Pulmonary Interstitial Lung Disease & Broncho Alveolar Lavage

Frédérique Capron
Anatomie Pathologique 1
Groupe Hospitalier Pitié-Salpêtrière
AP-HP Paris

Groupe Hospitalier Pitié-Salpêtrière, Université et Faculté de Médecine P & M Curie, Paris VI

Patient with pulmonary complain « clinical list »

- Infection
- Bronchopathies, COPD, Asthma
- Respiratory Insufficiency, Emphysema
- Cancer, I & II
- Diseases due to environnemental exposure
  - Tobacco, pollution, toxics gazes
  - Drug induced and hospital acquired
  - Professionally induced
- Inflammatory Diseases

Diseased lung under the microscope

- Cancer, I & II
- Inflammatory Diseases, Interstitial Lung Diseases
- Infection
- Diseases due to environnemental exposure

- *Bronchopathies, COPD, Asthma*
- *Respiratory Insufficiency, Emphysema*

Infiltrative Lung Diseases *Definition*

- Patient:
  - cough, shortness of breath, general malaise
  - no pulmonary complain
  - extra pulmonary (systemic disease)
- Thoracic Imaging: ground glass, reticulation, airway ectasia, honey combing, ILD
- Lung Function: restrictive or obstructive syndrome, CO diffusion capacity, altered lung volumes
- Blood tests: hematosis, eosinophils, immuno tests

Specimens sent to the pathologist

- Bronchoscopy: *airways & peripheral*
  - BB, TBB
  - Bronchial aspirates
  - Lavage, BAL
  - Echo guided mediastinal biopsies
- Echo guided TBNB: cyto & microB: *nodes*
- CT guided TTNB: *(localized)*
- Surgical lung biopsy: *CT scan correlated, upper & lower lobes*

Under the microscope

1. Method, “semiopath”: microsemiology is an alphabet and entities or patterns are words
2. Clinical information, biology tests & imaging report are necessary for a proper diagnosis
3. Path Report :
   - diagnosis of a disease
   - or of lung pattern
4. Second look, follow up
5. Beware of: infection & tumor

Lung biopsy observation

- Bird’s eye and dive : pleura, lobular septae, alveolar, vessels & small airways, lymphatics
- Distribution: bronchocentric, lymphatic tracks, at random, diffuse or nodular
- Details: cell type, in the lumens or alveoli walls & septae
- Granulomas: type, fusion, necrosis
- Hemorrhage
- Dating: acute, cellular, organizing, fibrotic, remodeling, mutilation

If the lung looks normal …check

- Pleura, lymphatics
- Smooth muscle
- Vessels:
  - Structure: capillaries, veins : *vasculopathy*
  - Intra vascular tumor: lymphoma or carcinoma
- Small airways: lobule up to airways, airways down ti the lobule
- Look for neuro endocrine hyperplasia
- Many extraordinary cases …

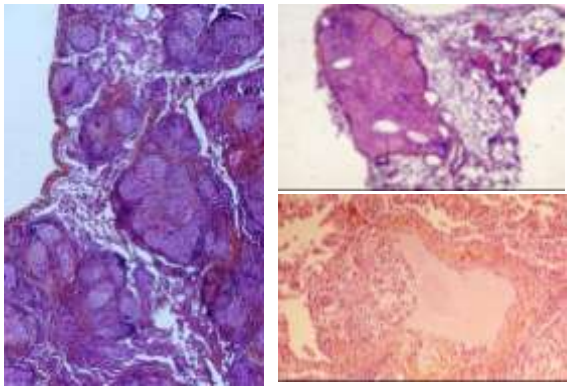
Inflammatory lung disorder

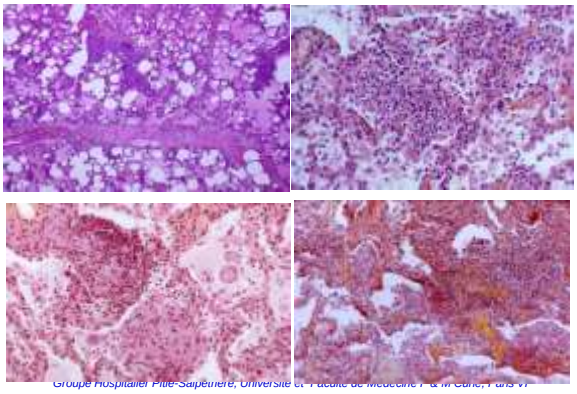
Next step:

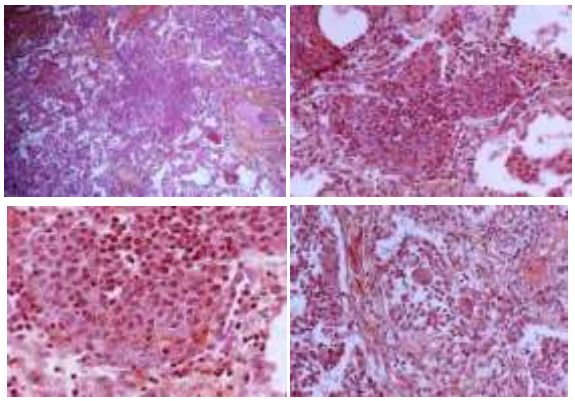
1. Recognition of an entity / disease
2. Pattern of disease
   - Correlation , follow up
   - Idiopathic
   - Related to …

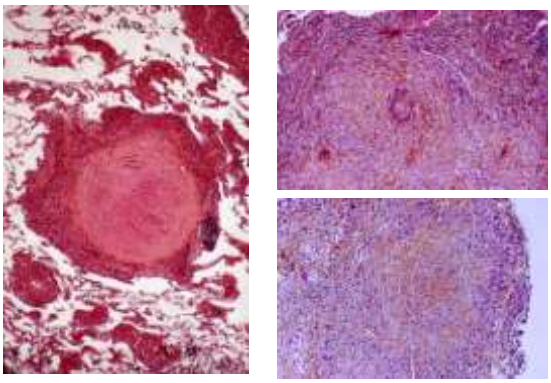
Specific diseases or well defined entities, keys & clues for a Dg

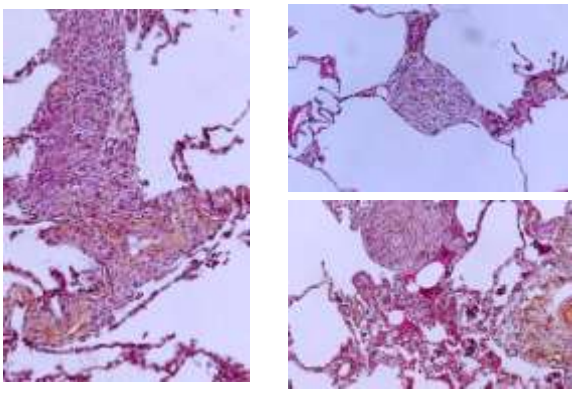
- Sarcoidosis
- Extrinsic alveolitis & hypersensitivity pneumonitis
- Eosinophilic pneumonia
- Pneumoconioses
- Lung histiocytosis: Langerhans gr., Chester Erdheim, Rosai Dorfman
- LAM, STB
- Angiitis
- Alveolar proteinosis
- Amyloidosis

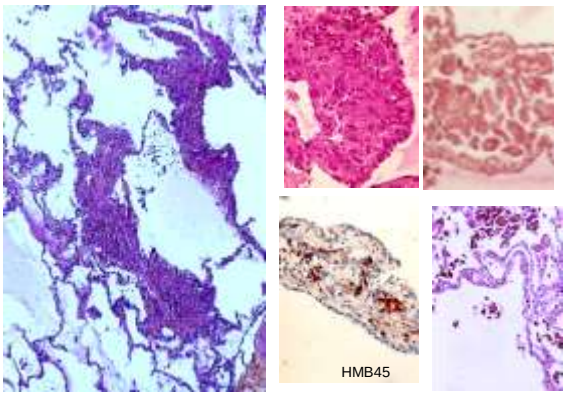








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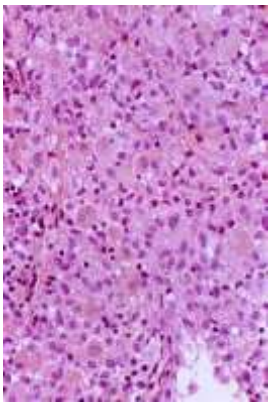

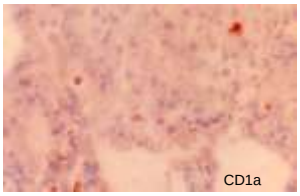

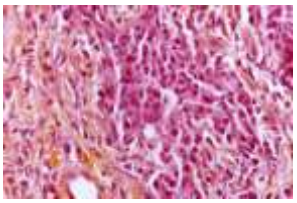

Inflammatory lung

1. Recognition of an entity / disease

2. Pattern of disease:
   - Describe
   - Classification
   - Comment

Classification of Idiopathic Pneumonia ATS / ERS

Pathology patterns	*Clinical*
• *Usual Interstitial Pneumonia*	• *Idiopathic Pulmonary Fibrosis*
• *Non specific Interstitial Pneumonia*	• *Nonspecific Interstitial Pneumonia*
• *Organizing Pneumonia*	• *Cryptogenic Organizing Pneumonia*
• *Diffuse Alveolar Damage*	• *Acute Interstitial Pneumonia*
• *Respiratory Bronchiolitis Associated lung Disease*	• *Respiratory Bronchiolitis-Associated Intersttital Lung Disease (RB-ILD)*
• *Desquamative Interstitial Pneumonia*	• *Desquamative Interstitial Pneumonia*
• *Lymphoid Intesrtitial Pneumonia*	• *Lymphoid Interstitial Pneumonia*

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Idiopathic pneumonias

- Usual Interstitial Pneumonia
- Non specific Interstitial Pneumonia *(waiting list, to be specified*)
- Organizing Pneumonia *(BOOP)*
- Diffuse Alveolar Damage *(ARDS)*
- Desquamative Interstitial Pneumonia DIP *(< smokers)*
- Respiratory Bronchiolitis Associated LD
- Lymphocytic Interstitial Pneumonia *(Lymphoid pathology)*

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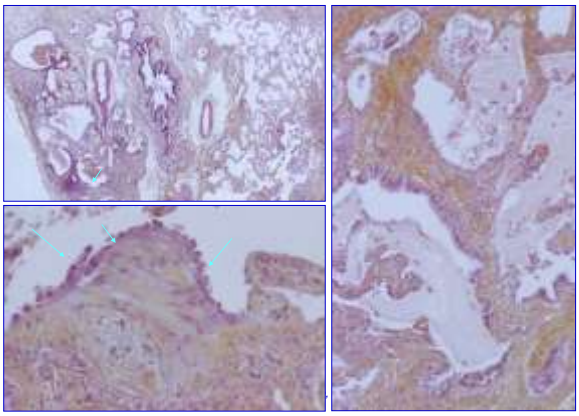

UIP

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Idiopathic pneumonias

- Usual Interstitial Pneumonia
- Non specific Interstitial Pneumonia
- Organizing Pneumonia
- Diffuse Alveolar Damage
- Respiratory Bronchiolitis Associated LD
- Desquamative Interstitial Pneumonia
- Lymphocytic Interstitial Pneumonia

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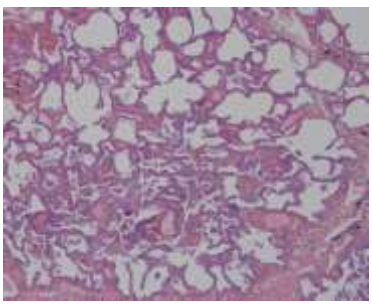
NSIP



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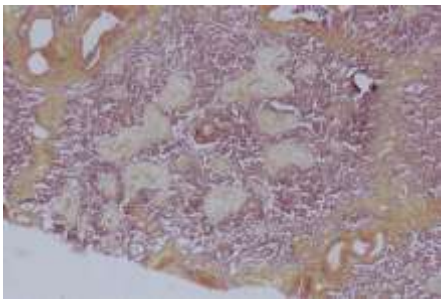
Organizing Pneumonia



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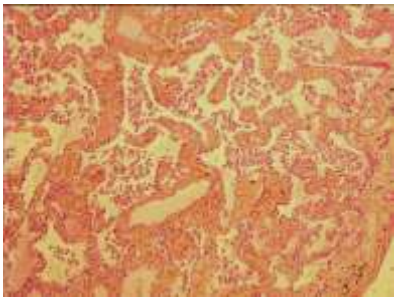
Desquamative interstitial pneumonia DIP



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Complementary entities

- Airway Centered Interstitial fibrosis
- Bronchiolitis centered fibrosis

- NSIP:
  - HSP, or pre dysimmune
  - Dysimmine
- HSP-like pattern

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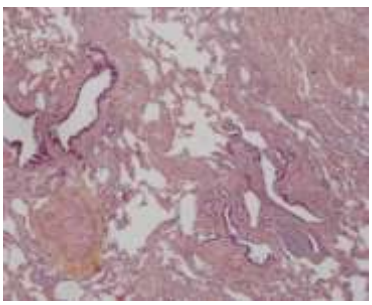
ASIP, bronchocentric fibrotic LD



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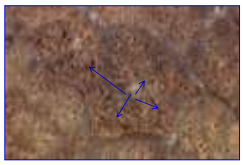
Broncho Alveolar Lavage BAL



Technical procedure

- Volume:
- Aspect:
- Cellularity
- Cellular deffirential cell count/200/400
- Cytology
- Iron load of macrophages
- Cell pellet in paraffin bloc
- Standardized report
- Integrated & BB or TBB biopsy, B. aspirate reporting
- *Simple* +++

BAL, br. washing, br. aspirate

BAL procedure:
- 200, 300 ml
- 60 %
- Cellular counting
- Cytology
- *ILD*
- *Multifocal*

Bronchial washing:
- Less than 40 ml
- Cytology
- Localized lesion

Aspirate:
- Cytology
- Large indication



Stains, IHC, ISH, …
DNA, bloc banking …

Path Lab work up: Clinical back ground

- BAL & Chronic ILD:
  - Regular standardized report
- BAL & Acute ILD:
  - Acute care
  - Emergency
  - Reporting according to the situation

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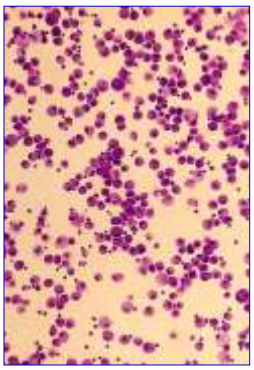
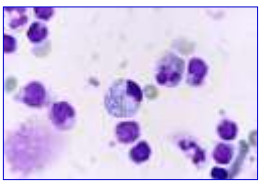
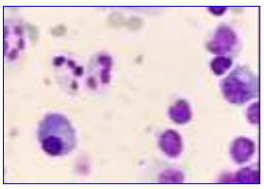
BAL: high cell count

- Smokers, tobacco, others, nargille
- Dust exposure
- ILD chronic
- Alveolar resumption: edema, post pneumonia
- Diseased lung
- DIP, LIP, COP

Cells in BAL

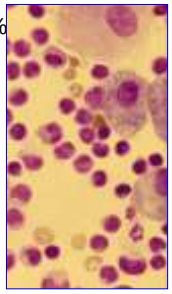




BAL: Lymphocytes

- Sarcoidosis: CD4 >, 3O%
- Hypersensitivity pn.: CD8>, 30 à 85%
- Pneumoconioses

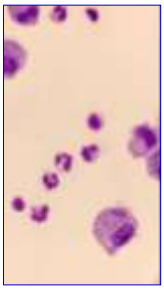
- COP, NSIP, LIP

- CTD
- Drug induced
- Infection, tumor
- …



PMN & BAL *other than infection*

- Chronic ILD / Lung fibrosis:
  - Active disease
  - Airway ectasia
- HSP: exposure to allergen
- Angeiitis
- ARDS & DAD
- Dust disease
- CTD
- Bronchitis & bronchiolitis



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BAL: Eosinophils

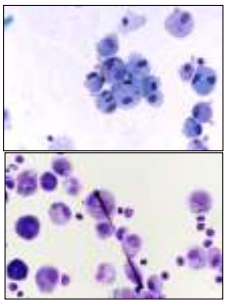
- Asthma
- Carrington's, Churg et Strauss'
- Drug induced pn.
- Acute eosinophilic pn.
- Allergic BrPn / aspergilus
- Primary fibrosis
- Tropical lung
- Peripheral eosinophilia

BAL: asbestos bodies

- Fibers: ferruginous coat
- Many shapes: fragmented, annular

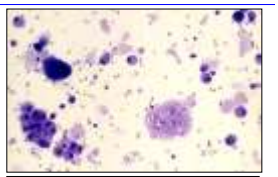
- Visible: iron stain, DQ, Ppap

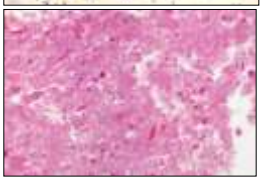
- Exposure:
  - 3 ab / ml
  - 1 ab/ slide



BAL: alveolar proteinosis

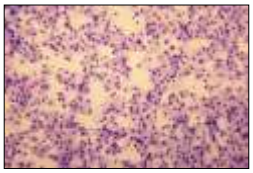
- Milky
- Aggregates, dense bodies
- Cell pellet: LPA material, eosinophilic bodies clefts
- Look for: dust, pathogens

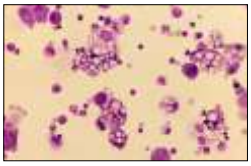


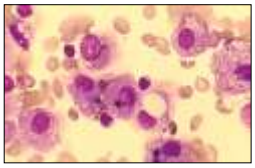


Fat in macrophages

- Foamy:
  - OP, HSP
  - bronchial d.,
  - Inhalation
  - Drug induced
  - Storage d.
- Lipid vacuoles:







Alveolar hemorrhage *cytological*

Active

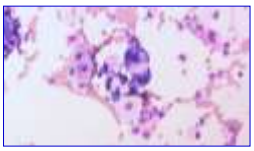
- RBC, hemophagocytosis

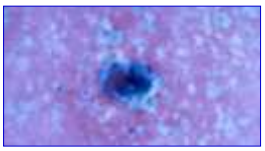
Occult

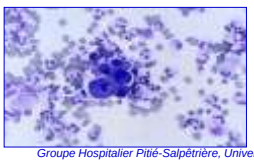
- Iron load, Golde's>100

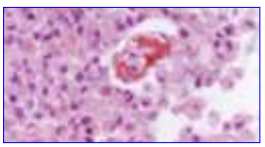
Persistant

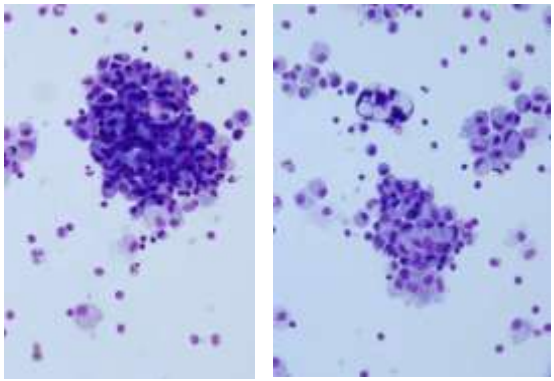
Acute alveolar damage *cytological*

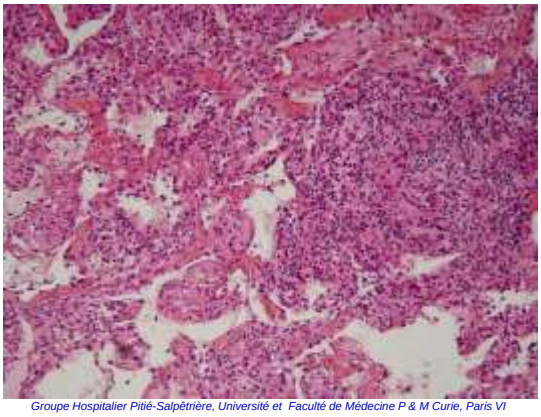










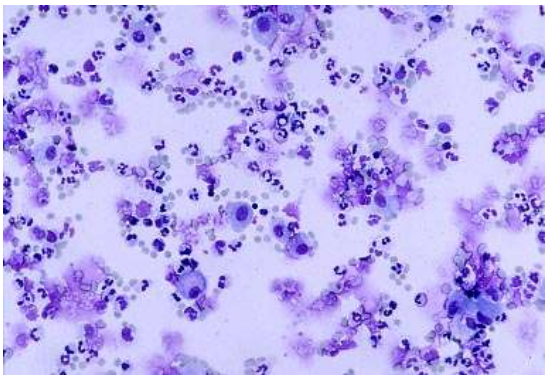


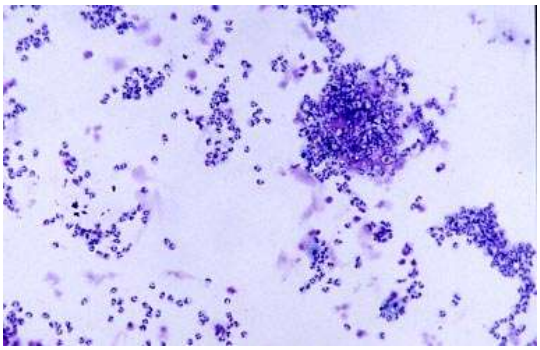
Immune alveolitis / GHPS results

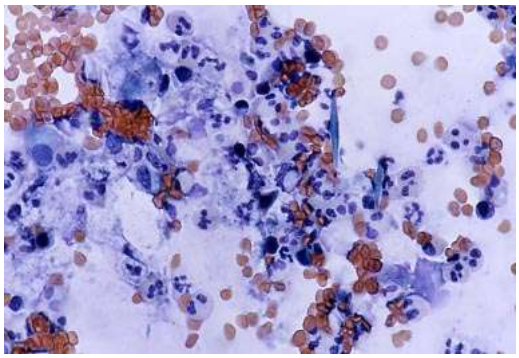
- Cellularity +
- Lymphocytes +
  - LGL
  - Activated lymphocytes
  - Plamocytoid lymphocytes
- Mast cells
- Foamy macrophages
- Cell aggregates: included Lc, epithelioid, giant cells
- Alveolar damage, hyaline membranes
- Non specific, clue for …

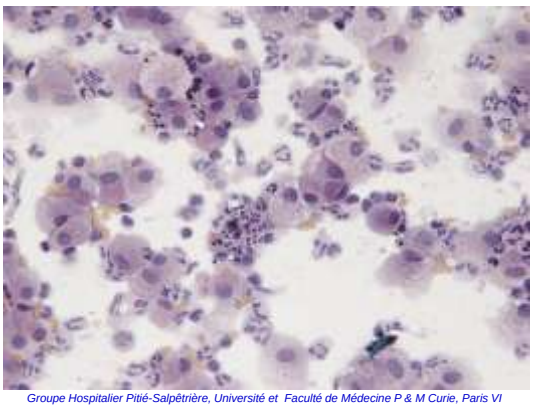
Immune alveolitis / GHPS results

- Correlation:
  - EAA
  - Drug induced
  - CTD
  - Dysimmune state, IDS
  - Post viral
  - Sarcoidosis ?
- ARDS: valuable consideration









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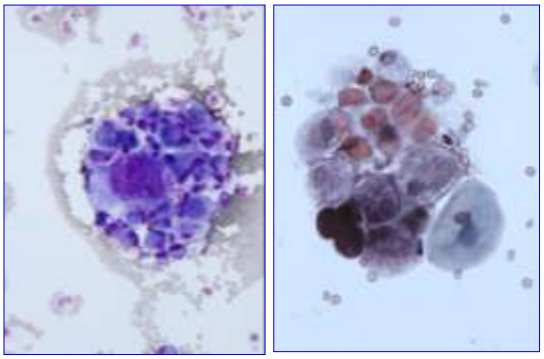

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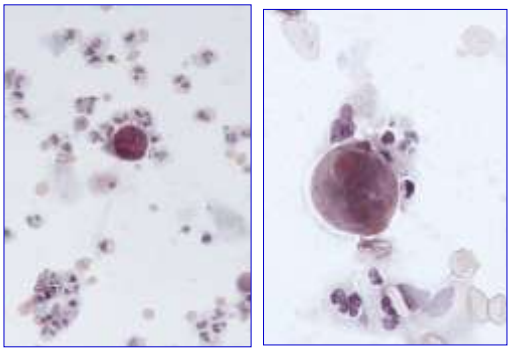

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BAL HSV *br.pneumonia*

- Acute pn.
- BAL wok up for mainly infectious work up
- HSV cytology added to MB
- HSV1 or 2
- HSV sub type same as URA same patient
- Acquired, treatment

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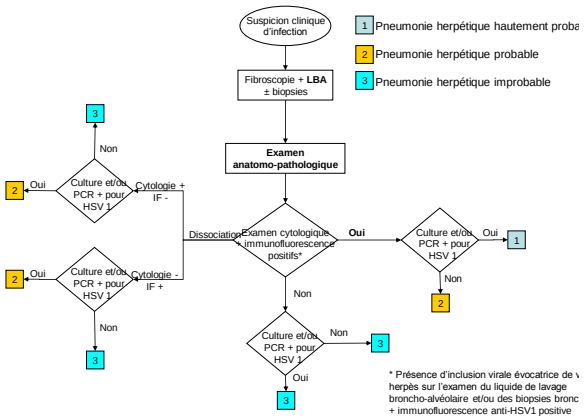

BAL reporting

- Integrated with BB & TBB
- Cellular predominant, *do not assimilate with a histological denomination*:
  - Lymphocytes
  - Eosinophils
  - PMN , *not always indicative of infection*
  - Gaint cells
- Cytological profile:
  - Storage, hemorrhage
  - Immune alveolitis, smokers alveolitis
  - AD, HSV, AP, AB,

Conclusion

- BAL non invasive, easy to perform
- Not representative of the whole lung
- Primary diagnostic work up, can be repeated
- Sometimes no SLB is done: if BAL &clinical & radiological data, correlate, & follow up
- Alveolar >>> AP and EP chronic or acute
- SLB if necessary, BALs non conclusive
- BAL & Thoracic imaging: integrated diagnosis
- Best evaluation by a lung pathologist, experience