Lungs and AIDS from Radiological point of view

Dr. Etienne Leroy Terquem – Pr Pierre L'Her

SPI / ISP

Soutien **P**neumologique **I**nternationa / **I**nternational **S**upport for **P**ulmonology

GreenShoots FOUNDATION

“Support needing populations through medical assistance and the transfer of knowledge to local medical practitioners.”

Our vision for the

Medical Assistance & Medical Education (MAME) Programs

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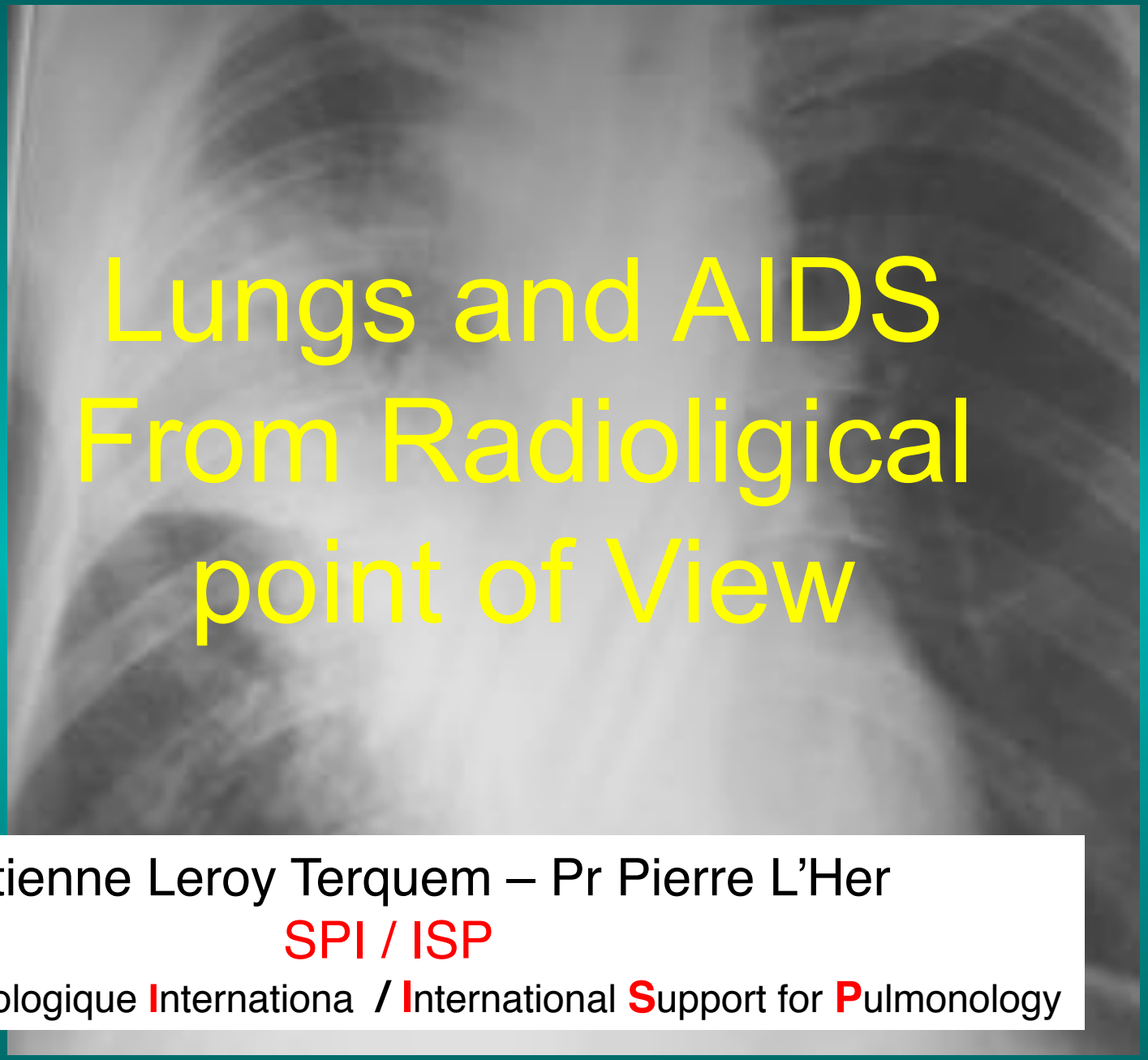

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Global TB Burden

- In 2012,

  8.6 million people were estimated to have TB but only 5.7 millions newly diagnosed cases reported to TB programmes.

- Therefore, about 3 million people with TB were missed either because they are not diagnosed or they were diagnosed but not reported

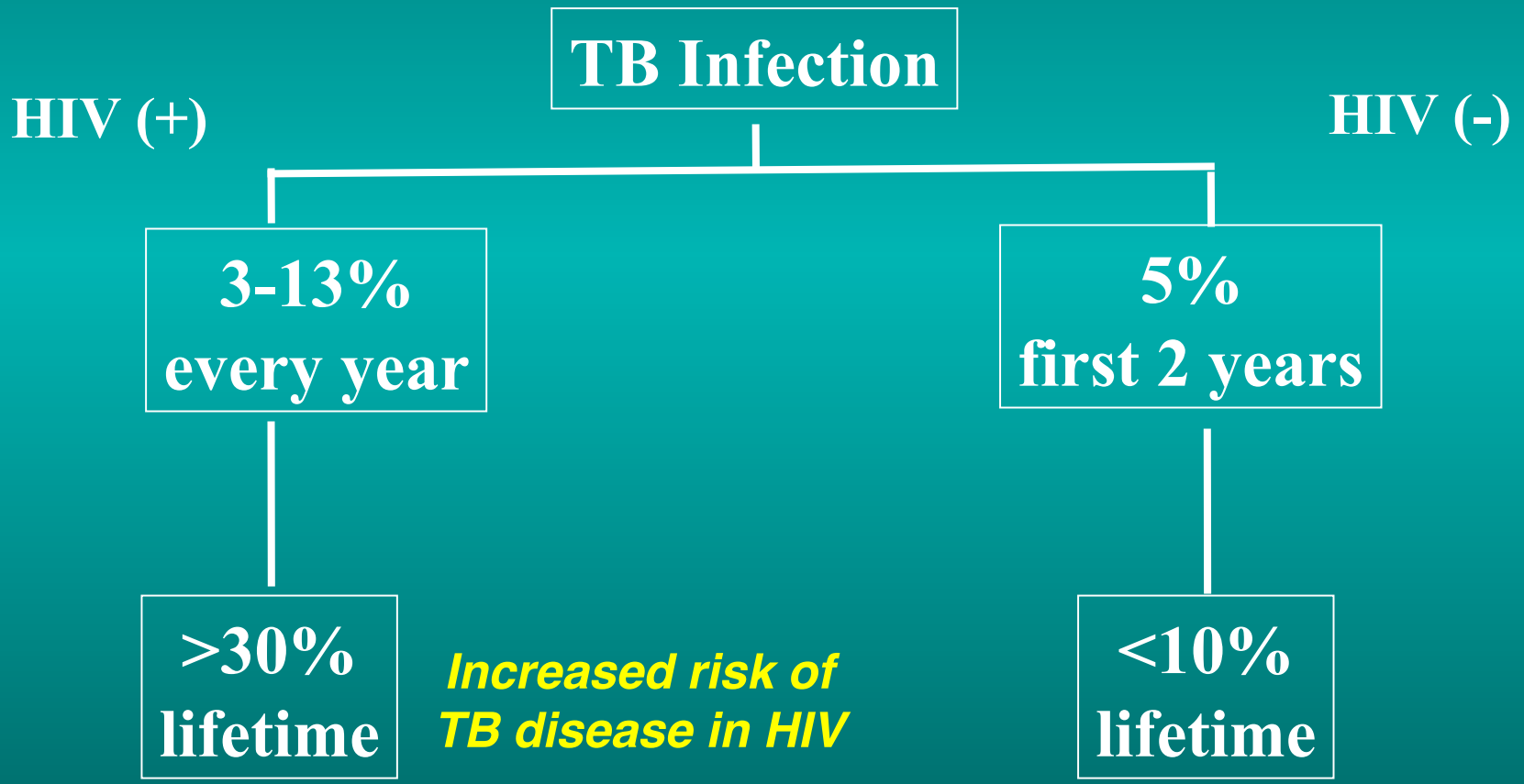
TB Burden in Myanmar

A major public health problem;

- **One of the 22 TB high burden countries,**
- **One of the 27 high MDR TB burden countries**
- **One of the 41 high TB/HIV burden countries**

(WHO report 2009)

Incidence of TB: HIV (+) *vs* HIV (-)



World Health Organization

More difficult to treat TB disease

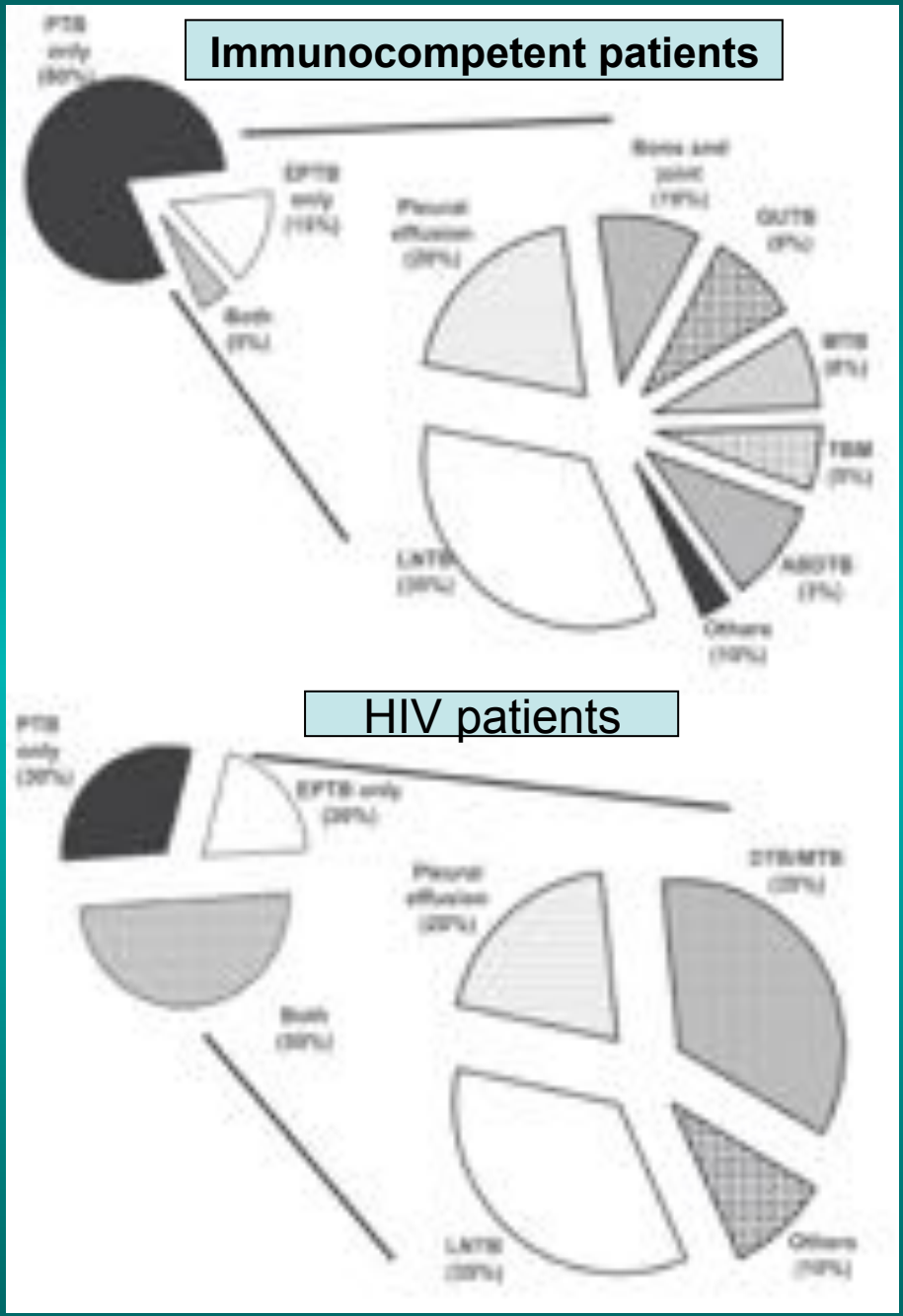
- Adverse drug reactions
- May increase *default rates* in TB programs
- May increase overall *mortality rate* in TB programs

More difficult to diagnose TB in HIV

- TB infection
  - False positives and false negatives from tuberculin skin test in HIV
- TB disease
  - Typical symptoms may be missing
  - Sputum smear may be negative
  - Chest x-rays may be normal or atypical

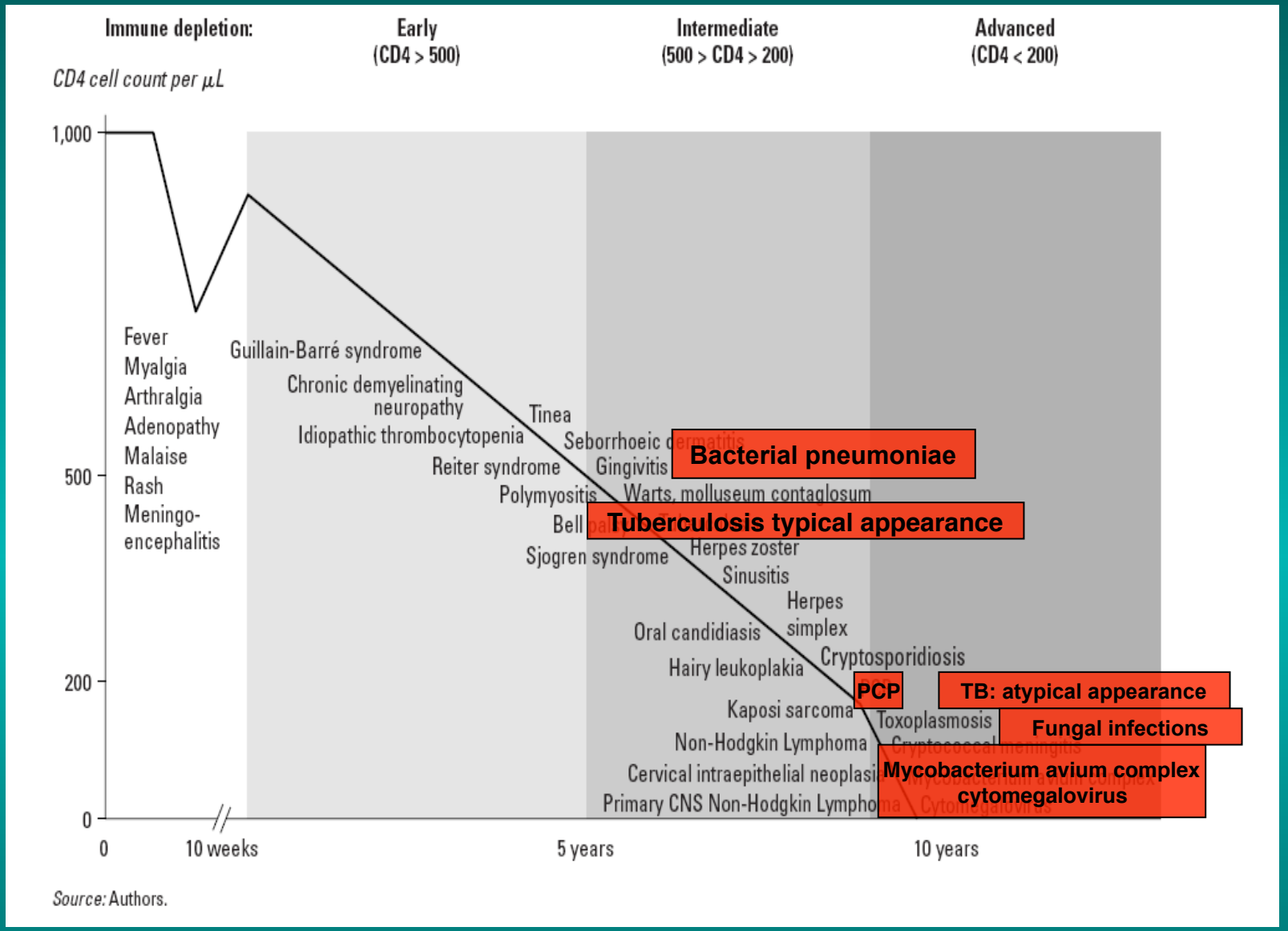
More extra pulmonary TB in case of HIV co infection.

PTB, pulmonary TB
EPTB, extrapulmonary TB
LNTB, lymph node TB
MTB, miliary TB
DTB, diseminated TB
TBM, meningeal TB
ABDTB, abdominal TB
GU TB, genitourinary TB



Sharma SK, Mohan A. Extrapulmonary tuberculosis. *Indian J Med Res* 2004; *120* : 316-53.

The global answer to TB/HIV: We will do with Collaborative activities



Cascade of infections and cancers that develop as immune function is depleted

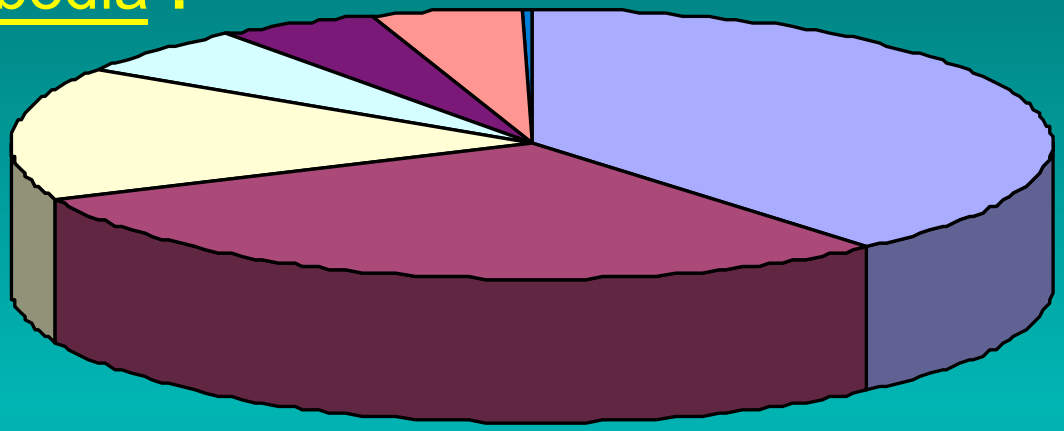
HIV/AIDS prevention and treatment.NIH Stefano Bertozzi and coll.

CD4+ cell count ($\times 10^6$ cells l^{-1})	Pulmonary pathology
>500	Bacterial pneumonia TB (re-infection) Lung carcinoma
200–500	Bacterial pneumonia TB (re-infection) Lung carcinoma
50–200	Bacterial pneumonia TB (primary) Lung carcinoma PCP KS Lymphoma Fungal infections Toxoplasmosis Bacillary angiomatosis
<50	Bacterial pneumonia TB (atypical appearances) Lung carcinoma PCP KS Lymphoma Fungal infections Toxoplasmosis Bacillary angiomatosis MAC CMV

TB, Tuberculosis; PCP, *Pneumocystis carinii* pneumonia; KS, Kaposi's sarcoma; MAC, *Mycobacterium avium* complex; CMV, cytomegalovirus.

ANRS* study on lung diseases and AIDS in East Asia

Cambodia :



Vietnam : similar but very few fungal infections, no atypical mycobacteriae or anguillulosis

*French national agency for scientific research in AIDS

The respiratory diseases are frequent (80 % of the cases) and severe during the course of HIV infection.

The respiratory diseases are frequent (80 % of the cases) and severe during the course of HIV infection.

- They can occur at every phase of the evolution: from the beginning of AIDS until death.
- The respiratory diseases are numerous :
  - infectious <= immunodepression
  - tumourous
  - others

- The ARV have modified the situation in wealthy countries, and also in developing countries, but, in these countries, lung diseases associated with AIDS remain frequent and severe, and their diagnosis and treatment continue to be difficult.

HIV and Lungs (TB): Double Trouble

Lung = target for many severe infections with high incidence of death

- This natural evolution can be modified by :
  - **prophylactic treatment** => effective on some pathologies (eg: cotrimoxazole and pneumocystosis or toxoplasmosis)
  - The use of **antiretroviral treatments**: they are very effective against HIV and can remain effective for a long time if the treatment is correctly adapted and if the patient is compliant.

3 main pathologies for 80% of pulmonary infectious diseases in AIDS:

- Tuberculosis
- Pneumocystosis
- Bacterial pneumopathies

Respiratory diseases in patients not receiving ARV

Infectious diseases

- Pneumocystosis (PCP)
- Tuberculosis
- Bacterial Pneumoniae
- Parasitic pneumoniae
- Fungal pulmonary diseases
- Atypical mycobacteriae
- Viral diseases

Respiratory diseases in patients not receiving ARV

Infectious diseases

- Pneumocystosis
- Tuberculosis
- ***Bacterial pneumoniae***
- Parasitic pneumoniae
- Fungal pneumoniae
- Atypical mycobacteriae
- Viral diseases

- *Strepto pneumoniae*
- *H. influenzae*
- others
  - *Staph. aureus*
  - *Ps. aeruginosa*
  - Legionnaires' disease
  - *Nocardia asteroides*
  - *Rhodococcus equi….*

Respiratory diseases in patients not receiving ARV

Infectious diseases

- Pneumocystosis
- Tuberculosis
- Bacterial pneumonia
- ***Parasitic pneumoniae***
- Fungal pneumoniae
- Atypical mycobacteriae
- Viral diseases

- Toxoplasmosis
- Anguillulosis
- Leishmaniosis
- Cryptosporidiosis
- Strongiloïdiasis…

Respiratory diseases in Patients not receiving ARV

Infectious diseases

- Pneumocystosis
- Tuberculosis
- Bacterial pneumonia
- Parasitic pneumoniae
- ***Fungal pneumoniae***
- Atypical mycobacteriae
- Viral diseases

- Cryptococcosis
- Aspergillosis
- Histoplasmosis
- Coccidioïdomycosis
- Penicilliosis

Respiratory diseases in patients not receiving ARV

Infectious diseases

- Pneumocystosis
- Tuberculosis
- Bacterial pneumoniae
- Parasitic pneumoniae
- Fungal pneumoniae
- ***Atypical mycobacteriae***
- Viral diseases

- *Mycobacterium avium*
- *M. kansassii*

Respiratory diseases in patients not receiving ARV

Infectious diseases

- Pneumocystosis
- Tuberculosis
- Bacterial pneumoniae
- Parasitic pneumoniae
- Fungal pneumoniae
- Atypical mycobacteriae
- ***Viral diseases***
  - *CMV*

Many Pathologies

- Who can help to Physician to get early Dx for TB and Lungs diseases????

- Clinical Sign/Symptoms PLUS
- Investigations ; Microscopy, Radiological points (X ray, CT ,..)

and/or Bronchoscopy or BAL

- For us, X ray---???

- Let’s try to find out some Radiological finding in lungs diseases

Possible etiologies according to radiological appearance

- Normal chest Rx with clinical respiratory signs
- Focalised condensation
- Diffuse lesions

1. Normal chest Rx with clinical respiratory signs

With courtesy of Mayaud
in Girard, Katlama, Pialoux
"VIH 2001 ", éd. Douin Paris

Frequent pathology

- Bacterial infection of superior airways
- Opportunistic infection at the beginning (Pneumocystosis)

Possible pathology

- bronchial tuberculous infection or TB miliary at the beginning
- other opportunistic infections at the beginning (aspergillosis)
- endo-bronchial tumour
- lymphocytic intersticial pneumonia (T CD8 in BAL)

differential diagnosis

- pulmonary embolism
- bronchospasm
- lactic acidosis (ARV complications)

2. Focalised condensation

courtesy of Mayaud
in Girard, Katlama, Pialoux
"VIH 2001 ", éd. Douin Paris

Frequent pathology

- common bacterial infection

possible pathology

- Tuberculosis
- mycosis (aspergillosis, cryptococcosis…)
- atypical mycobacteria
- others bacterial infections (*Nocardia, Actinomyces, Rhodococcus equii..*)

rare pathology

- lymphoma
- toxoplasmosis

differential diagnosis

-lung cancer

3. Diffuse lesions

courtesy of Mayaud
in Girard, Katlama, Pialoux
"VIH 2001 ", éd. Douin Paris

frequent pathology

- pneumocystosis
- Kaposi's disease
- tuberculosis

possible pathology

- mycosis (aspergillosis,histoplasmosis, cryptococcosis)
- mycobactérioses atypical mycobacteries
- others infections (toxoplasmosis...)
- usual bacterial infections

rare pathology

- intersticial lymphoïd pneumonia

Différential diagnosis

- pulmonary œdema
- iatrogenic pneumopathy

Chest X ray TB HIV(-)

and HIV+ CD4>200

- more frequent in superior lobes
- caverns
- typical nodular infiltrates (in the apex and more or less excavated)

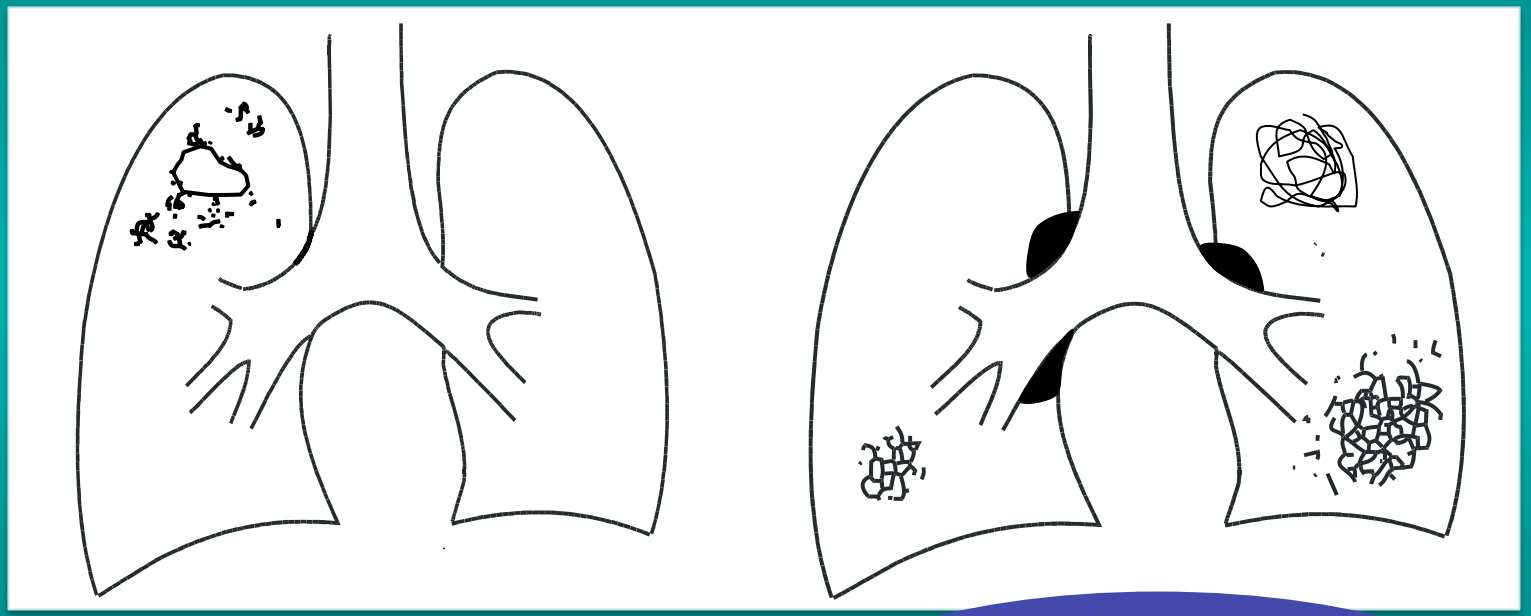
Chest X ray TB HIV+

(CD4 < 200)

- cavitation is rare
- Frequency of TB pneumoniae and adenopathies (often associated)
- Lesions in inferior and superior lobes
- Frequency of miliaries

  Frequency of extra pulmonary TB

CXR in case of patients TB/ HIV+



not too severe immunodepression
CD4>200

Severe immunodepression

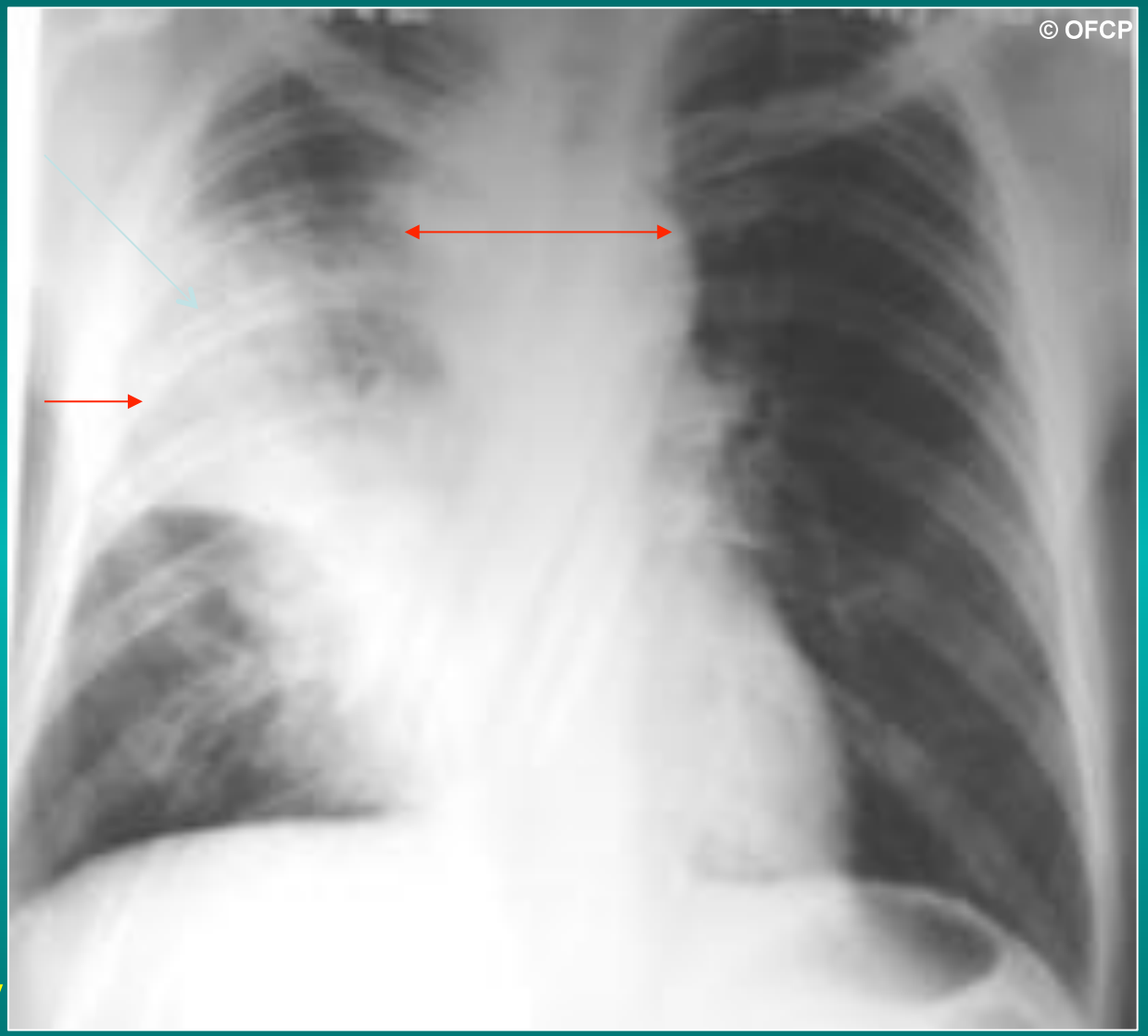
Male 30 years old
Soldier HIV +

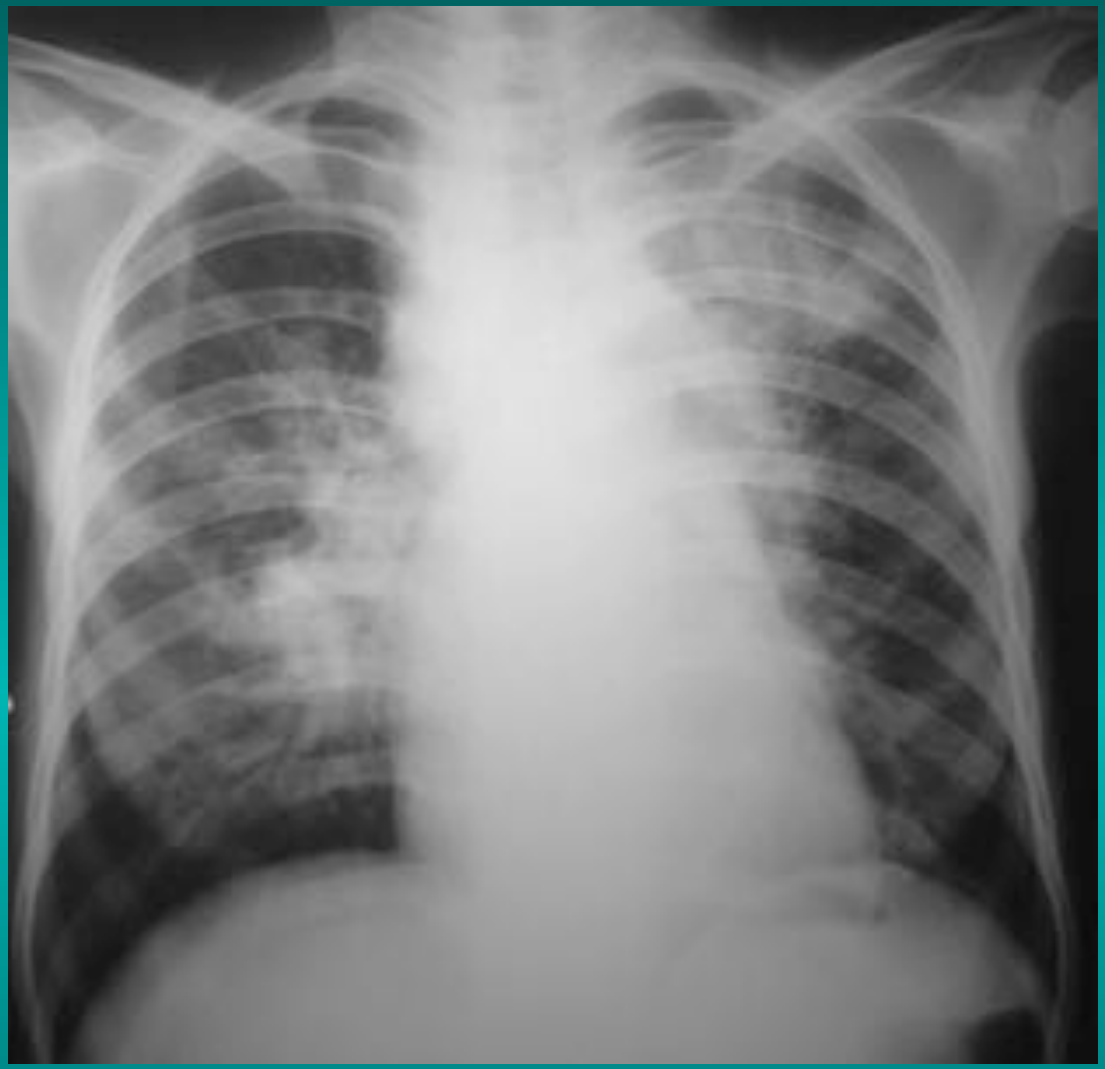
Pneumonia of right superior and middle Lobes

Hilar adenopathies
AFB x3 negative

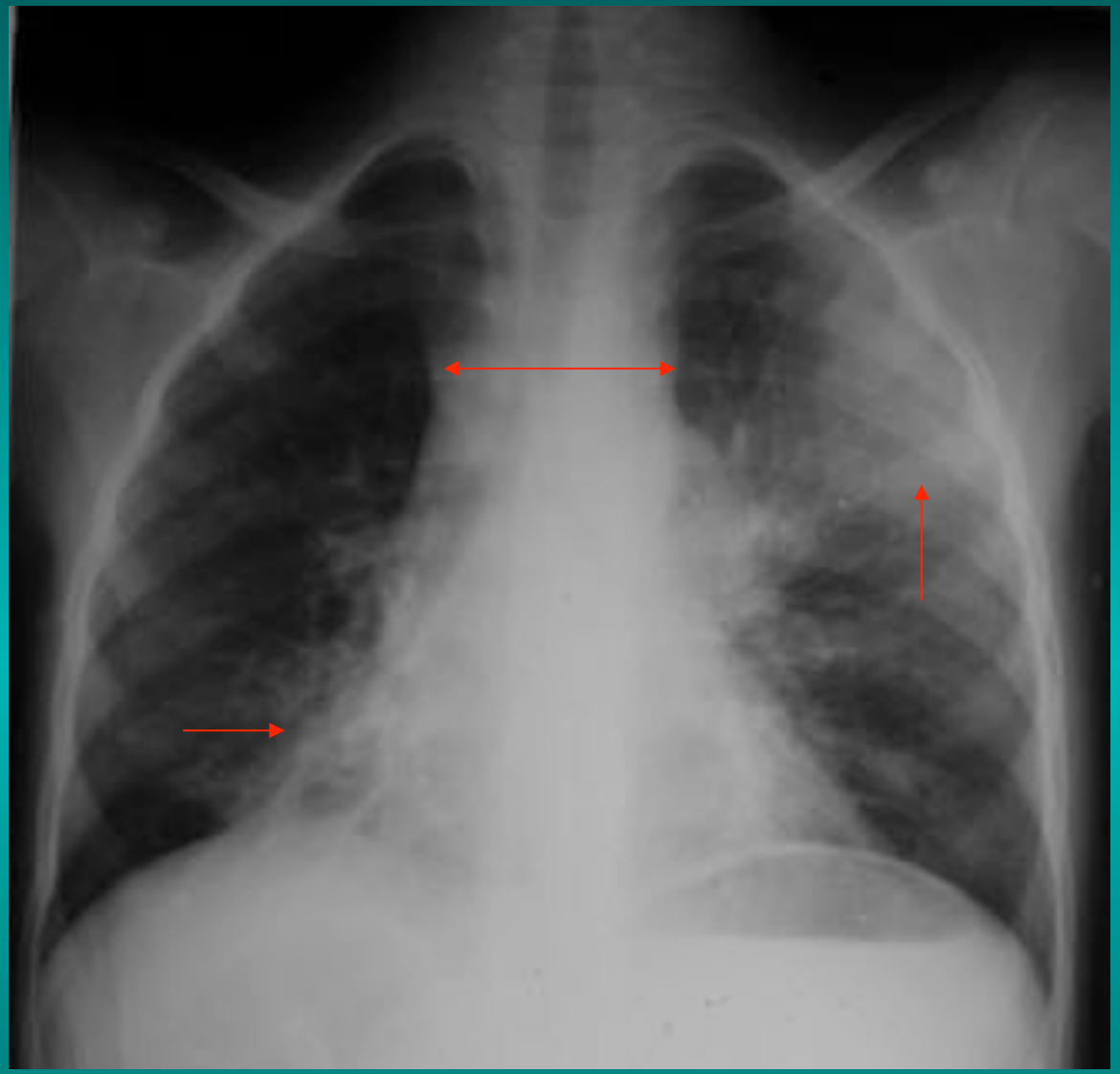
Bronchial aspiration and BAL : AFB+ +

Bronchial endoscopy
Aspect of fistula from adenopathy

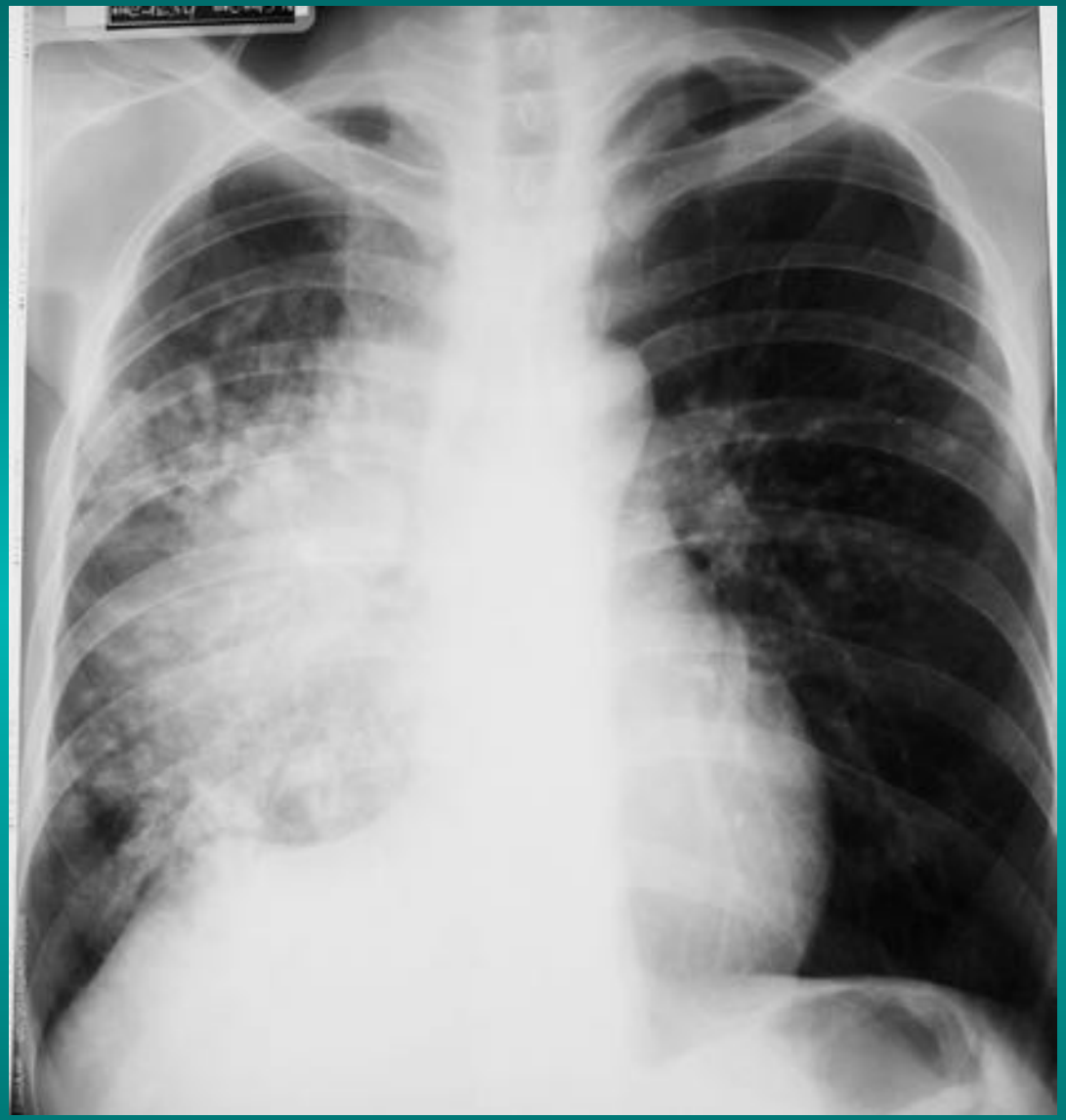




TB bilateral pneumonia and mediastinal adenopathies in a patient with AIDS. CD4 level: 50/mm3.
No excavation.



TB, HIV+: double tuberculous pneumonia; middle lobe and left superior lobe. Mediastinal adenopathies



R L lobe and middle lobe
TB pneumonia in context
of severe immunodepression

Inferior lobe TB are not rare
in case of AIDS

External segment
of middle lobe pneumonia

TB of middle or
inferior lobes pneumoniae
are common in cases of AIDS

Tuberculous miliary: HIV+ young woman, CD4 level: 60/mm3

Mediastinal adenopathies are frequent in AIDS cases

Endobronchial fistula with bronchogenic dissemination is possible

Immune reconstitution inflammatory syndrome: clinical examples

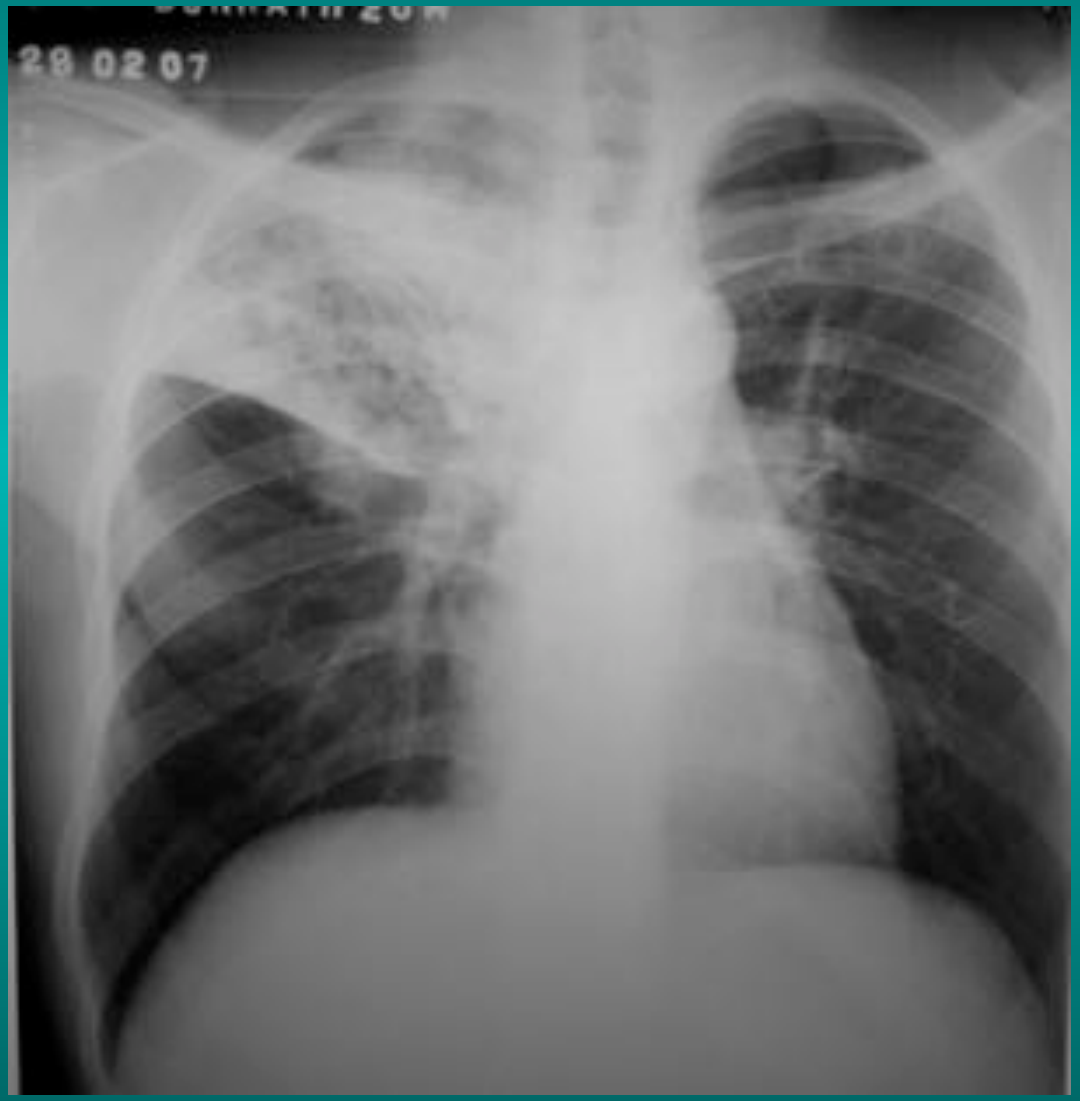
Male HIV +, CD4 level: 50/mm3
October 2006. AFB (-)

Case 1

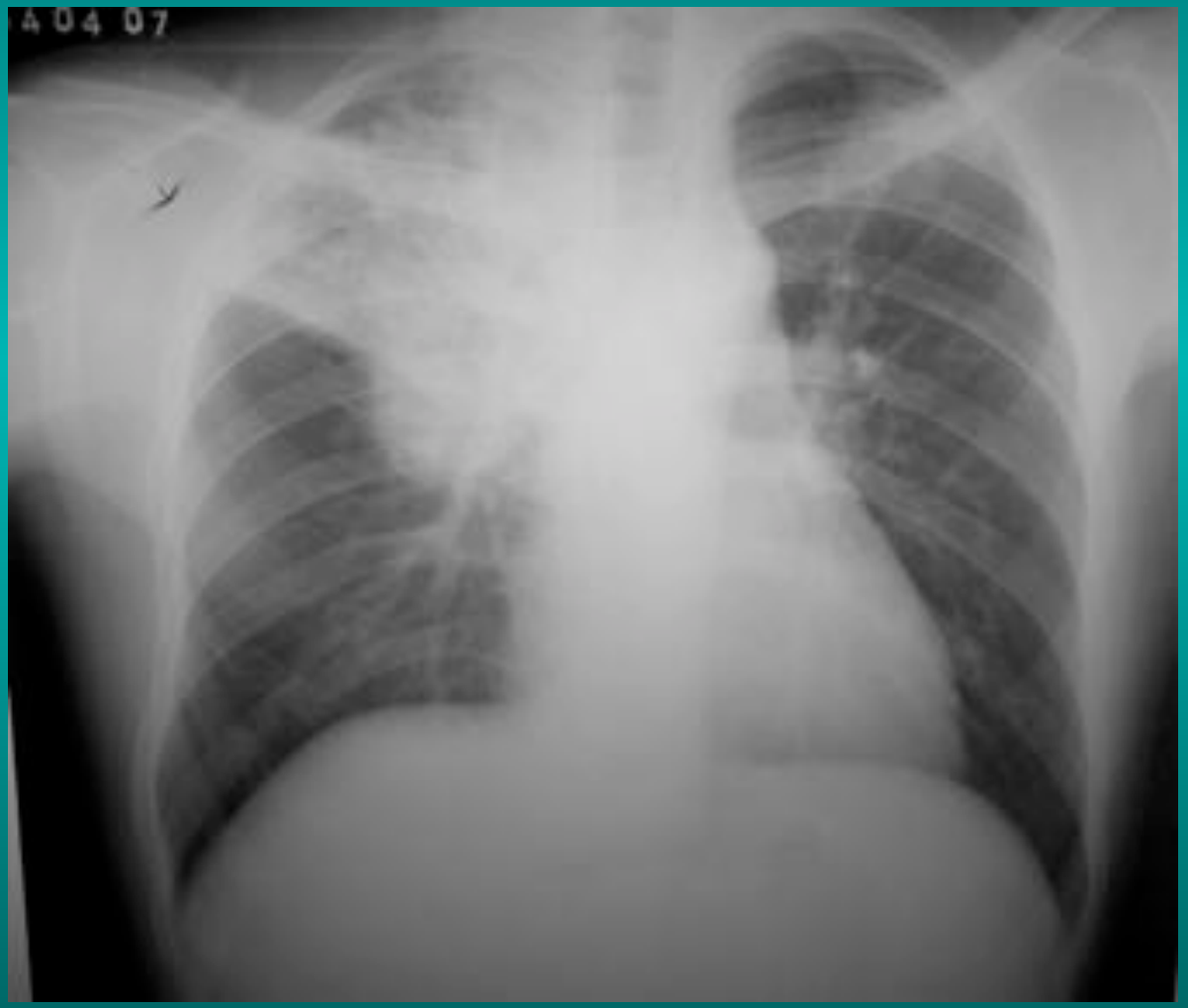
Dec 2006: AFB + in sputum .Beginning of TB treatment

9/02/2007: Chest X ray after 2 months of TB treatment.
Beginning of anti retroviral treatment

Chest X ray on 28/02/2007 (After 3 weeks of ARV treatment)



Chest X ray on 04/04/2007: 7 weeks of antiretroviral and continuing TB treatment. (Favourable issue after few weeks of associated cortico-steroïd treatment)



Paradoxical reactions in the immune reconstitution inflammatory syndrome

- Fever
- Adenopathies
- Ascites
- Pleural or pericardic effusion
- Pulmonary infiltrate or pneumoniae
- Encephalic diseases (tuberculoma)

-Soon after introduction of ARV

-The severity is correlated with the initial Immunodepression (base line CD4 level)

Several micro-organisms are responsible for lung diseases in AIDS. Therefore, differential diagnosis of TB in HIV patients are many, and especially pneumocystosis.

Frequency of pneumocystosis

Pneumocystosis

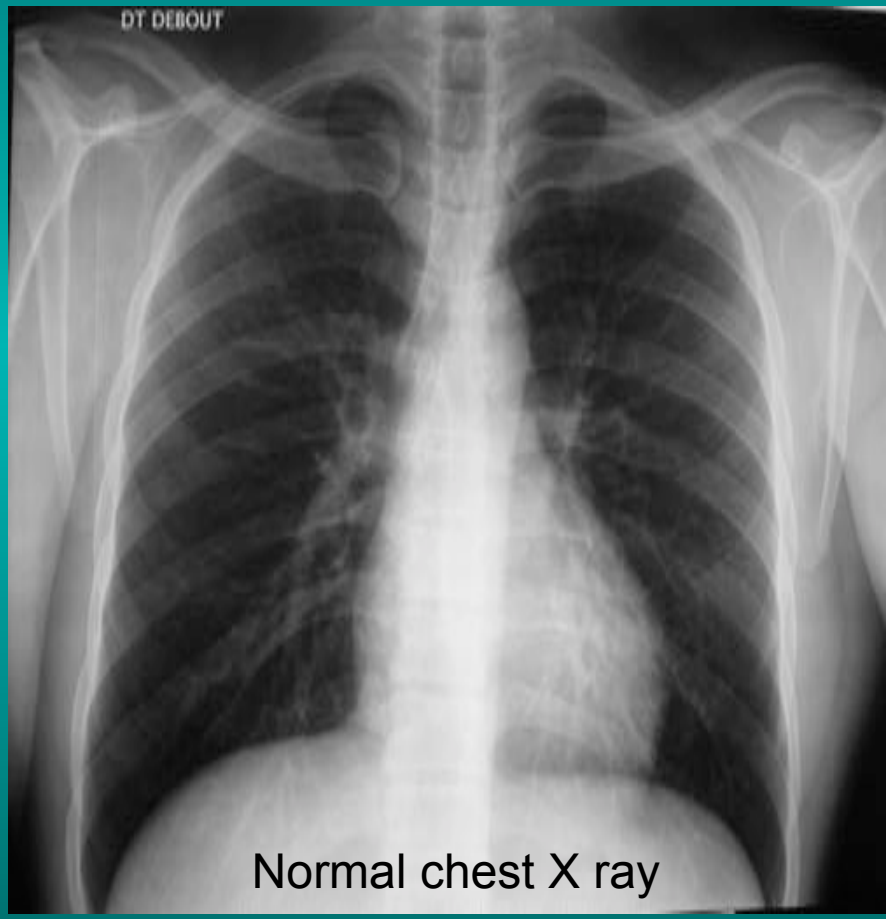
- Unknown HIV infection status (80% of cases)
- No prophylaxis with Cotrimoxazole **(100% of cases)**
- Fever: 38° - 40°C
- Normal pulmonary auscultation (90% of cases)
- No extra-pulmonary signs (90% of cases)
- interstial/ alveolar **diffuse opacities** (100% of cases)
- **Hypoxia** (SaO_2 < 90%) 100% of cases

Courtesy of Chan Sarin ANRS1260

Interstitial picture: ground glass attenuation image

Male, HIV +, severe dyspnea, normal auscultation, SaO_2 86%
interstitial and alveolar diffuse lesions

Male 42 years old, cough, exertional dyspnea, SaO2 92 %;HIV+
BAL: pneumocystosis
Chest X ray: could be considered as normal. Possible ground glass attenuation image



Normal chest X ray

interstitial and diffuse pneumonia
with ground glass attenuation

+

Hypoxemia
SaO_2 < 90 %

Without
cotrim.
prophylaxis

= PCP

Cotrimoxazole +/-cortisone
+ oxygen
are mandatory to prevent
death

National TB Program strategy for TB case finding

Respiratory +/- general symptoms

→ AFB-sputum X 2/3 cups (within 2 days)

↓

If negative → antibiotic (amoxycillin) X 10 days

If patient not improved and new smears negative

↓

CXR (after 2 or 3 weeks)

If it was PCP, the patient will be dead

In HIV infected patients, CXR should be performed early




non TB bacterial pneumoniae are fréquent in case of HIV infection

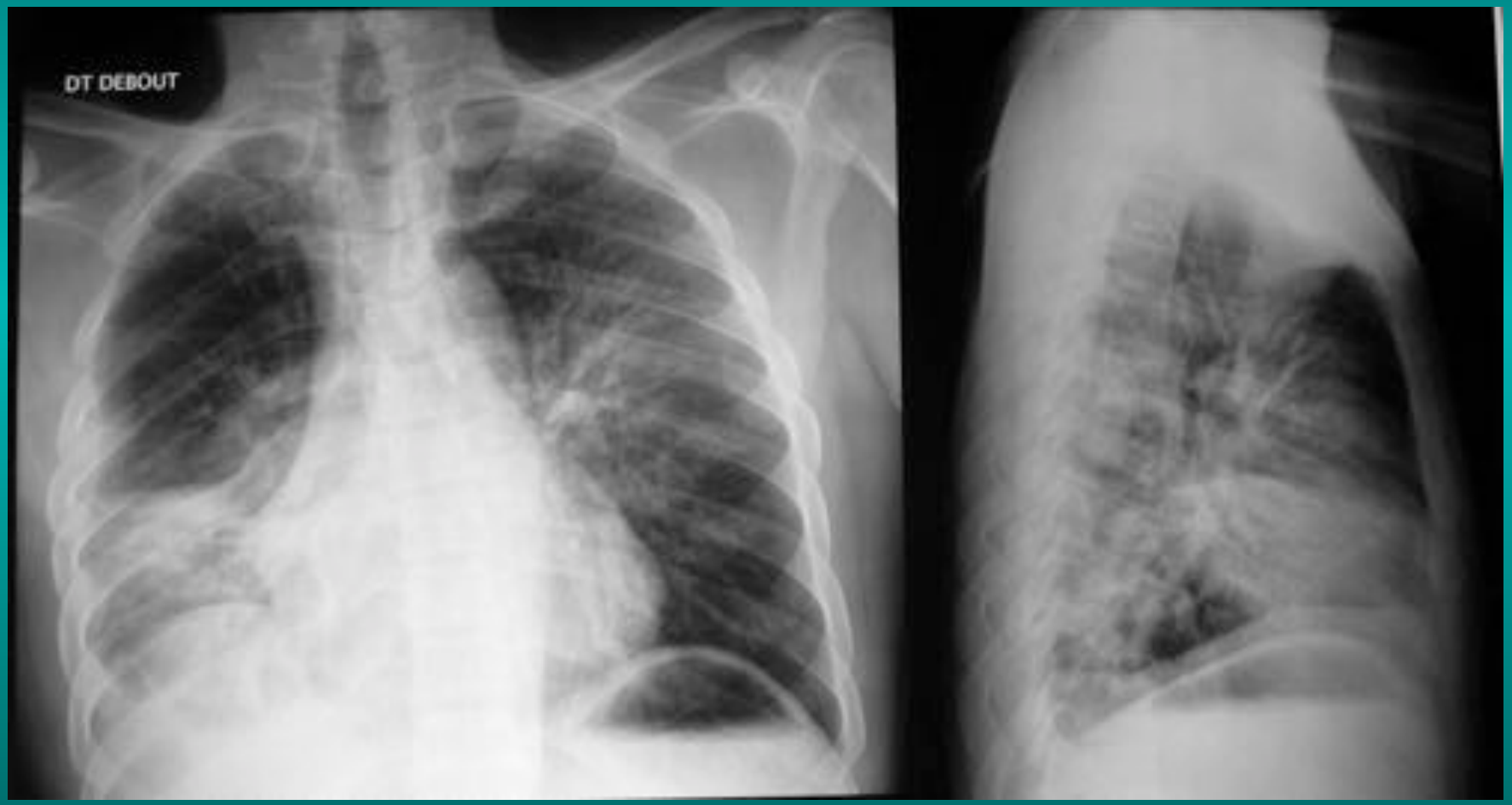
- *Strepto pneumoniae*
- *H. influenzae*
- autres
  - *Staph. aureus*
  - *Ps. aeruginosa*
  - Légionellose
  - *Nocardia asteroides*
  - *Rhodococcus equi….*

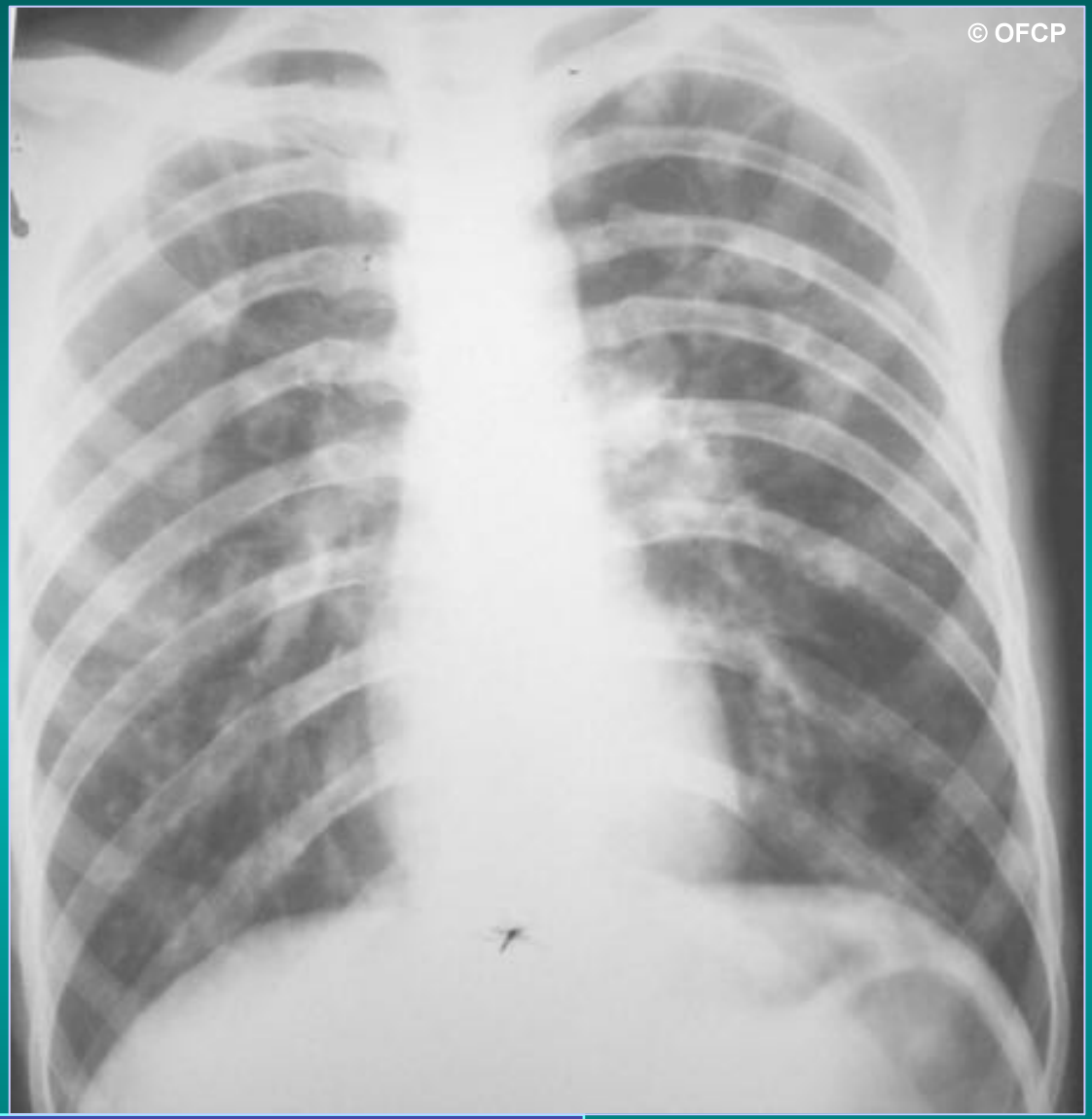
Mild Immunodépression

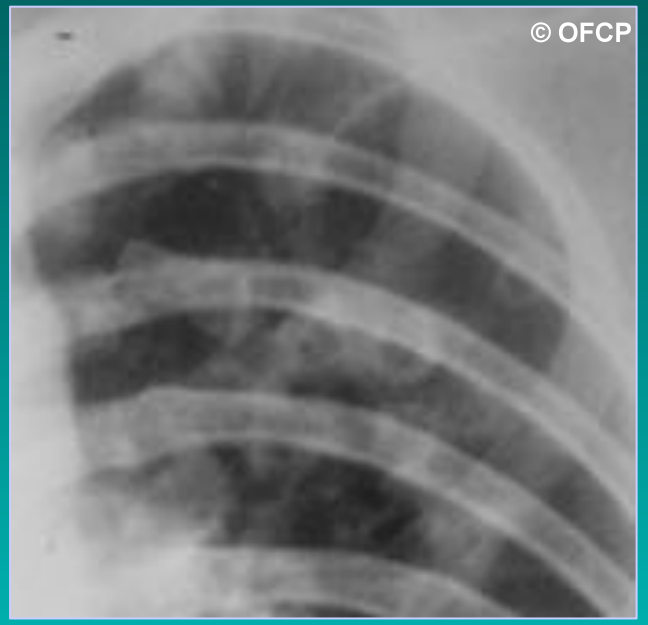
Severe immunodepression

Non TB bacterial pneumonia are frequent in Hiv infection with moderate immunodepression: Str. Pneumoniae, hemophilus….

They are often bilateral







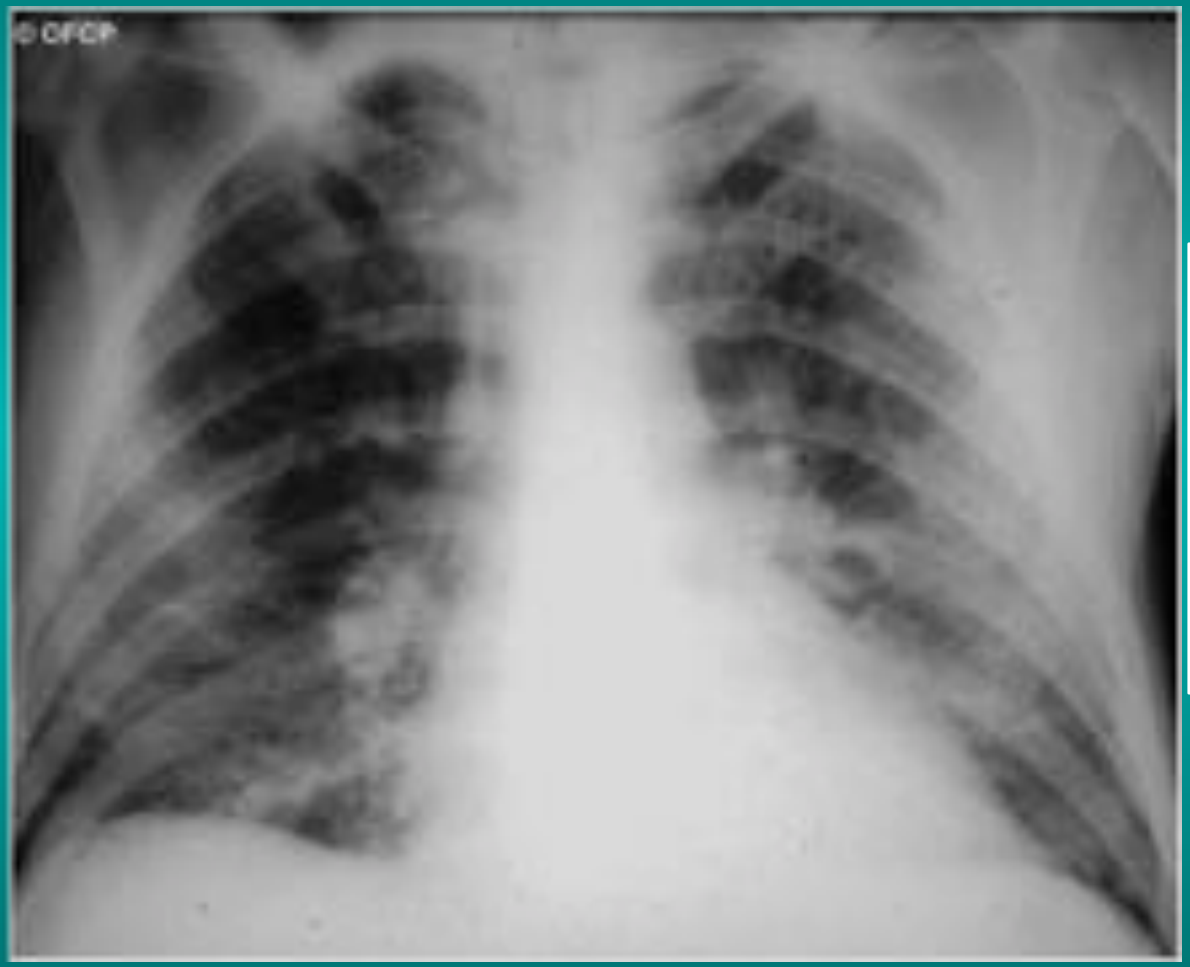
Nocardiosis

bilateral opacities
With excavated nodules

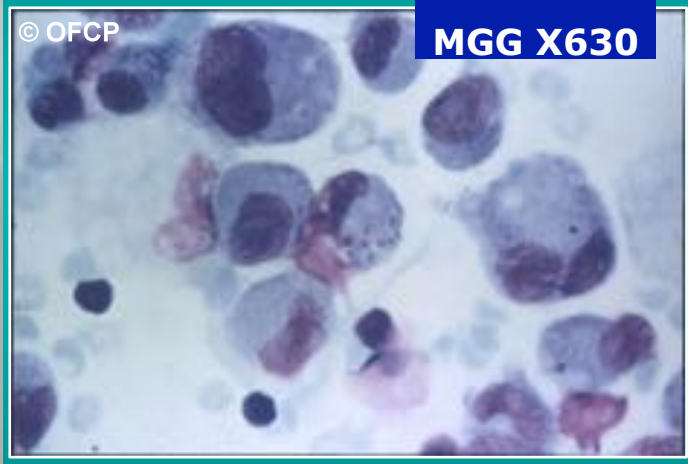
Infectious disease and aids ward. khmero russian hospital
PhnomPenh

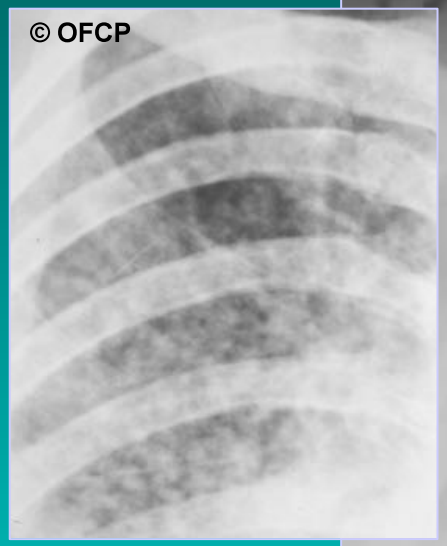
One can also see fungal infections:
Cryptococcosis
Histoplasmosis
Penicillium marneffei
Invasive aspergillosis

Disseminated histoplasmosis to *H. capsulatum* in an HIV+ patient



BAL : fungal micro-organisms in the macrophages





W. 20y. HIV+,
cough, dyspnea,
t° 38°5C
Miliary

AFB -

BAL : Histoplasmosis

Sometimes in AIDS: poly-pathology

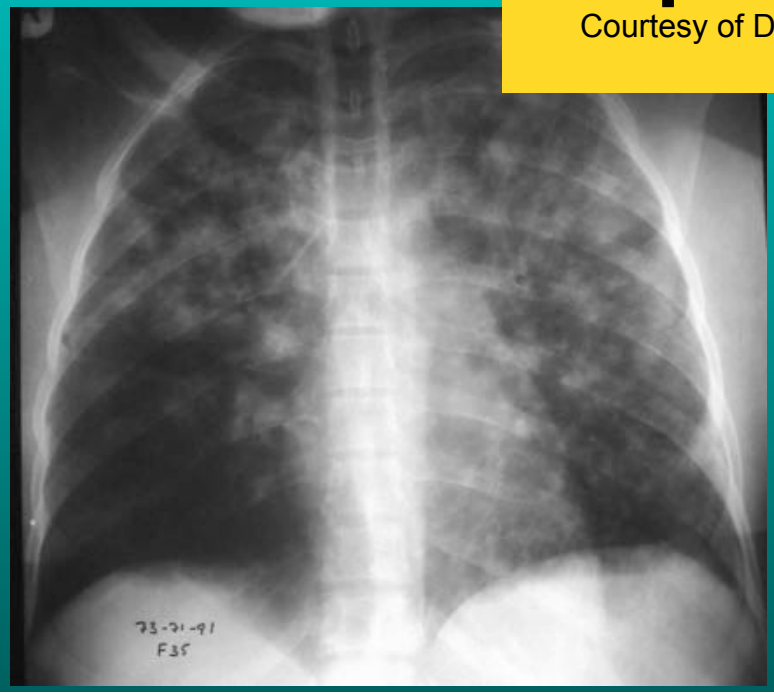
Kaposi illness: various lesions on chest Xray

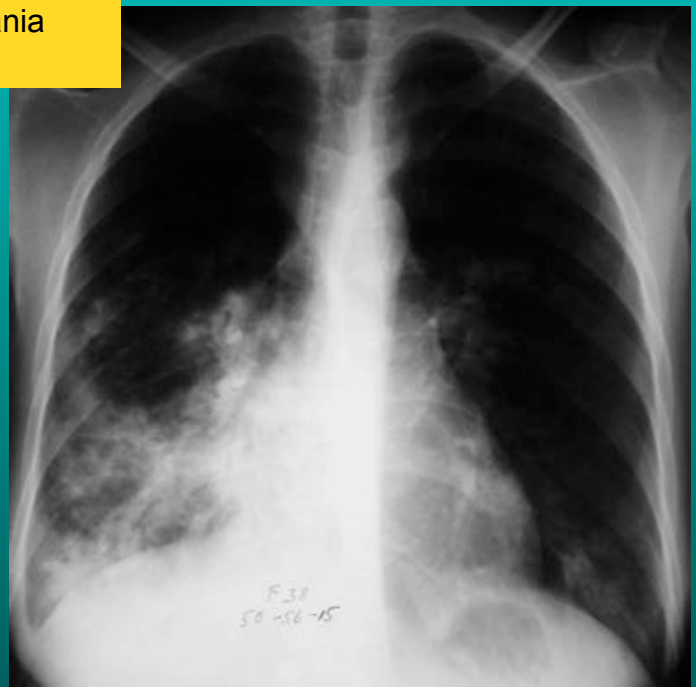
- Diffuse micro or micronodules
- Alveolar condensation, lower lobes predominant
- Pleural effusion
- Possible mediastinal adenopathies
- Frequent (but not constant) association with cutaneous or mucosis lesions, which can help for diagnosis

Possible confusion with TB

Kaposi illness

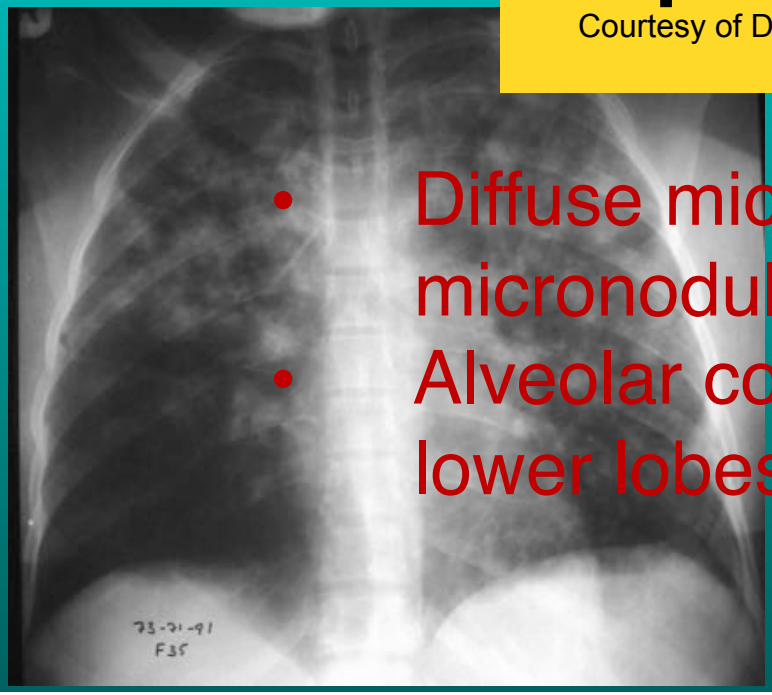
Courtesy of Dr Difenthal. Tanzania

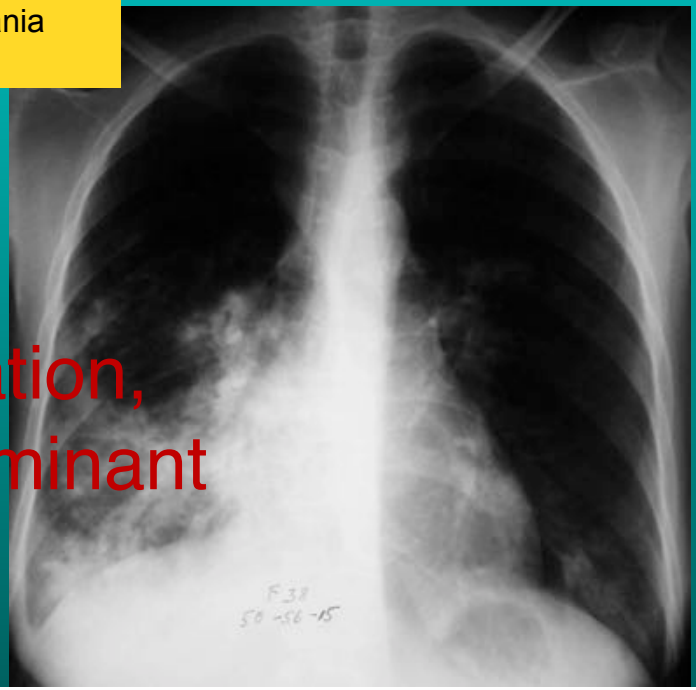




Kaposi illness

Courtesy of Dr Difenthal. Tanzania





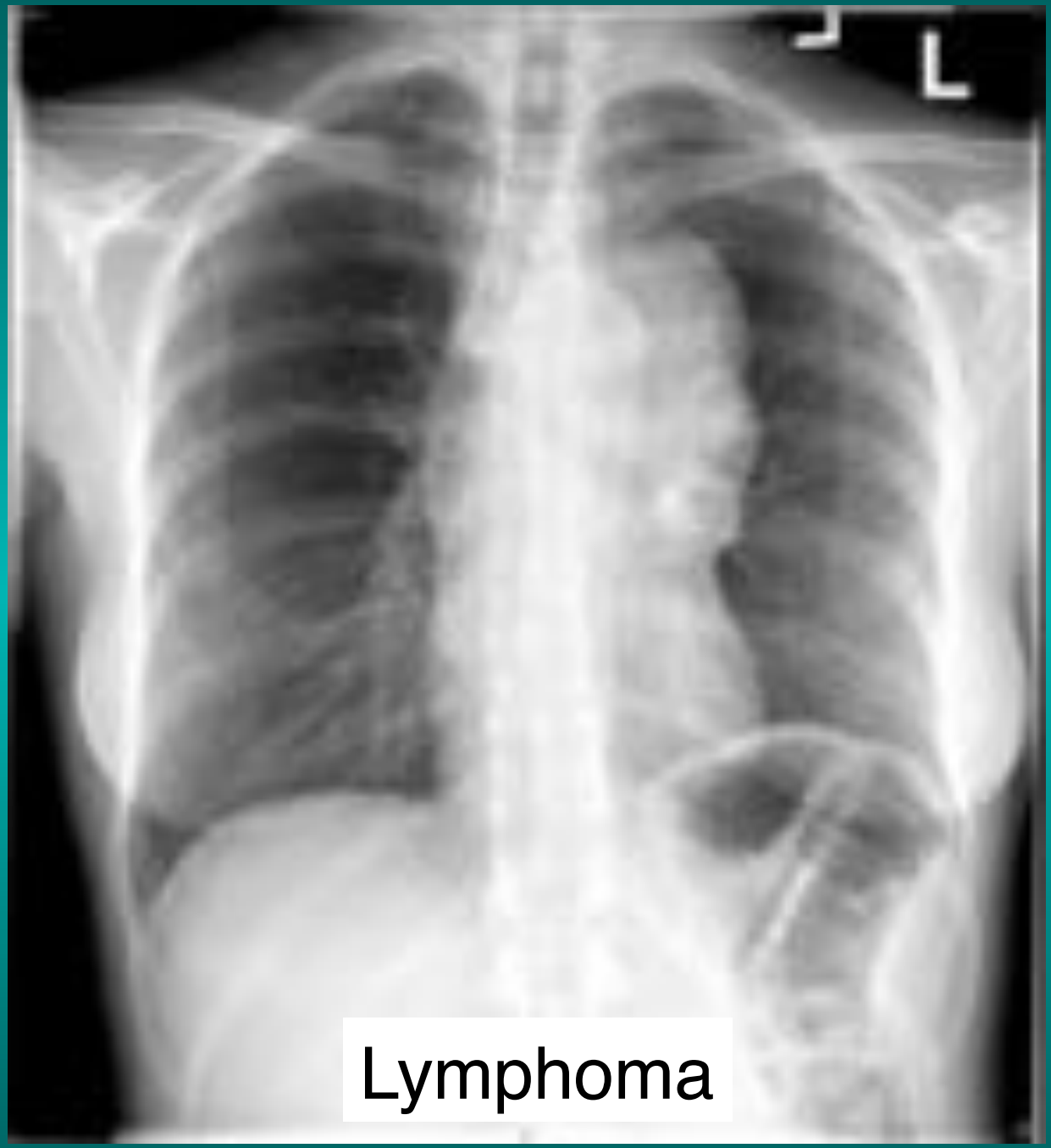
- Diffuse micro or micronodules
- Alveolar condensation, lower lobes predominant

LIP

Lymphocitic interstitial pneumoniae:

- 2 to 5 years old HIV children (20% of HIV+ children in developed countries)
- Less frequent in adults. T

diagnosis is difficult: One must eliminate opportunistic infection (Bronchio-alveolar lavage and lung biopsy)



Lymphoma

Lymphoma

- Rarely confined to chest only
- When seen in the chest it presents as typical mediastinum nodal enlargement, or mass in the anterior mediastinum *(as in the previous slide)* pleural or pericardial effusion, pulmonary infiltrates or pulmonary mass

Other Investigation to dx TB

In cases of acute respiratory disease in AIDS with AFB(-) in sputum,

Bronchial endoscopy and BAL are useful for diagnosis if a reliable bacteriological laboratory is available…

ON SUMMARY

summary

- HIV infection is increasing the risk of very severe TB
- TB treatment is the same in HIV(+) et HIV(-) cases but with more risk of complications and more risk of associated opportunistic infections
- Mortality rate of lung disease in AIDS stays at a high level
- Collaboration between National TB program and HIV/AIDS program is crcial in countries with high TB/VIH prévalence .

summary

CXR and TB / HIV

- CXR can give informations for diagnosis especially if AFB neg

(Important of CXR interpretation with case example!!!!)

- Diagnostic of opportunistic infections can be difficult and NEED training for Radiology)

- Physicians working in TB program or in TB field should be correctly trained to CXR interpretation

One Interesting Message

- SPI/ISP will have Radiological training to TB doctors soon.

- If you are interested, Please contact with Dr Ni Ni (she is also a facilitator).

Ok with our Dr Ni Ni??

- Welcome for some advices!!

Thank you