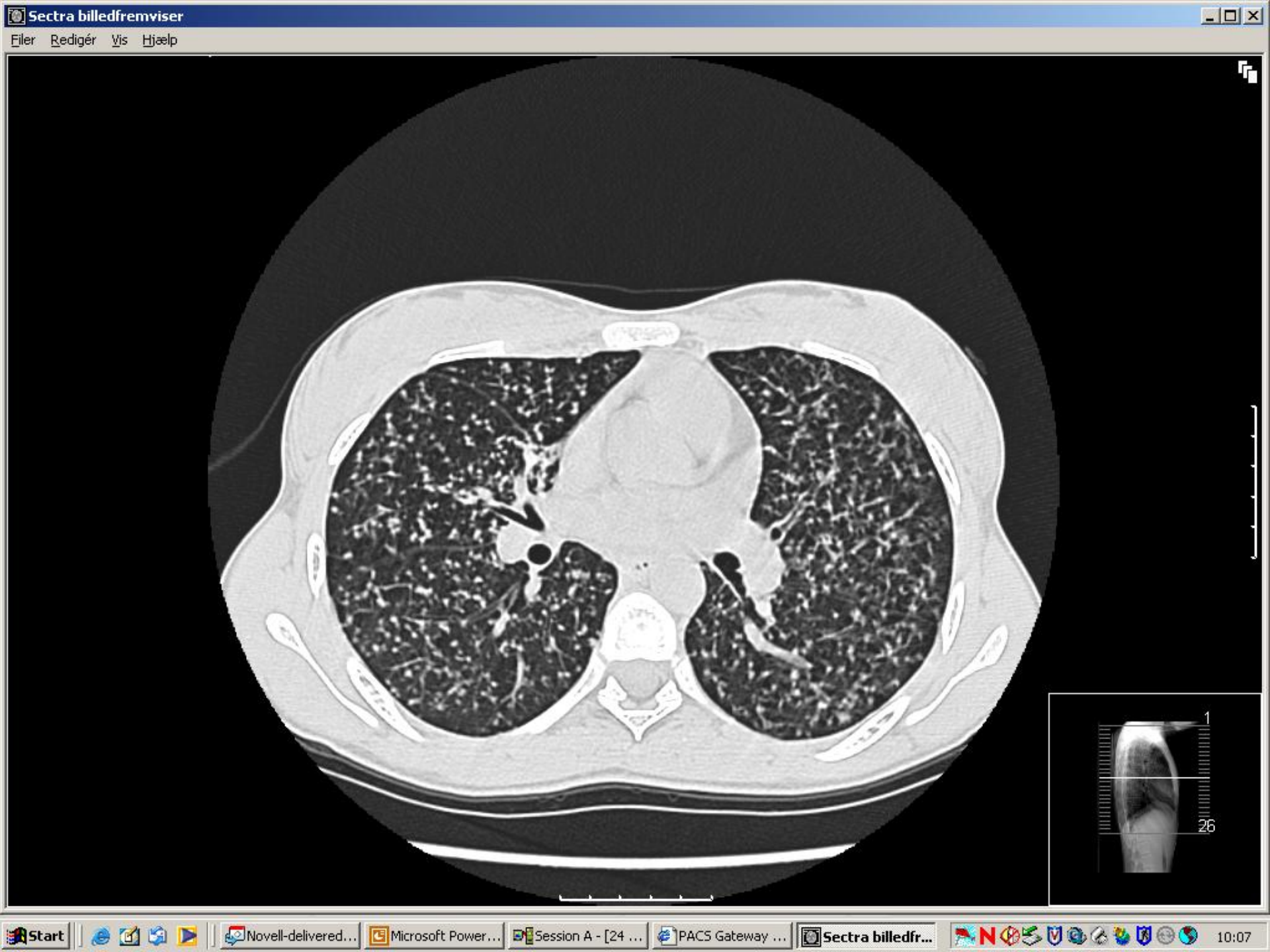
Sectra billedfremviser

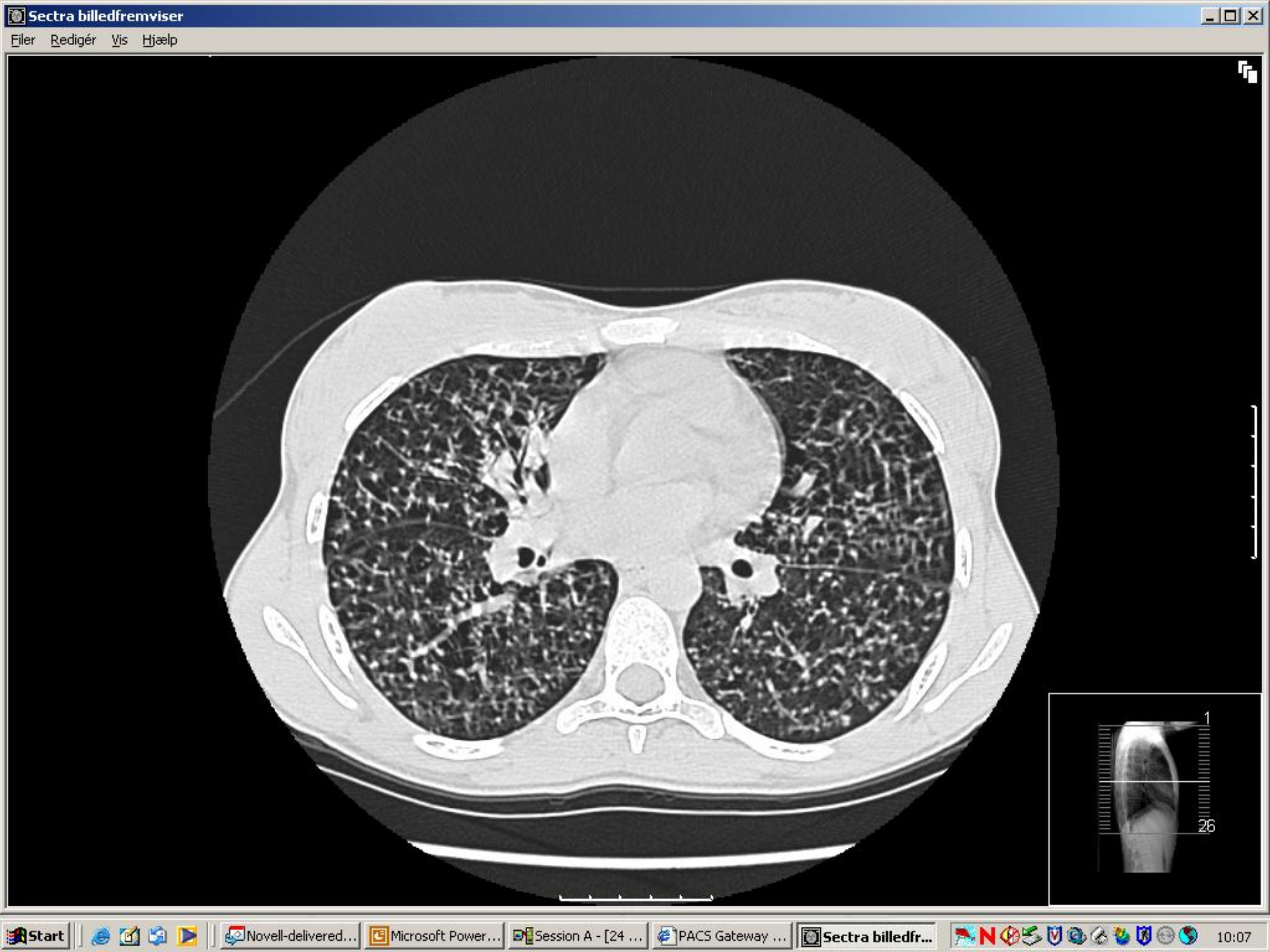
Filer Redigér Vis Hjælp



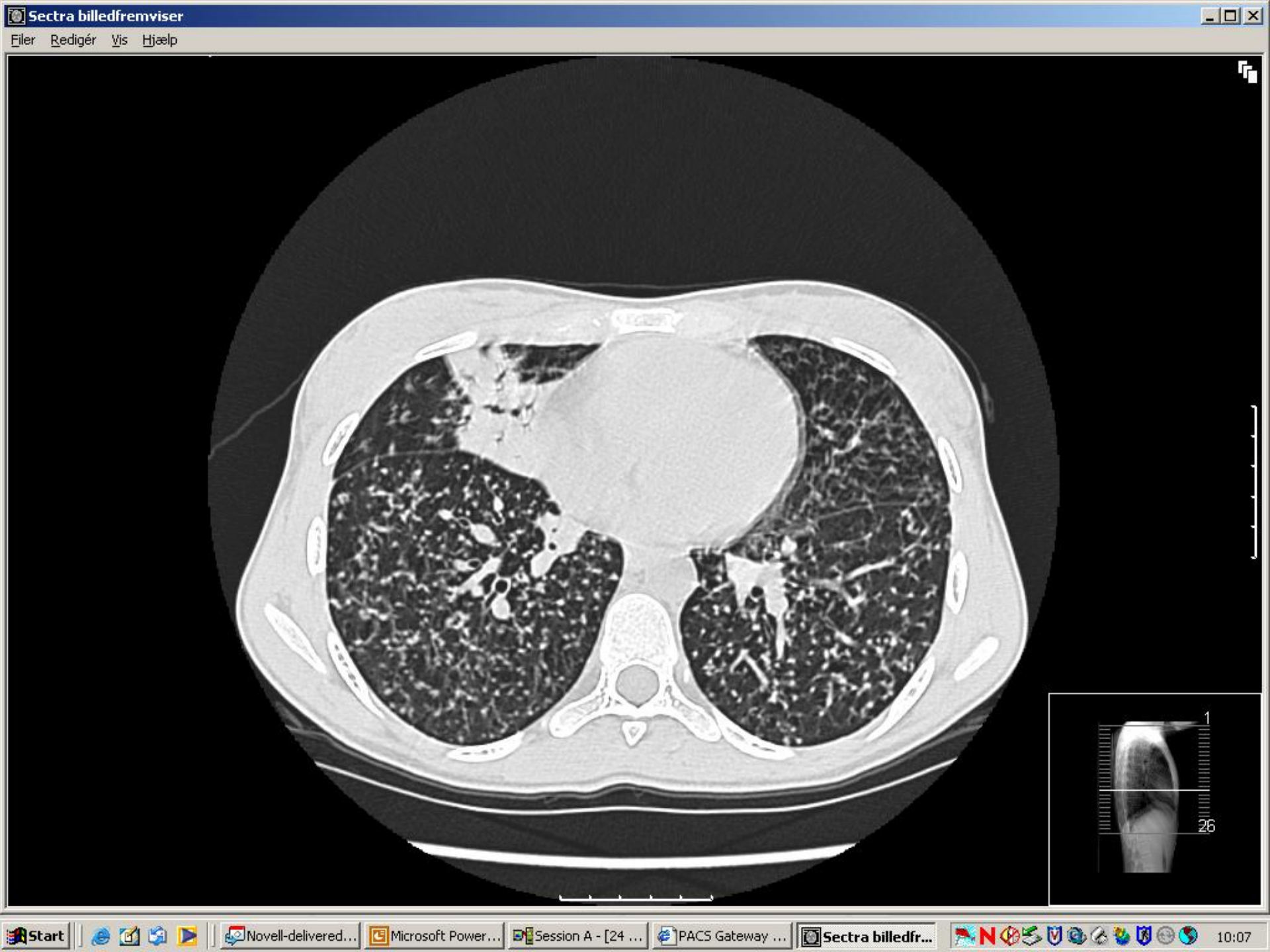

Start | Novell-delivered... | Microsoft Power... | Session A - [24 ... | PACS Gateway ... | Sectra billedfr... | 10:06

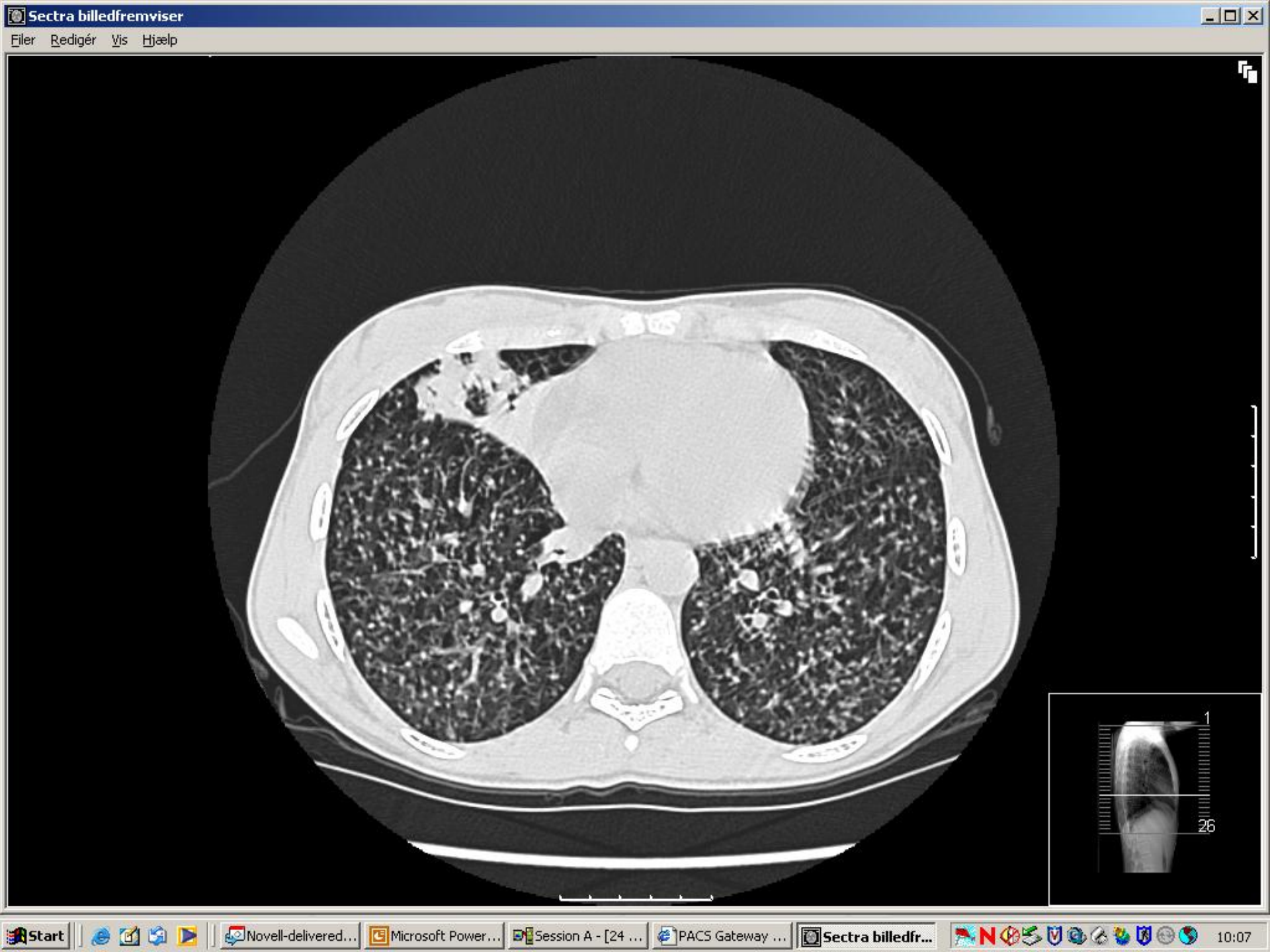

Sectra billedfremviser
Filer Redigér Vis Hjælp
1
26
Start
Novell-delivered...
Microsoft Power...
Session A - [24 ...
PACS Gateway ...
Sectra billedfr...
10:07


Sectra billedfremviser
Filer Redigér Vis Hjælp
1
26
Start
Novell-delivered...
Microsoft Power...
Session A - [24 ...
PACS Gateway ...
Sectra billedfr...
10:07


Sectra billedfremviser
Filer Redigér Vis Hjælp
1
26
Start
Novell-delivered...
Microsoft Power...
Session A - [24 ...
PACS Gateway ...
Sectra billedfr...
10:07

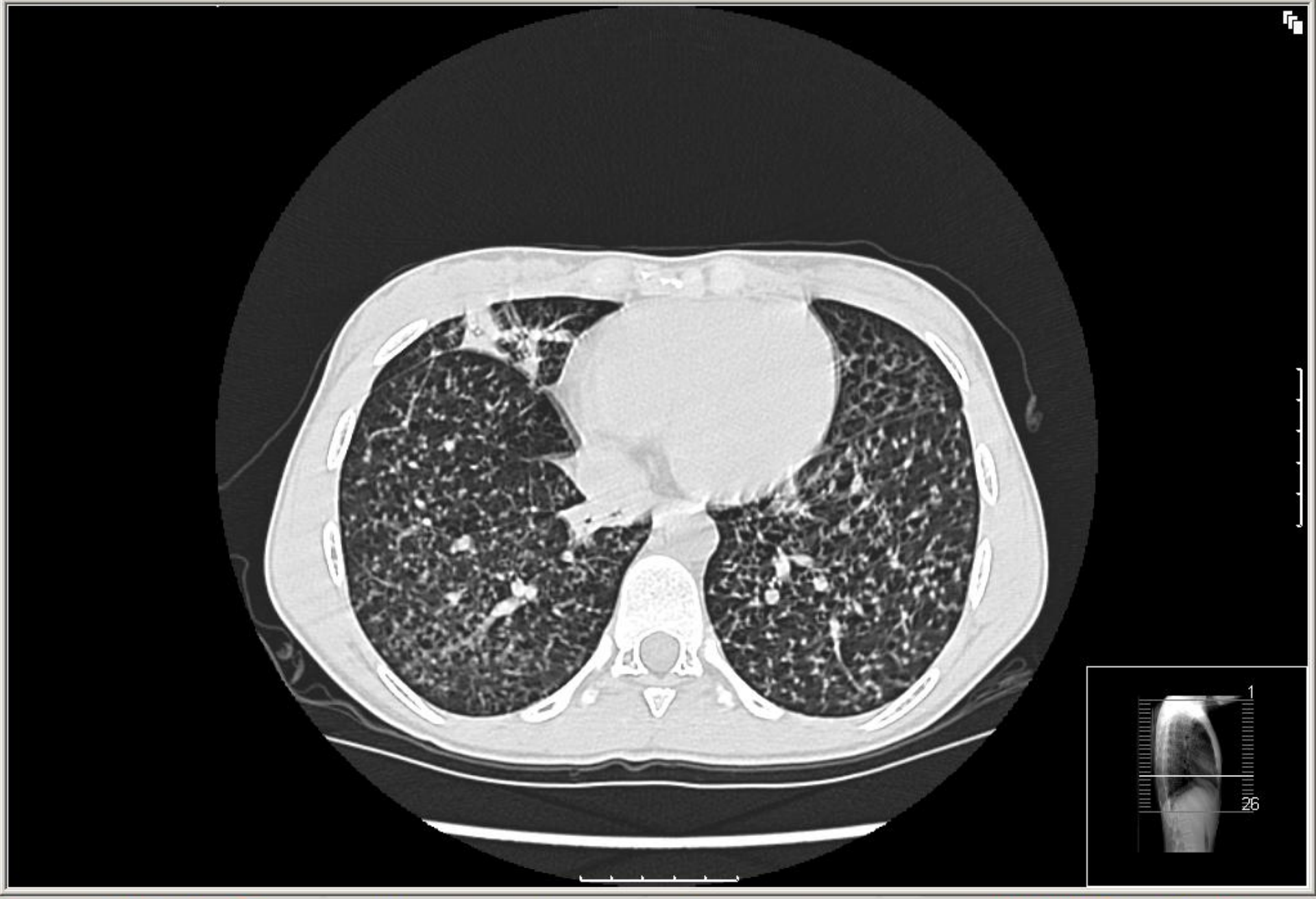
Sectra billedfremviser
Filer Redigér Vis Hjælp
1
26
Start
Novell-delivered...
Microsoft Power...
Session A - [24 ...
PACS Gateway ...
Sectra billedfr...
10:07


Sectra billedfremviser
Filer Redigér Vis Hjælp
1
26
Start
Novell-delivered...
Microsoft Power...
Session A - [24 ...
PACS Gateway ...
Sectra billedfr...
10:07

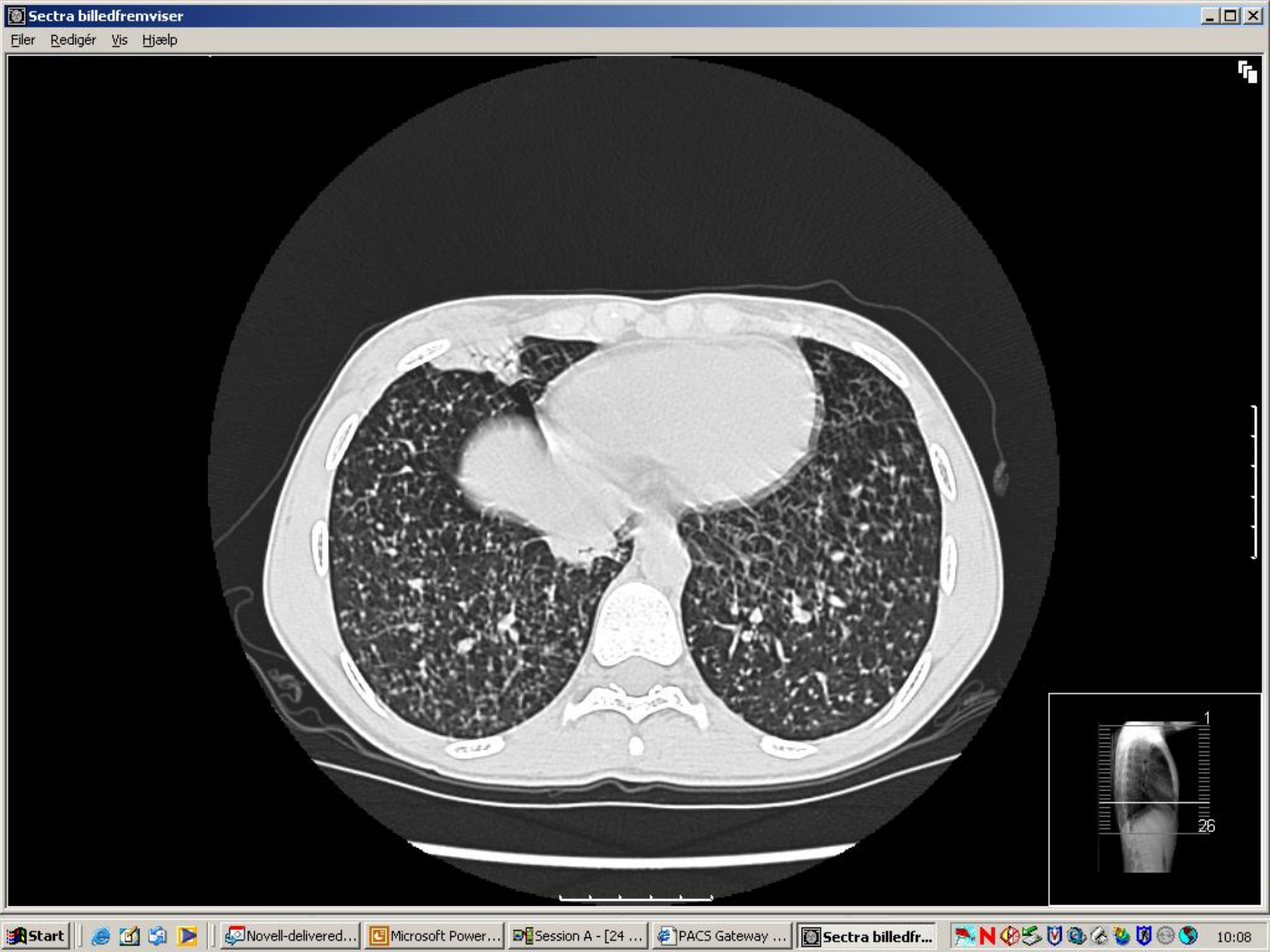

Sectra billedfremviser
Filer Redigér Vis Hjælp
1
26
Start
Novell-delivered...
Microsoft Power...
Session A - [24 ...
PACS Gateway ...
Sectra billedfr...
10:07

Sectra billedfremviser

Filer Redigér Vis Hjælp



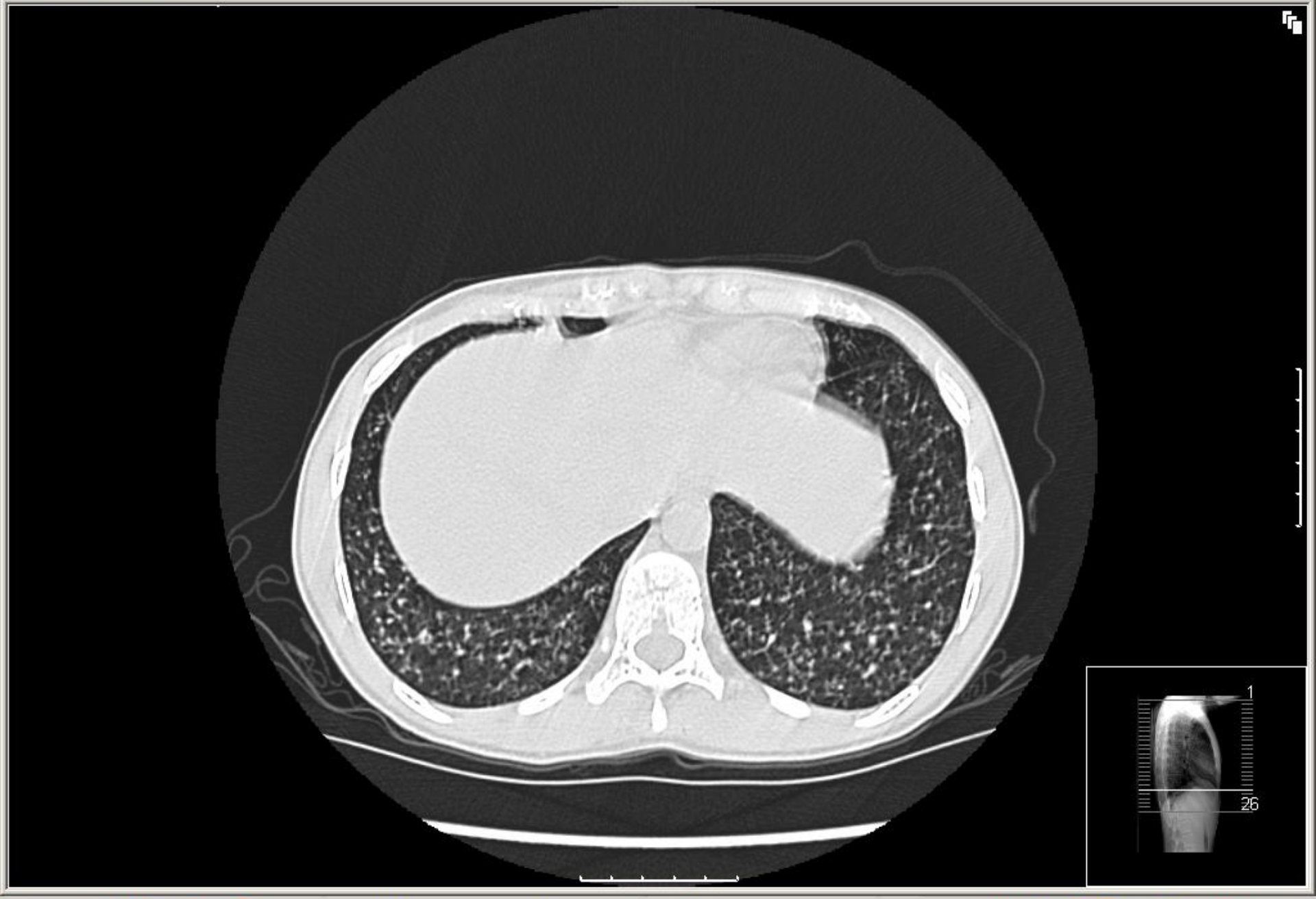

Start | Novell-delivered... | Microsoft Power... | Session A - [24 ... | PACS Gateway ... | Sectra billedfr... | 10:08


Sectra billedfremviser
Filer Redigér Vis Hjælp
1
26
Start
Novell-delivered...
Microsoft Power...
Session A - [24 ...
PACS Gateway ...
Sectra billedfr...
10:08

Sectra billedfremviser
Filer Redigér Vis Hjælp
1
26
Start
Novell-delivered...
Microsoft Power...
Session A - [24 ...
PACS Gateway ...
Sectra billedfr...
10:08

Sectra billedfremviser

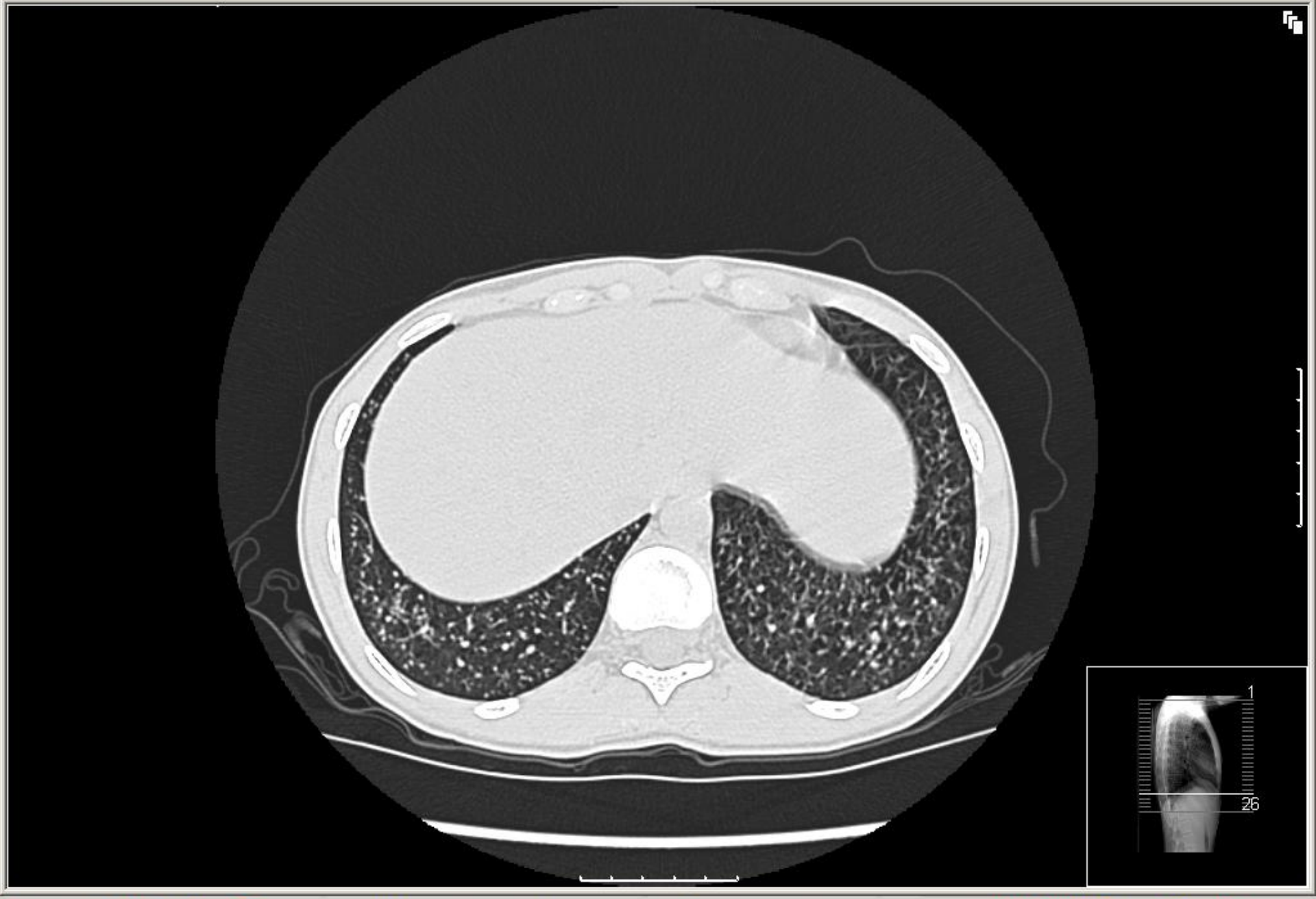
Filer Redigér Vis Hjælp




Start | Novell-delivered... | Microsoft Power... | Session A - [24 ... | PACS Gateway ... | Sectra billedfr... | 10:08

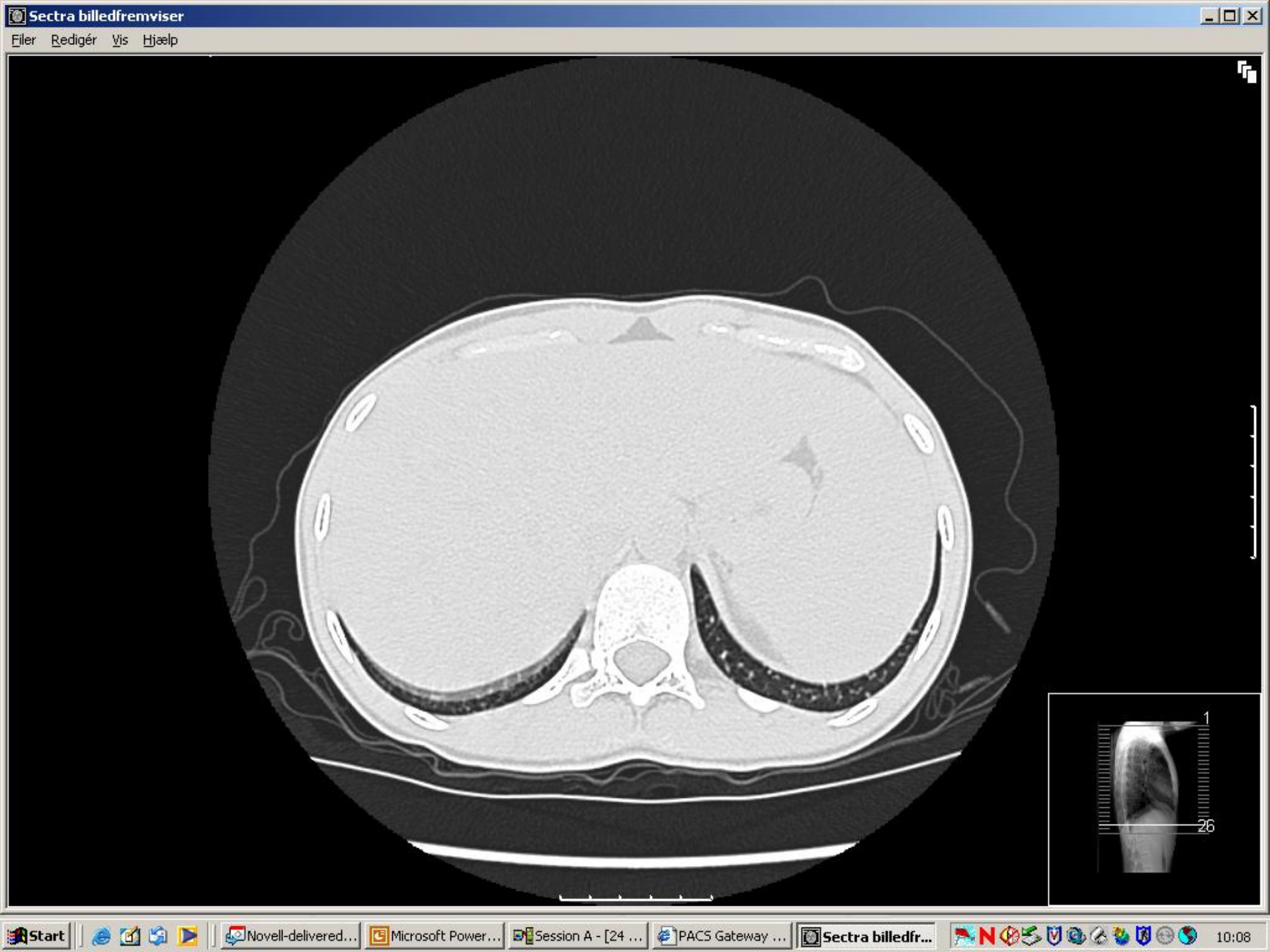
Sectra billedfremviser

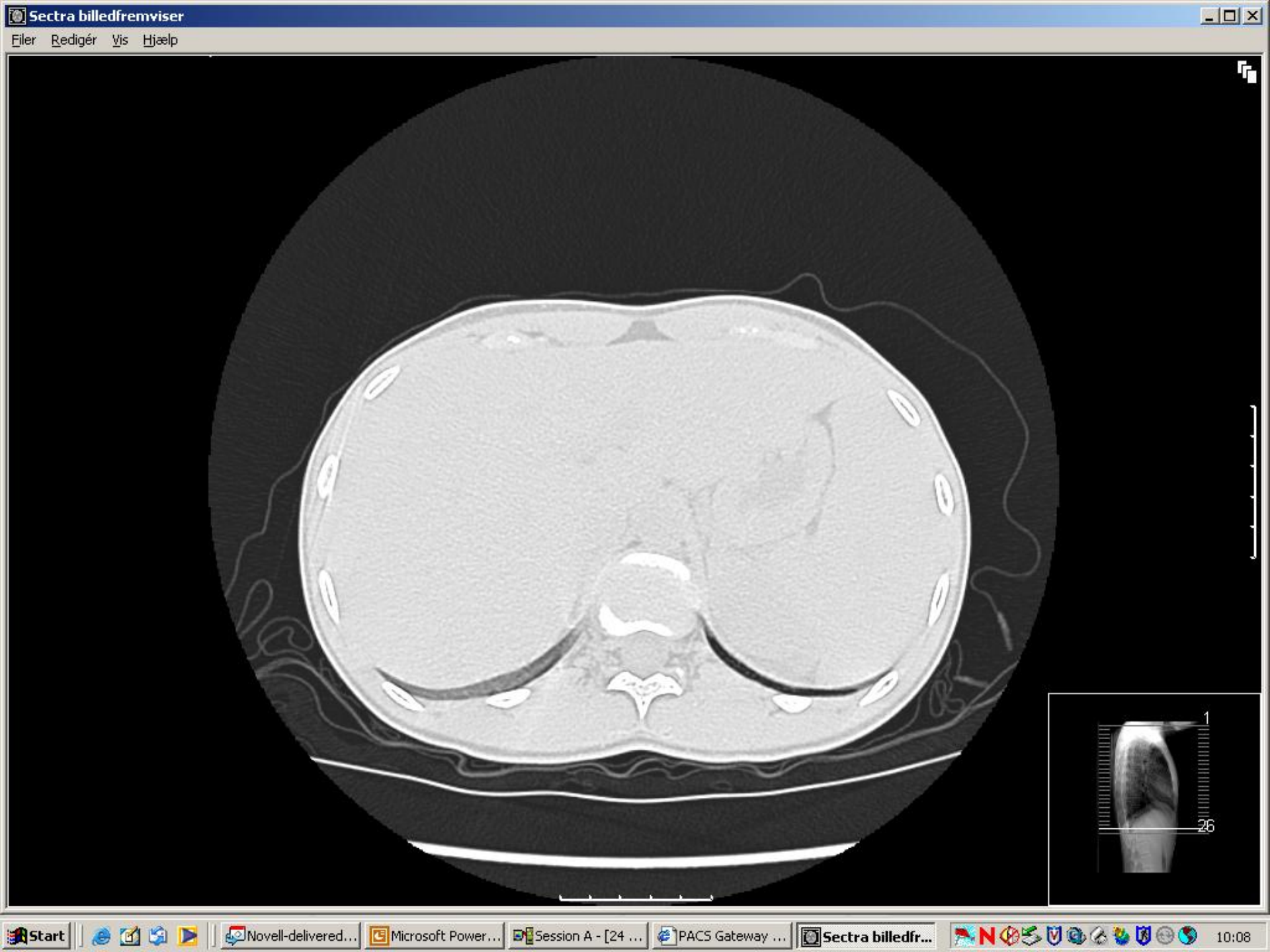
Filer Redigér Vis Hjælp

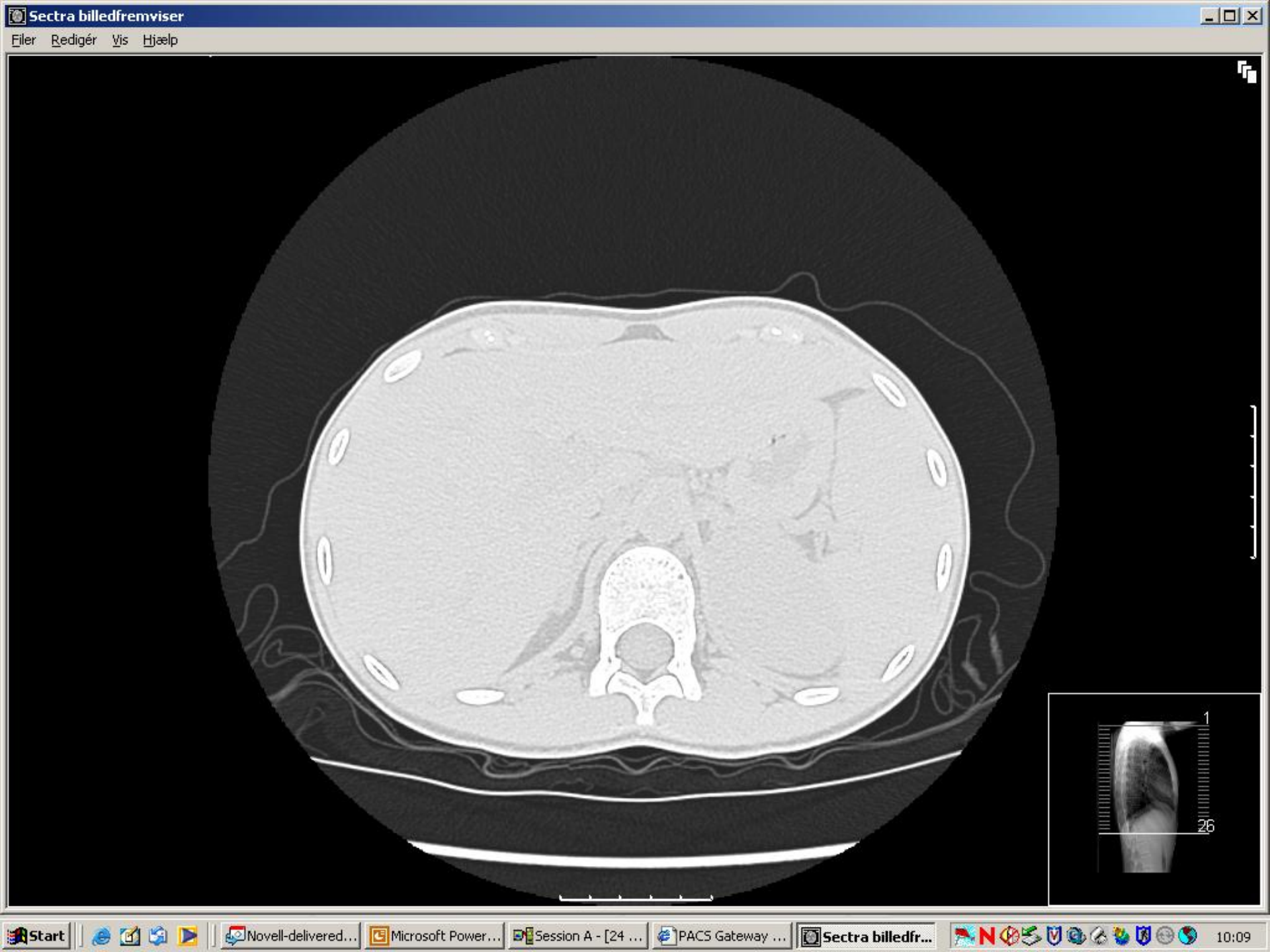



Start | Novell-delivered... | Microsoft Power... | Session A - [24 ... | PACS Gateway ... | Sectra billedfr... | 10:08

Sectra billedfremviser
ler Redigér Vis Hjælp
1
26
Start
Novell-delivered...
Microsoft Power...
Session A - [24 ...
PACS Gateway ...
Sectra billedfr...
10:08


Sectra billedfremviser
Filer Redigér Vis Hjælp
1
26
Start
Novell-delivered...
Microsoft Power...
Session A - [24 ...
PACS Gateway ...
Sectra billedfr...
10:08

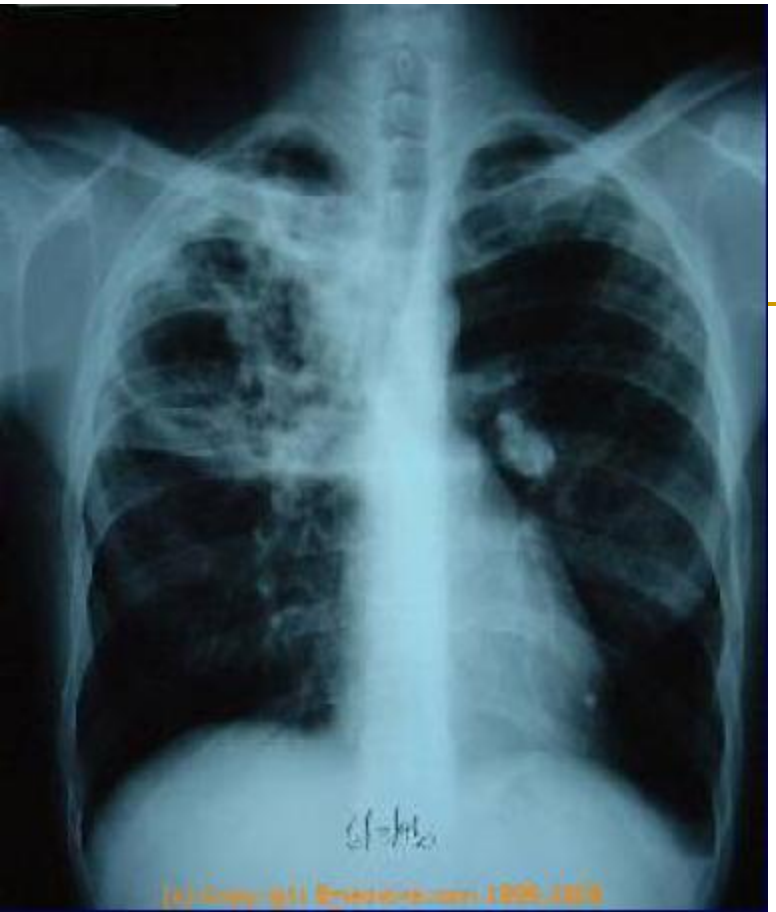

Sectra billedfremviser
Filer Redigér Vis Hjælp
1
26
Start
Novell-delivered...
Microsoft Power...
Session A - [24 ...
PACS Gateway ...
Sectra billedfr...
10:08

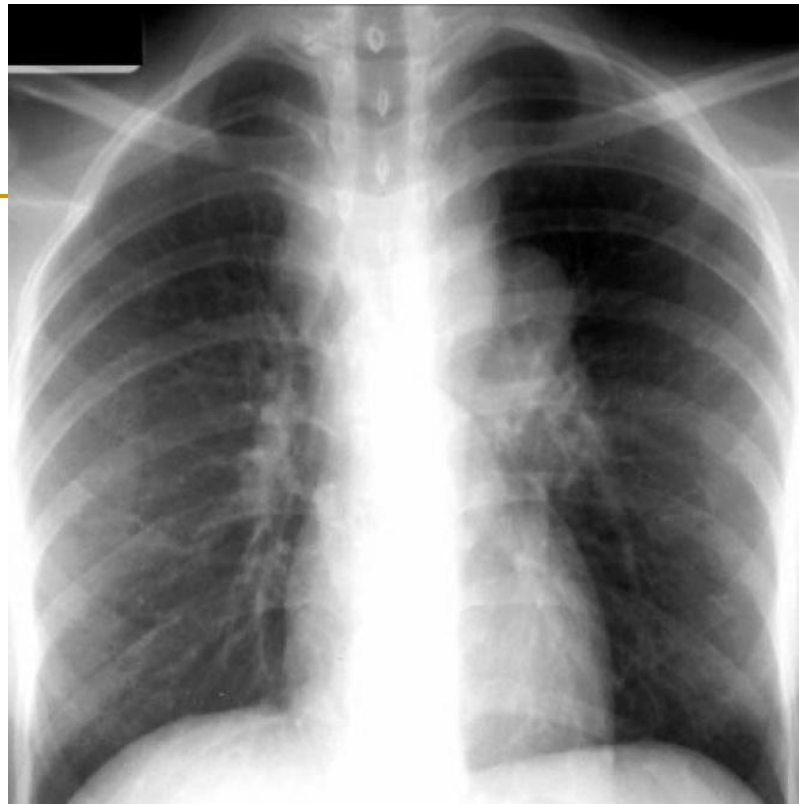

Sectra billedfremviser
Filer Redigér Vis Hjælp
1
26
Start
Novell-delivered...
Microsoft Power...
Session A - [24 ...
PACS Gateway ...
Sectra billedfr...
10:09

# Beskrivelse af hrct

- 26.04.06. RD:
- Infiltratio pulmonis bilateralis in prim. in dex. / TB obs. pro.

# Tuberculosis





# What is Mycobacterium?

# MYCOBACTERIUM

- Aerobic bacilli –non spore forming
  non motile
- Cell wall –rich in lipids
- Acid-fast bacilli
- Very slow growing

# TB: History

- Earliest Archeological Evidence of Spinal TB is from Egyptian Mummies, 4000 BCE.
- Earliest Evidence of Pulmonary TB 1000 BCE in a 5 Year old Boy
- Earliest Written Description 668-626 BCE: *The Patient Coughs Frequently, His sputum is Thick and Sometimes Contains Blood. His Breathing is Like a Flute, His Skin is Cold but His Feet are Hot. He Sweats Greatly and his Heart is Much Disturbed*

# TB history

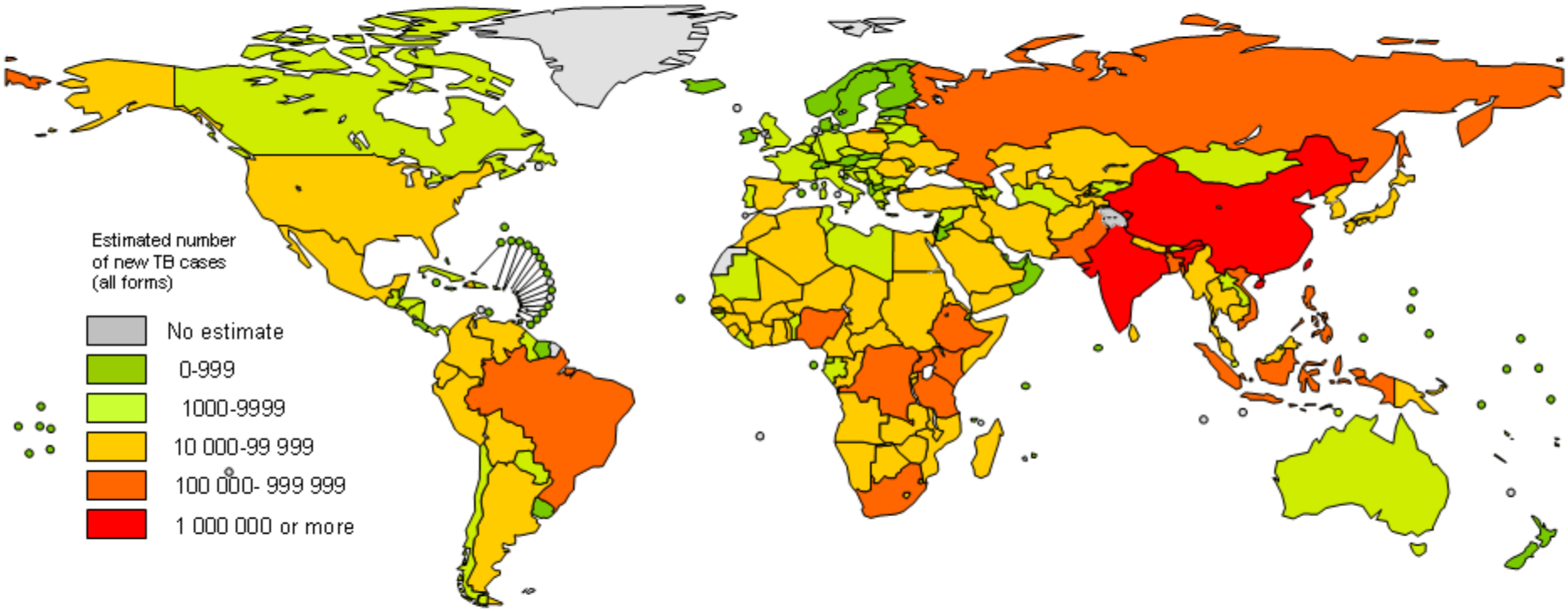
- TB Peak = Industrial Revolution 17th- 18th Century Resulting in 25-30% of all Adult Deaths in Europe
- Until Robert Koch's discovery of the TB bacteria in 1882, many scientists believed that TB was hereditary and could not be prevented
- Koch’s discovery brought hopes for a cure but also bred fear of contagion
- A person with TB was frequently labeled an outcast

# Prevention is very important

- **Incidence declined before availability of anti-tuberculous drugs**
- **Improved social conditions - housing /nutrition**
- **Case detection & treatment**
- **Contact tracing**
- **Evidence of infection / disease**
- **Treatment of infected / diseased contacts**

ROLE OF IMMUNIZATION
BCG (bacillus Calmette Guerin)

# Estimated numbers of new cases, 2005




The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.
Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

# Tuberculosis Epidemiology

~ 2 billion people are infected –

A Third of the World!

10% will develop active TB in their lifetime

→ 10 million new active TB / yr

→ 2 million deaths / yr

World Health Organization

# MYCOBACTERIA ASSOCIATED WITH HUMAN DISEASE

| Mycobacterium | Environmental contaminant | Reservoir |
|---|---|---|
| *M tuberculosis* | No | Human |
| *M bovis* | No | Human, cattle |
| *M leprae* | No | Humn |
| *M kansasii* | Rarely | Water, cattle |
| *M marinum* | Rarely | Fish, water |
| *M scrofulaceum* | Possibly | Soil, water |
| *M avium intracellulare* | Possibly | Soil, water, birds |
| *M ulcerans* | No | Unknown |
| *M fortuitum* | Yes | Soil, water, animals |
| *M chelonae* | Yes | Soil, water, animals |

# CLASSIFICATION OF MYCOBACTERIA ASSOCIATED WITH HUMAN DISEASE

| Mycobacterium | Clinical significance | Pigmentation | Growth |
|---|---|---|---|
| | | | |
| *M Tuberculosis , M bovis*<br>*M ulcerans* | Strict pathogens | No | No |
| *M leprae* | Strict pathogen | - | - |
| | | | |
| *M marinum , kansasii* | Usually pathogenic | Photochromogens | slow |
| | | | |
| *M scrofulaceum* | Rarely pathogenic | Scotochromogens | slow |
| | | | |
| *M avium intracellulare* | Pathogenic in immunocompromised | No | slow |
| | | | |
| *M fortuitum, M chelonae* | Rarely pathogenic | No | 'rapid' |

# Pathogenesis

- Inhaled aerosols

  Engulfed by alveolar macrophages

  Bacilli replicate

  Macrophages die

- Infected macrophages migrate → local lymph nodes
- Develop Ghon's focus → Primary complex
- Cell mediated immune response

  ↓

  stops cycle of destruction and spread

- Viable but non replicating bacilli present in macrophages

# TB Infection vs. TB Disease

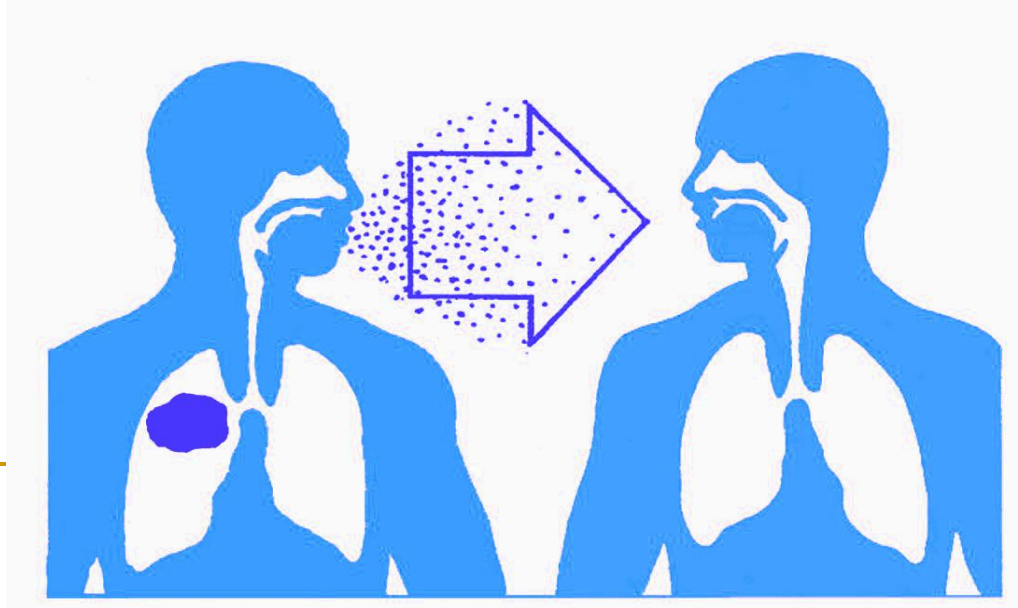
- There is a difference between TB “infection” and TB “disease”

- TB **infection**: TB germs stay in your lungs, but they do not multiply or make you sick
  - You cannot pass TB germs to others

- TB **disease**: TB germs stay in your lungs or move to other parts of your body, multiply, and may make others sick
  - can pass the TB germs to other people

# Transmission & spread

- Spread by droplet nuclei
- Close contacts at highest risk of becoming infected
- Once infected, 5% will develop TB disease within a year or two and another 5% will develop disease later in life



# How is it Spread?

- Is a person with microscopy positive TB in the sputum regarded as contagious?
  - YES
- Should the above patient be hospitalized and isolated ?
  - Yes, as they a regarded as contagious they have to be hospitalized and isolated due to other weakened patients
- When can the patients be discharged?
  - After 2 weeks relevant treatment

# How is it Spread?

- Should a person positive culture and negative sputum microscopy for TB and no productive sputum be hospitized ??
- NO, only culture positive persons are not regarded as contagious.
- Is ekstrapulmonal tuberkulose contagious?
- It depends, generally not but wounds are highly contagiously !!!

# So how Are TB Germs **NOT** Spread?

- Through quick, casual contact, like passing someone on the street
- By sharing utensils or food
- By sharing cigarettes or drinking containers
- By exchanging saliva or other body fluids
- By shaking hands
- Using public telephones

# Medical conditions predisposing to active tuberculosis - once person infected with organism

a) HIV infection

b) Prior MTB (fibrotic changes on Chest X-ray)

c) Diabetes

d) Steroid or other immuno suppressive medications

e) Silicosis (remember job Hx)

f) Hematologic diseases, e.g. lymphoma

g) Dialysis patients

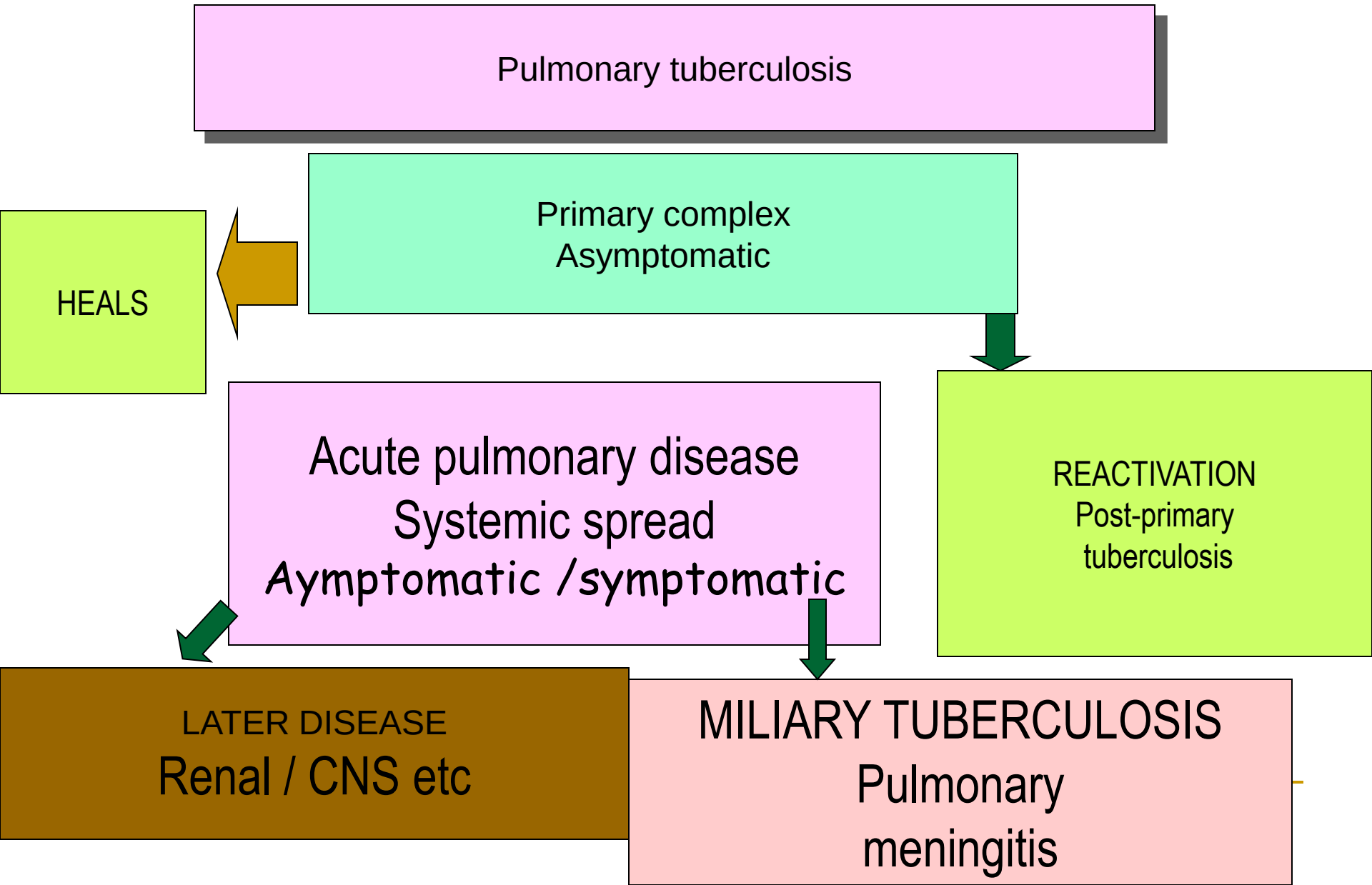
h) Post gastrectomy and malabsorption states

I) Others, cancer etc.

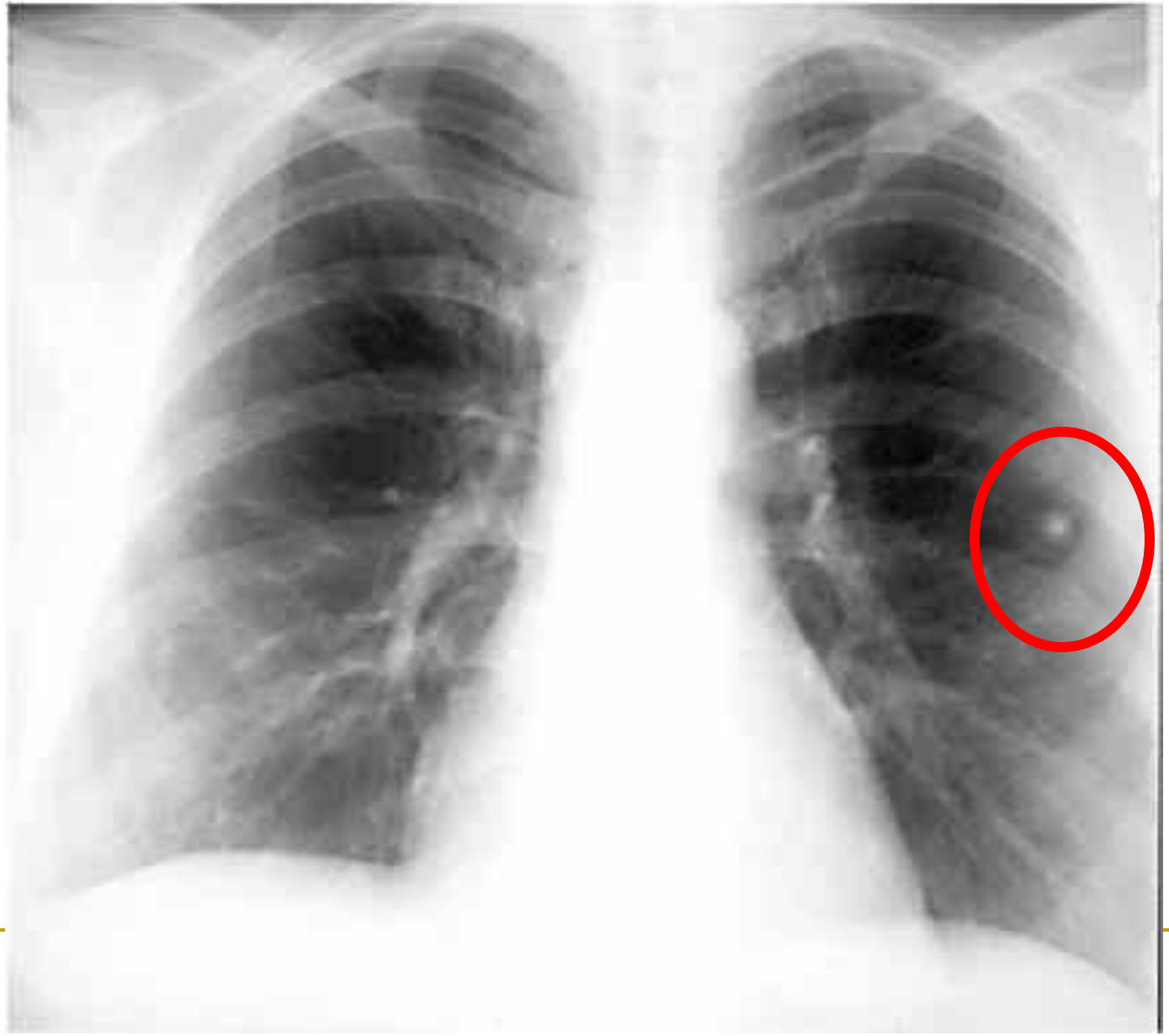
# Common sites of TB disease

- Lungs
- Pleura
- Central nervous system
- Lymphatic system
- Genitourinary systems
- Bones and joints
- Disseminated (miliary TB)

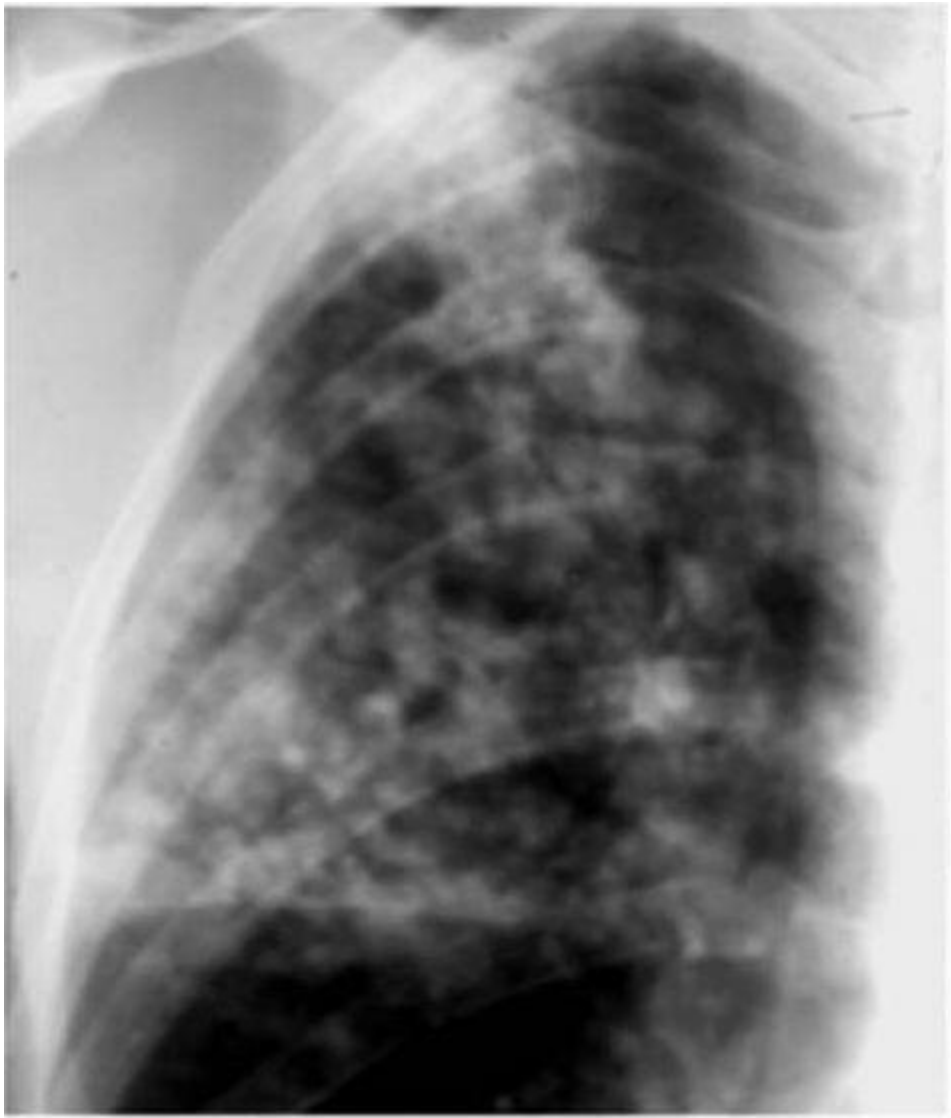
# Clinical presentation of TB



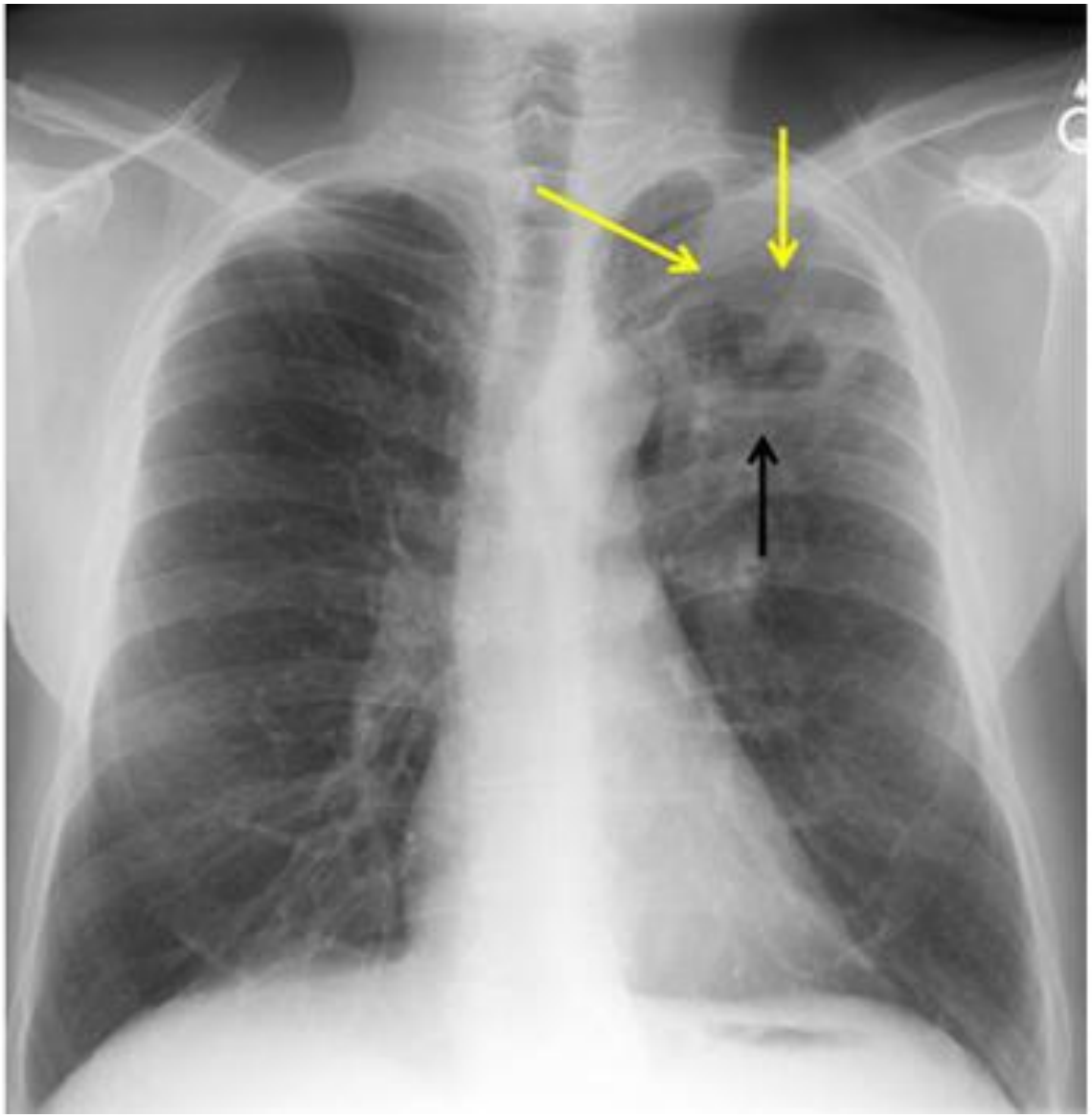
# Ghon's focus



# TB inflitrate



- Ill defined inflammatory exudation, circumscribed productive foci, and cavitation



- Consolidation
- Cavitation

# Common Symptoms of TB Disease

Cough (2-3 weeks or more)

Coughing up blood

Chest pains

Fever

Night sweats

Feeling weak and tired

Losing weight without trying

Decreased or no appetite

If TB outside the lungs, pt may have other symptoms

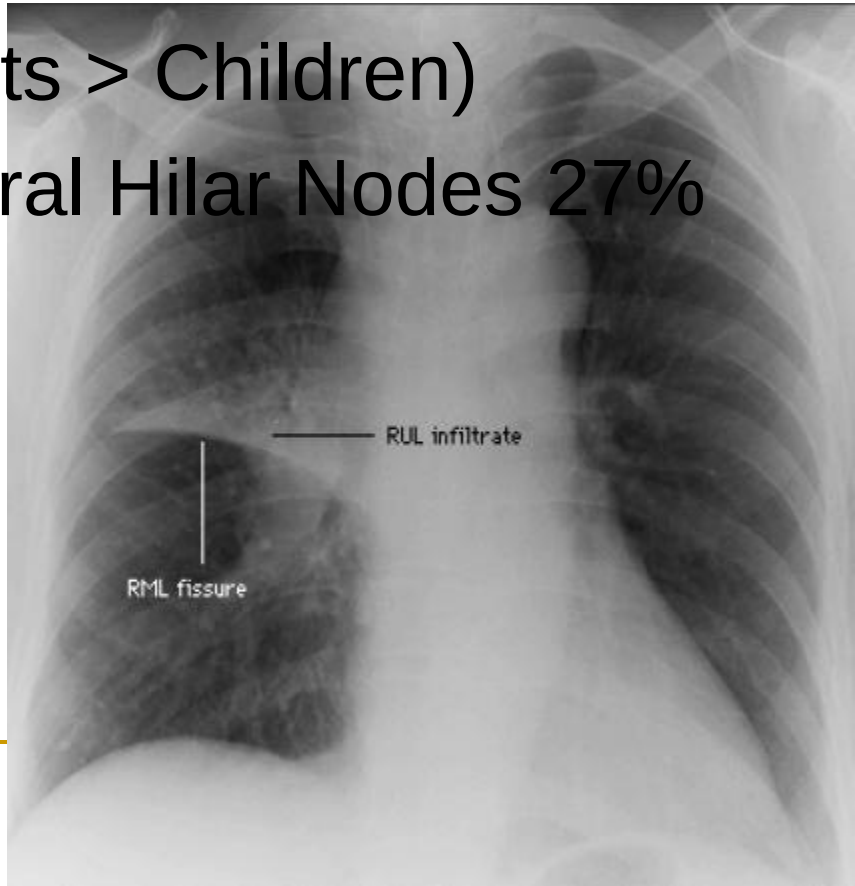
# TB: Primary Chest X-Ray

Hilar Adenopathy 64% (Children > Adults)

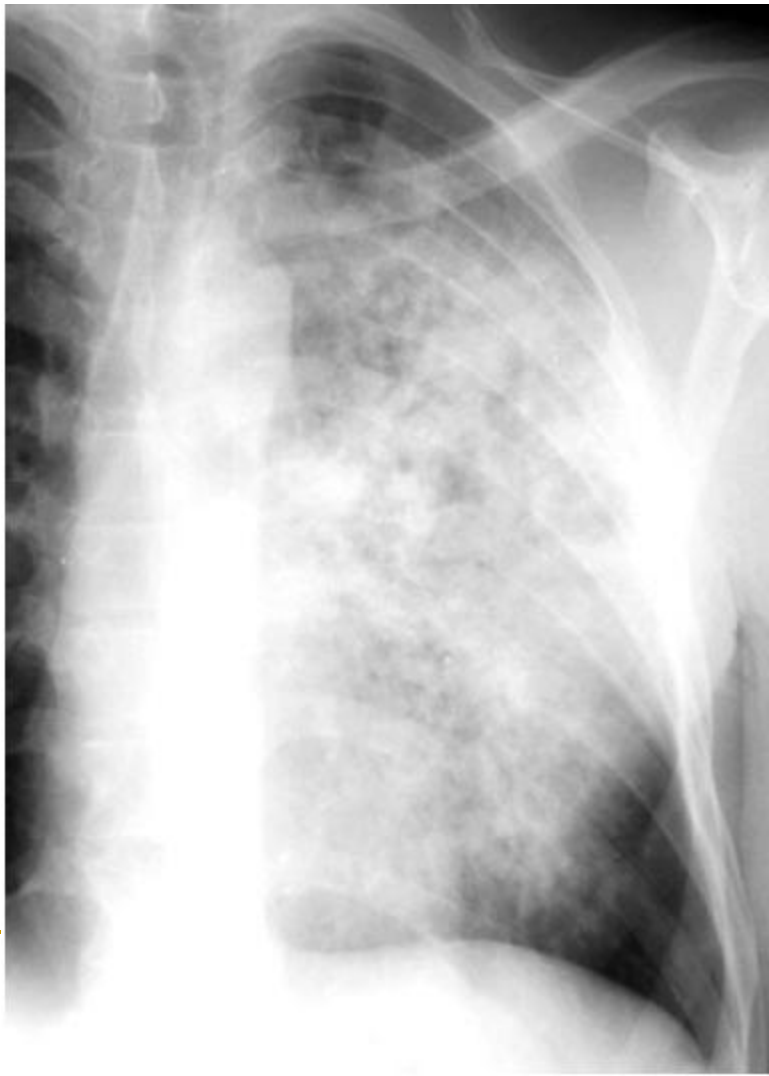
Hilar Changes Right > Left

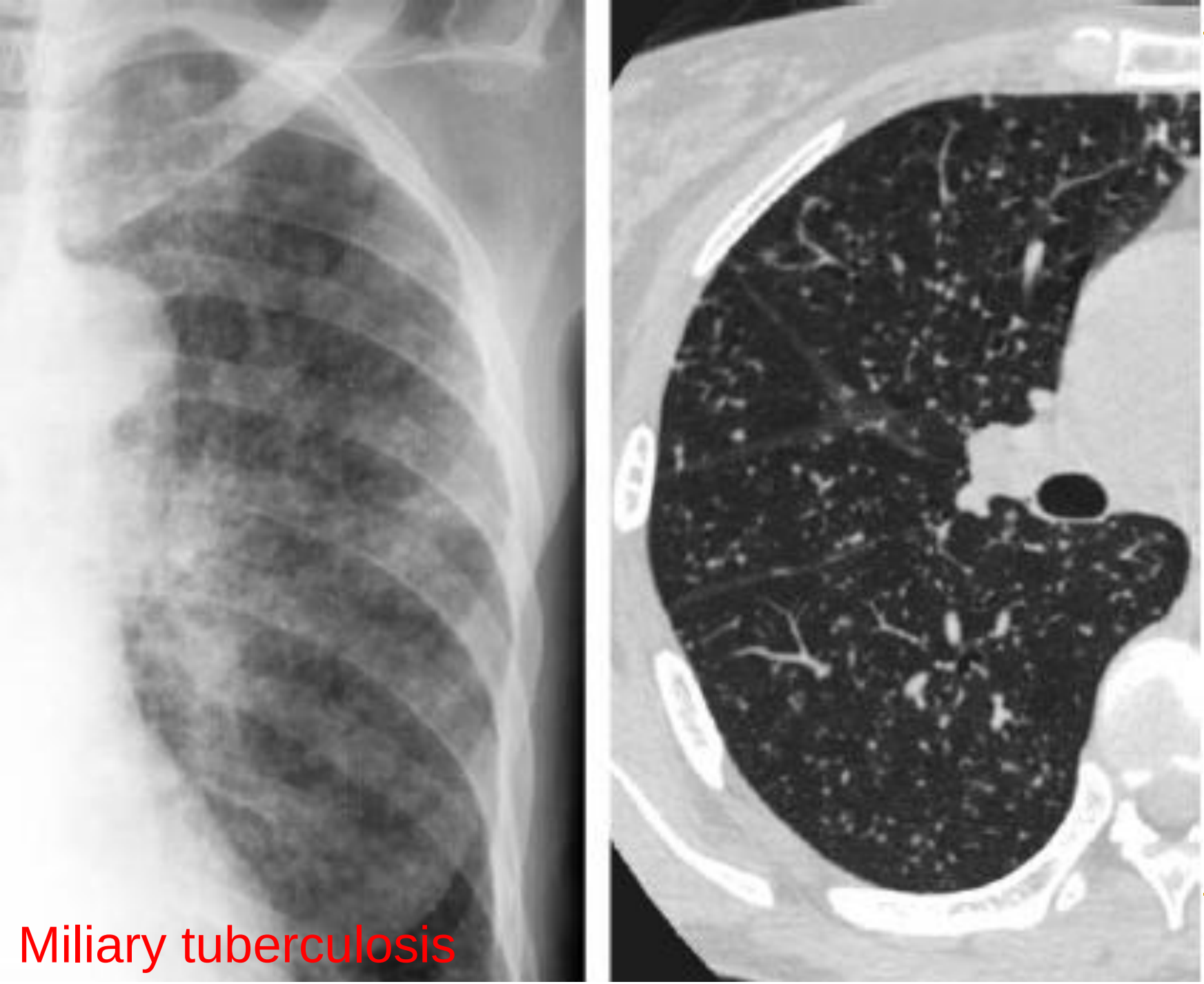
Pleural Effusion 29% (Adults > Children)

Unilateral Infiltrate/Ipsolateral Hilar Nodes 27%



- Parenchymal disease manifests as dense, homogeneous parenchymal consolidation in any lobe.

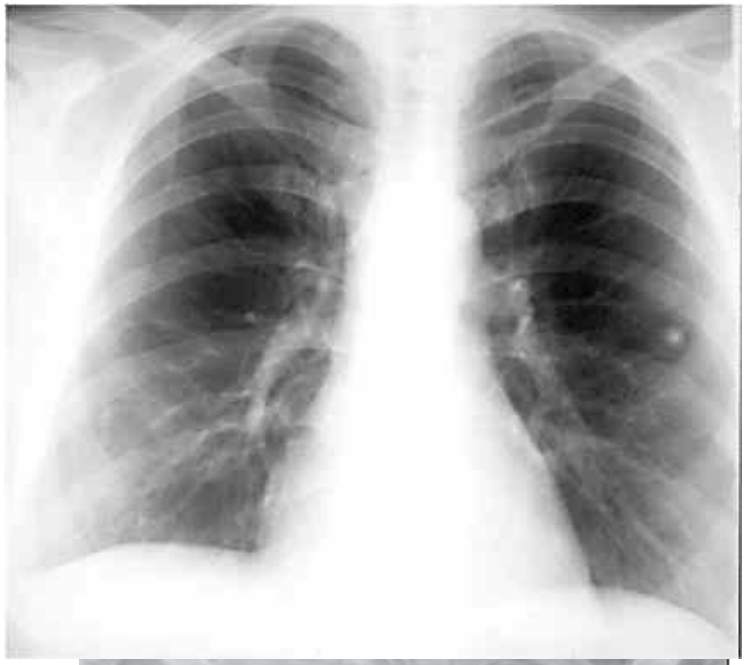


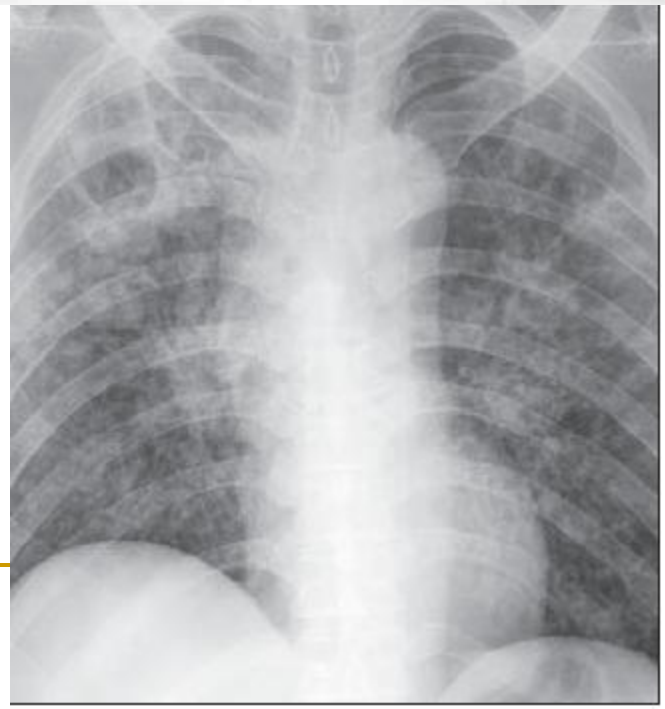


Miliary tuberculosis

# Summary

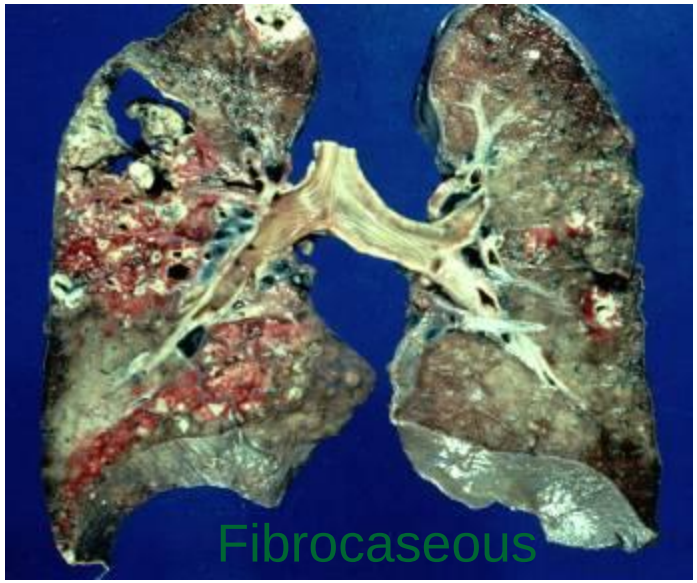
- Caused by *Mycobacterium tuberculosis*.
- Transmitted through inhalation of infected droplets
- Primary
  - Single granuloma within parenchyma and hilar lymph nodes (Ghon complex).
    - Infection does not progress (most common).
    - Progressive primary pneumonia
    - Miliary dissemination (blood stream).

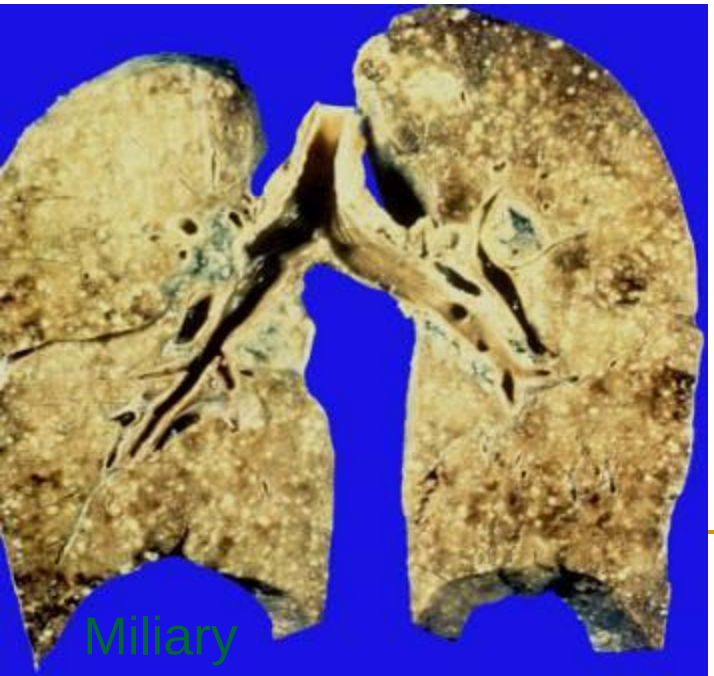


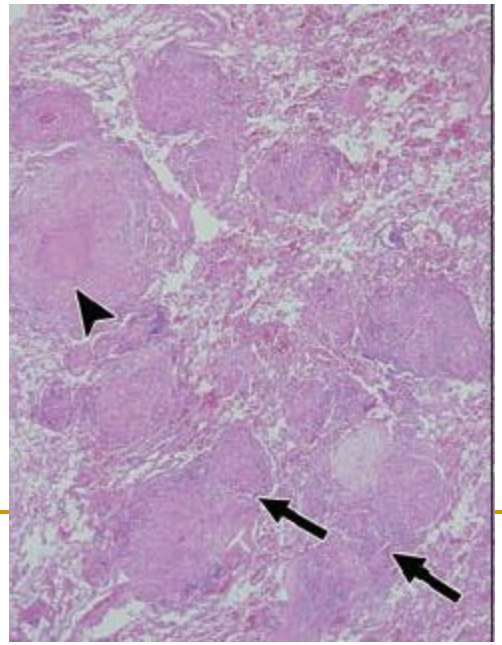


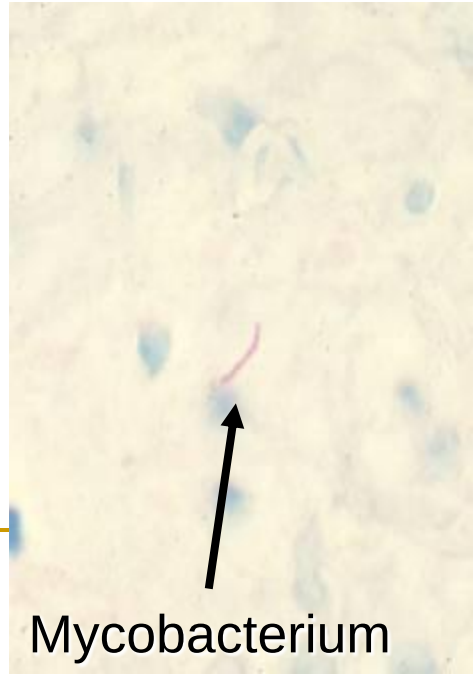
# Summary

- Secondary
  - **Infection (mostly through reactivation) in a previously sensitized individual.**
  - **Pathology**
    - **Cavitary fibrocaseous lesions**
    - **Bronchopneumonia**
    - **Miliary TB**





# Summary continue

## Primary Tuberculosis

** First exposure to MTB often a symptomatic

** Typically pul. Infiltrates: all lung fields with or without hilar adenopathy, these infiltrates non-specific in appearance and not cavitory

** In most cases pneumonitis clears without specific therapy and latent infections established

** In some cases, primary infection may progress, resembling reactivation disease

## Latent Infection

** following primary infection many persons remain asymp.

** Organisms remain latent within macrophages indefinitely

** Tuberculosis skin test (T-PPD) - very important to discover these persons

** If no preventive therapy given, 1:10 persons with MTB infection will develop clinical disease at some time in their lives

## Reactivation Tuberculosis

** Consitutional sx and generalized wasting

** Weight loss

** Fever at night, sweating

** Diagnosis maybe difficult as pul sx mild or lacking.

# But when to treat TB!?

# “Diagnosis, diagnosis & diagnosis” William Osler

Objectives for TB treatment and control

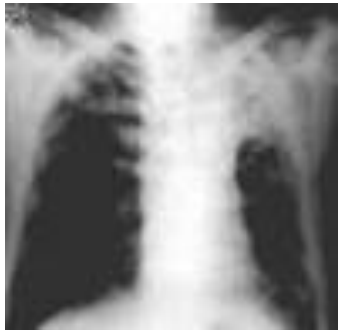
Based on clinical suspicion but always verify the diagnosis !!!!!!!!!!!!!!!!!

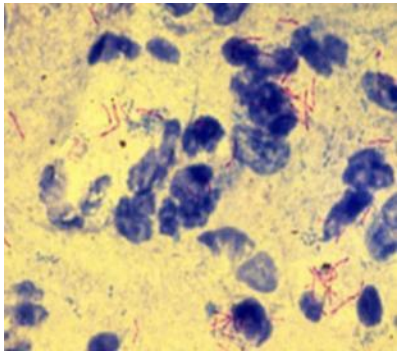
## Microbiology

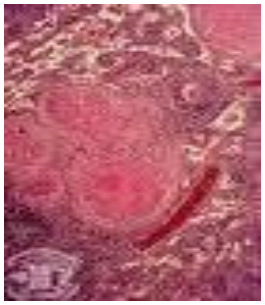
maybe histology

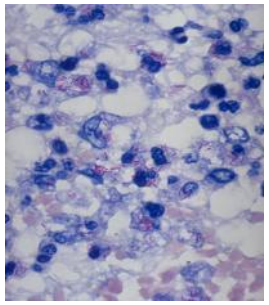
•To rapidly diagnose patients with active TB and treat them correctly to eliminate danger of spread.

•To have rapid diagnostic methods, with high sensitivity and specificity to diagnose diseased patients at the beginning of the symptoms for an adequate treatment prescription









Clinical suspicion Microbiology Histology

"Diagnosis, diagnosis & diagnosis"
William Osler

**High index of suspicion is essential**

# MTB manifestations are unspecific thus lab. confirmation is essential

**Close communication between the clinician and microbiology lab. is mandatory to identify microorganism causing disease and determine their susceptibility to antimicrobial agent that assist in their eradication.**

**Tuberculosis skin (PPD, mantoux) test important first step in identifying infected**

**Patients**

**Lab. Techniques for MTB identification:**

- **A.F.B. smear and cultures of resp. secretion (e.g. sputum)**
- **A.F.B. smear and cultures of potentially infected body fluids or tissues:**

  **CSF, gastric fluid, urine, LN BX bone marrow BX, joint fluids, etc.**
- **Rapid methods: PCR (polymerase chain reactions) and nucleic acid probes**

# "Diagnosis, diagnosis & diagnosis" William Osler

Microbiology

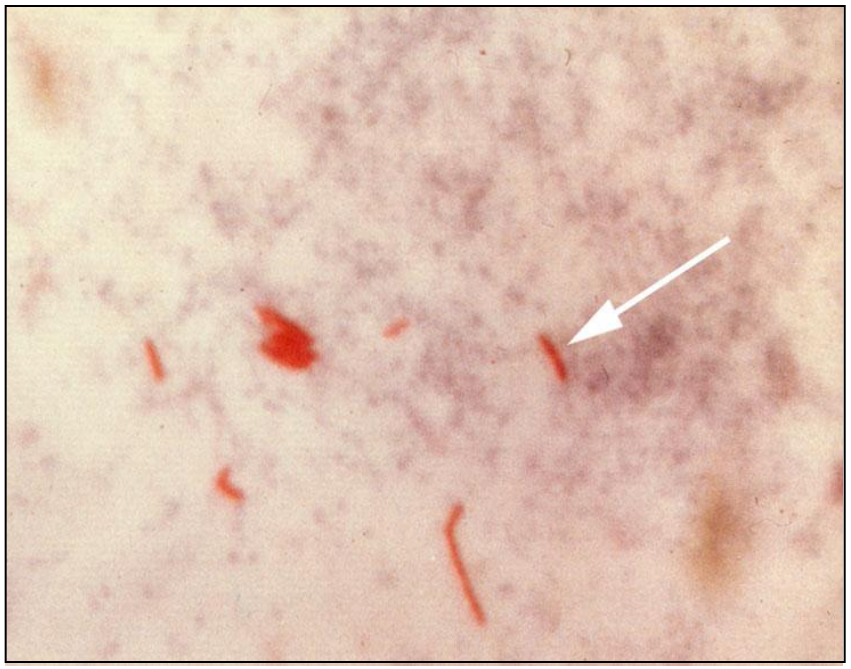
MTB: fastidious, slowly growing, **acid alcohol fast**, aerobic bacterium (AFB) (56 days before its for sure negative)

Cell wall composed of complex peptidoglycans and long chain lipids

These lipids make MTB hydrophobic thus resistant to many stains routinely used in Laboratory, e.g. Gram & Giemsa stains as well as AA fastness

(Once stained, cannot be decolorised by alcohol, acid solutions)

# AFB smear



**AFB (shown in red) are tubercle bacilli**

# False negative results

- Inadequate sputum collection
  - avoid – saliva, nasal discharge
  - collect – bronchial sputum from depth of chest
- Inadequate storage of sputum / stained smears
  - exposure to direct sunlight
  - radiation ( UV light )
  - excessive heat / humidity
- Not taking mucopurulent portion of sputum
- Inadequate smear preparation
- Inadequate smear examination
- Administrative & recording errors

# False positive results

- **Food particles**
- **Precipitated stains**
- **Saprophytic AFB**
- **Spores of *B.subtlis***
- **Fibres and pollen**
- **Scratches on slide**
- **Contamination through carry over of AFB from one smear to another**

# Aims of sputum culture

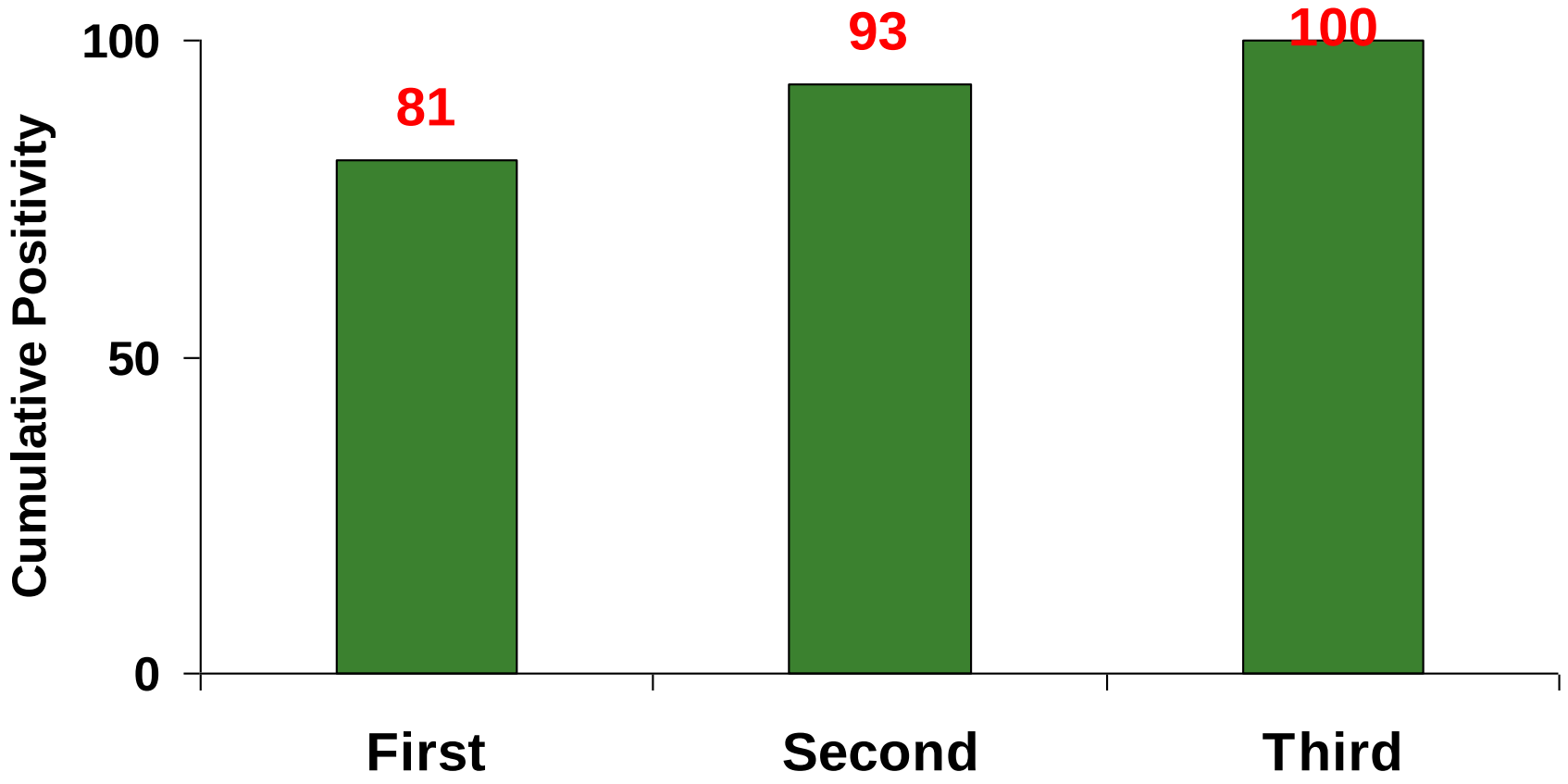
**Diagnosis of patients with infectious tuberculosis**

**Monitoring progress of patients on treatment**

# Questions

- How many sputum cultures for TB is nessesary?
- 1
- 2
- 3
- 4
- 5

# Three cultures and smears are optimal



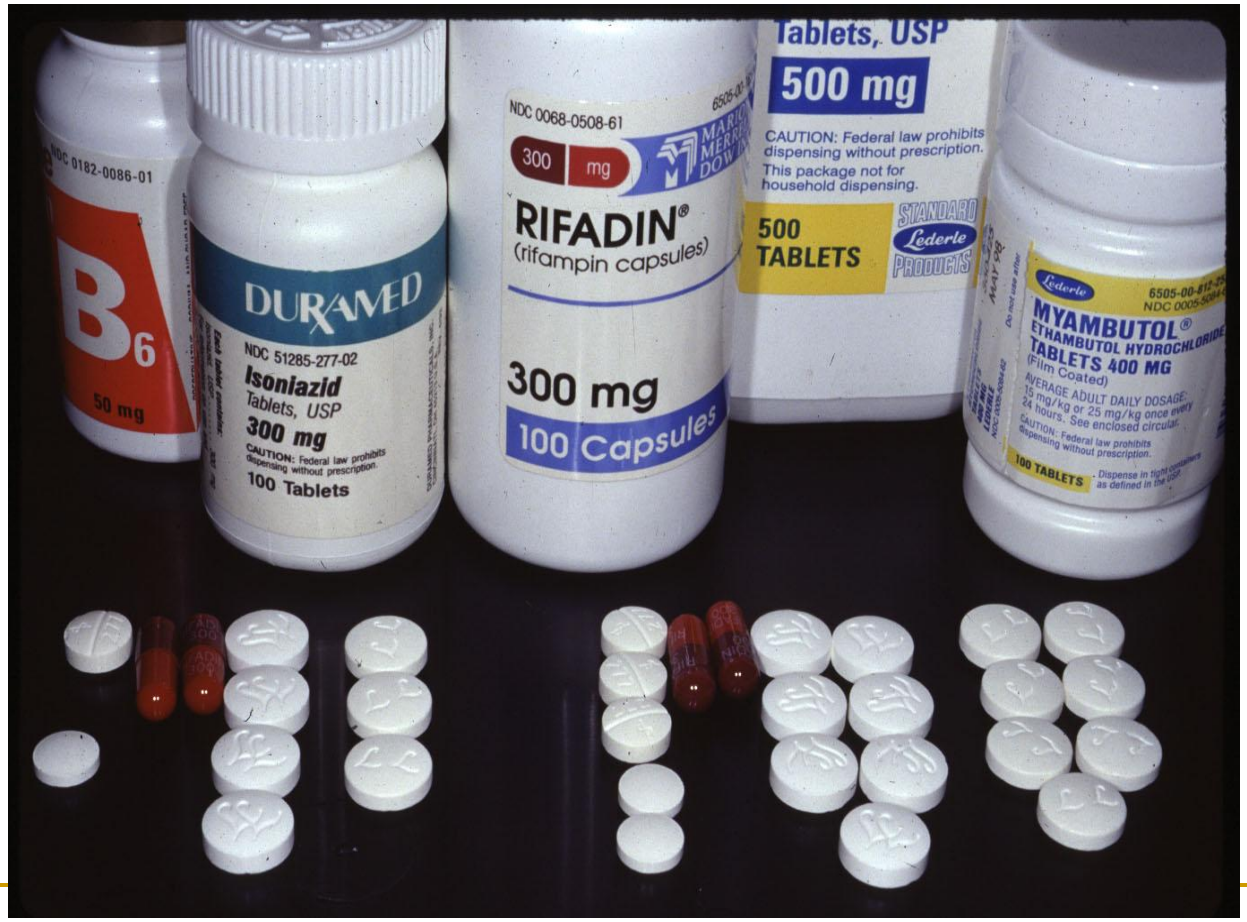
# TB: Tests and Diagnosis

PPD test/TST test*

*PPD = Purified Protein Derivative;

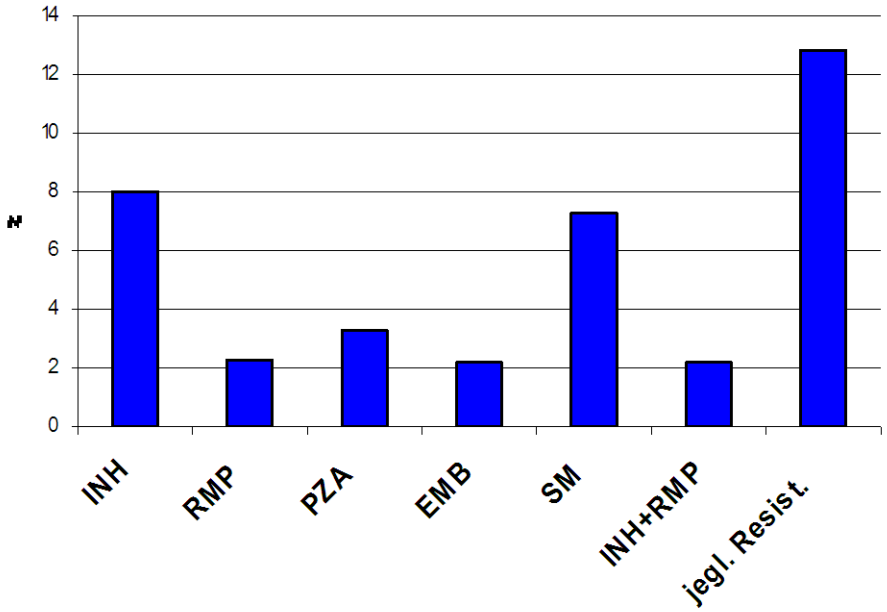
The Tuberculin Skin Test Identifies Individuals who have been Infected with Mycobacterium Tuberculosis, it does not differentiate between Old and New Infection

# Treatment of Active TB Disease



# Drug Susceptibility Testing

TB antibiotic resistance in Germany 2006




For all TB strains isolated, resistence has to be performed

Quelle: RKI, Bericht zur Epidemiologie der Tuberkulose in Deutschland für 2006; 2008

# DRUG THERAPHY

**First Line drugs:**

- ** isoniazid (INH)
- ** Rifampicin (RIF)
- ** pyrazinamide (PZA)
- ** Streptomycin,
- ** ethambutol

**Second line drugs: ***

- ** capreomycin, ciprofloxacin
- ** cycloserine, ethionamide
- ** Kanamycin, ofloxacin
- ** Para-amino salicylic acid (PAS)

* ***These drugs:***

  -- ***less effective***

  -- ***more expensive***

  -- ***more toxic***

# Drug theraphy

## Commonly Used Regimends to treat TB

a) **Initial phase (first two months) 3-4 drugs**

**INH, RIF, PZA, Streptomycin or Ethambutol**

b) **Continuation phase (3-10 months)**

**INH, RIF**

## Duration of Drugs Therapy for TB

**Depends on the site of disease;**

** **Pulmonary TB - 6 months**

** **Extra pulmonary TB**

- **TB Meningitis**
- **Bone / Joint**
- **Disseminated Disease**

} **2 months with 4 drugs + 10 months with INH +RIF**

# Toxicities of TB Treatment Important

All therapies have significant toxicity

All drugs are associated with hepatitis and hypersensitivity reactions

Unique toxicities

– INH: hepatic necrosis, peripheral neuropathy

– Rifampin: altered drug metabolism

– Pyrazinamide: hyperuricemia

– Ethambutol: optic neuritis

– Streptomycin: vestibular toxicity

# Evaluation Response To Treatment

Response To Anti TB Chemotherapy is Best Evaluated Through Sputum Examination

After 2 Months of Therapy 85% of Patients = Sputum negative

2 negative sputum must be present before stop treatment !!

# Some more !?

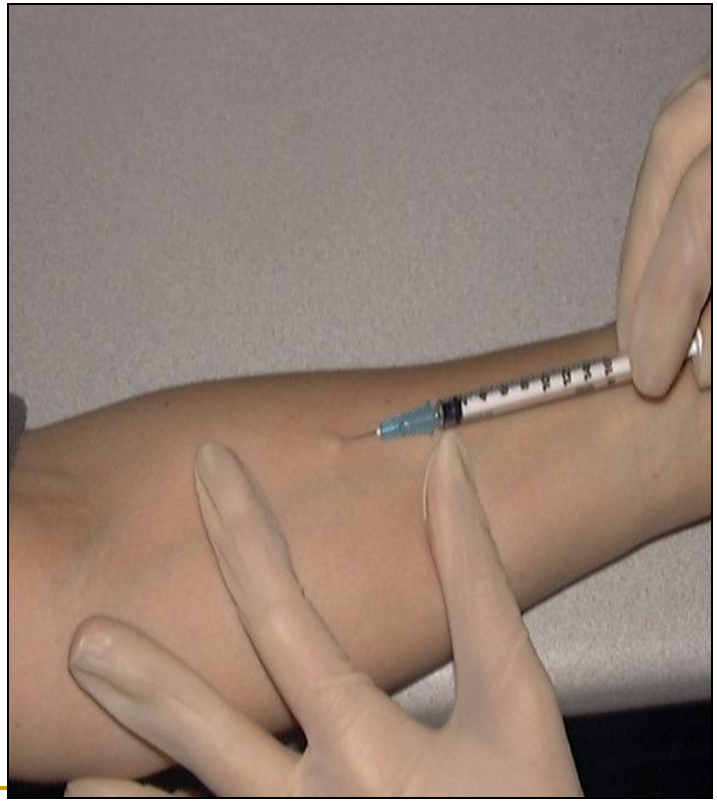
# LTBI vs. pulmonary TB disease

- Latent TB Infection
  - Tuberculin skin test (TST) positive
  - Negative chest radiograph
  - No symptoms or physical findings suggestive of TB disease
- Pulmonary TB Disease
  - TST usually positive
  - Chest radiograph may be abnormal
  - Symptomatic
  - Respiratory specimens may be smear or culture positive

# Administering the Tuberculin Skin Test (TST)

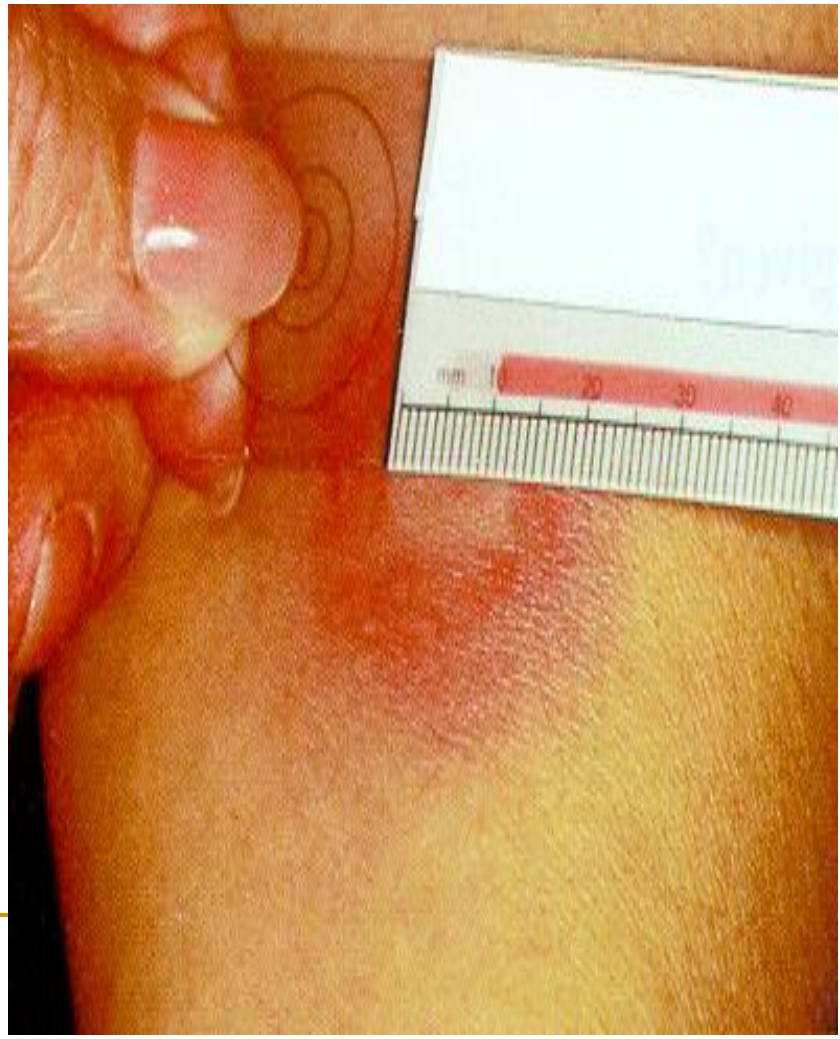
- Inject 0.1 ml of tuberculin intradermally
- Produce a wheal 6-10 mm in diameter

Mostly used on latent TB infection



# Tuberculin Skin Test Reading

- The test is read after 48-72 hours by a trained health care worker
- Diameter of the induration (firmness) is measured in millimeters (mm)
- Erythema (redness) is not measured



# Inactive (Latent)TB Infection

- LTBI- asymptomatic state in people infected with *MTB*
- Live, inactive TB organisms are “walled off” inside the body by the immune system
- Person with LTBI doesn’t feel sick & is not contagious, but they may have abnormal CXR
- TB can reactivate & begin to multiply at anytime after the initial infection (this may occur decades later)

# Latent TB Infection (LTBI)

- For adults with untreated LTBI & intact immunity the estimated risk of developing active TB is 5% - 10% over a lifetime

  (50% of those in 1st 2 yrs after infection)

- With HIV co-infection risk is 5%-10% per year

- Infants under a year have a 25% - 40% likelihood

- Adolescents & elderly also at higher risk

# Latent TB Infection

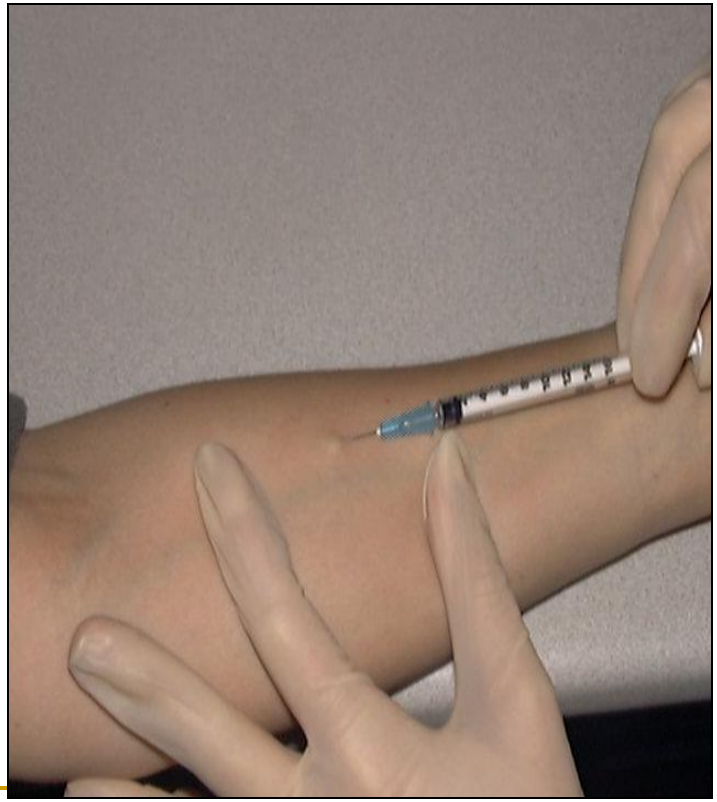
- Evaluate persons for risk factors
- Test those with a risk factor using the TST or Interferon-gamma release assay (IGRA)
- Evaluate those with a (+) TST or IGRA by doing a symptom history and chest X-ray
- Refer to PCP or local public health for treatment recommendations and medication administration

# Diagnosing LTBI especially patient starting TNF treatment

- The Mantoux tuberculin skin test (TST) is the most common method
- A TST reaction can take 3-12 weeks after TB infection to become positive
- A negative TST in a symptomatic patient does NOT rule out TB

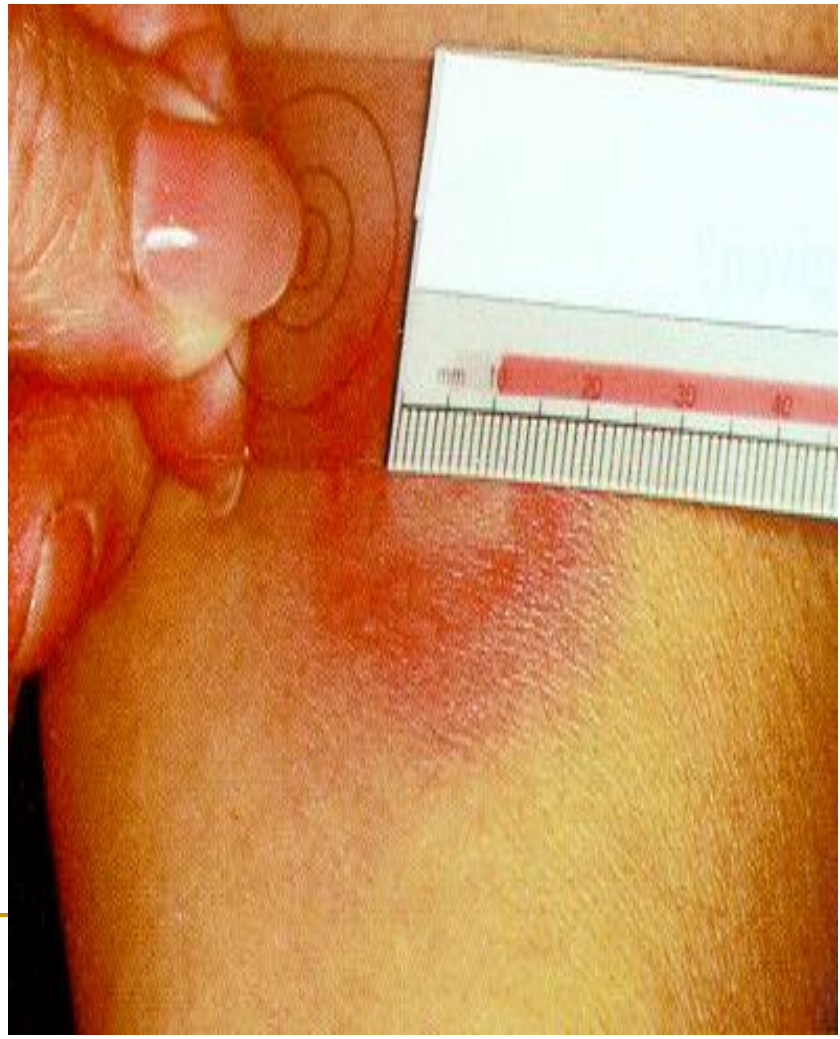
# Administering the Tuberculin Skin Test (TST)

- Inject 0.1 ml of tuberculin intradermally
- Produce a wheal 6-10 mm in diameter



# Tuberculin Skin Test Reading

- The test is read after 48-72 hours by a trained health care worker
- Diameter of the induration (firmness) is measured in millimeters (mm)
- Erythema (redness) is not measured



# TST for LTBI Diagnosis

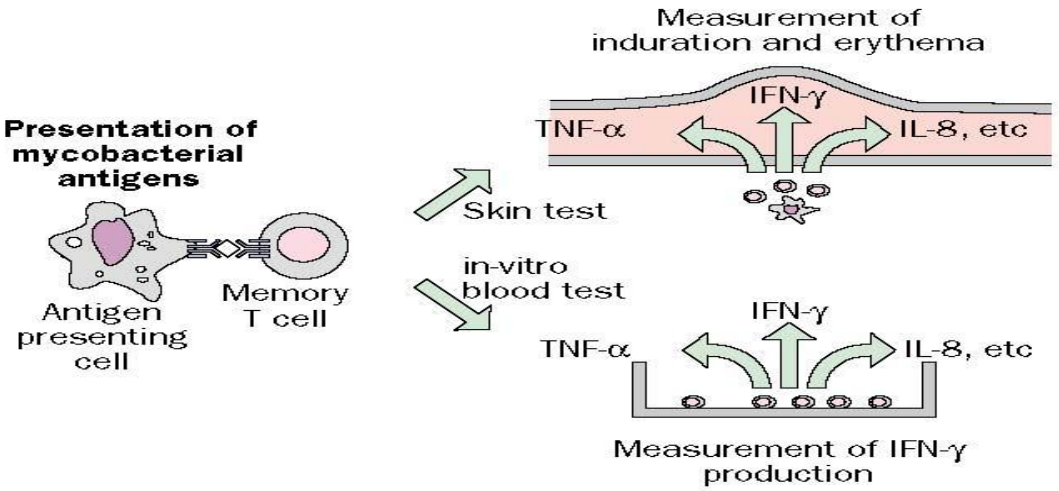
## Criteria for a Positive Reaction

| ≥5 mm | ≥10 mm | ≥15 mm |
|---|---|---|
| HIV infection | Recent immigrants | No risk |
| Contact to active TB case | Injection drug users | |
| Abnormal CXR | Children | |
| Immunosuppression | High-risk medical conditions | |
| | Residents and employees of jails/nursing homes, hospitals | |

Note: Skin test conversion is an increase of ≥10 mm within a 2-year period

# Interferon-gamma Release Assays

- Blood test for detecting TB infection
- Requires 1 visit (TST requires 2 visits)
- Results less subject to reader bias and error
- More specific with less cross-reaction with non-tuberculosis mycobacterium and BCG than the TST



# Thoughts

- IGRAs are the preferred test in:
  - BCG vaccinated
  - Persons unlikely to get a TST completed
- Implementing IGRAs requires careful thought about logistical hurdles but can be done
- IGRAs may be less accurate (i.e. specific) in low risk populations than previously reported
- Additional longitudinal data is needed in all populations to understand the true implications of a positive test

# Recommended Treatment for Latent TB Infection

- INH daily for 9 months

  or

- Rifampin daily for 4 months

# Risk Factors for Progression

- **HIV**
- **Fibrotic CXR c/w prior TB**
- Immunosuppression (transplants, TNF-alpha inhibitors)
- Recent close contact to active TB
- **Diabetes**
- **Chronic renal failure**
- Silicosis
- Leukemia / lymphoma
- Head/neck cancer
- Wt loss > 10%
- gastric bypass surgery