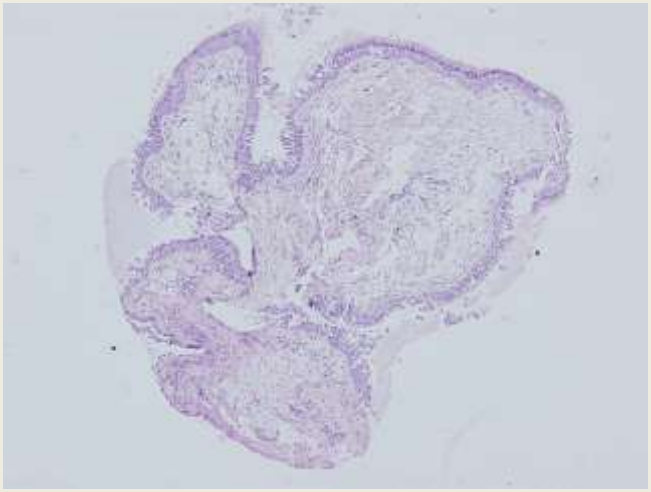
Bronchoscopic techniques in interstitial lung diseases. Obtaining and preserving specimens for investigation.



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Bronchoscopy in ILDs

- Bronchoscopy is a useful diagnostic tool in some ILDs, particularly sarcoidosis, hypersensitivity pneumonitis and organizing pneumonia
  - *Bradley B, Branley HM, Egan JJ, et al. Thorax 2008*
- **Bronchoscopic methods in ILDs**:
  - Bronchoalveolar lavage
  - Endobronchial biopsy
  - Transbronchial biopsy
  - Transbronchial needle aspiration of mediastinal lymph nodes under EBUS control

Sedation and local anesthesia

Sedation

- Intravenous midazolam is the preferred drug for sedation; it has a rapid onset of action and is titrable
- Dosage: no more than 5 mg midazolam (strength 1 mg/mL) should be drawn into a syringe prior to bronchoscopy for patients under the age of 70 (2 mg midazolam for patients over 70)
- Combination opioid and midazolam sedation should be considered in patients to improve bronchoscopic tolerance
- When opioids are used, short-acting agents (such as fentanyl or alfentanil) should be used to minimize post-procedural sedation.

  – *Du Rand IA, et al. Thorax 2013;68:i1–i44. doi:10.1136/thoraxjnl-2013-203618*

Sedation and local anesthesia

Local anesthesia

- **Nasal topical anaesthesia**
  - lidocaine gel
- **Laryngeal and tracheobronchial topical anaesthesia-** 1% lidocaine solution:
  - **Application of lidocain spray** to anesthesize tongue, and larynx followed by aplication of lidocain (tetracain), by special bore laryngeal needle inserted through vocal chords
  - **"Spray-as-you-go" delivery,** in which lidocaine is applied via the bronchoscope working channel. Repeated application allows lidocaine delivery to the entire airway
  - **Direct injection into the upper trachea** using a needle passed through the cricothyroid membrane, allowing lidocaine delivery to the larynx and trachea prior to bronchoscope insertion- not frequently used
  - **Additional lidocaine doses** to the bronchial tree can be administered as required via the bronchoscope
  - **Use of nebulized 4% lidocaine** – increases the risk of doubling the total dose of lidocaine, and is not recommended

- *Du Rand IA, et al. Thorax 2013;68:i1–i44. doi:10.1136/thoraxjnl-2013-203618*

General anesthesia

- Administered and guided by anesthesiologist
- **Indications:**
  - Medical indication - patients undergoing combined bronchoscopic procedure with longer durations, e.g. EBUS+BAL+TBLB
  - Allergic patients - In patients who have an allergy to local anesthetics
  - Patient request – for patients who do not want to have bronchoscopy using only local anesthesia + sedation
- **Artificial ventilation**:
  - **Classical volume or pressure ventilation** – suitable for patients intubated using an endotracheal tube
  - **High- frequency jet ventilation** – suitable for patients intubated using a rigid bronchoscope

General anesthesia with jet ventilation

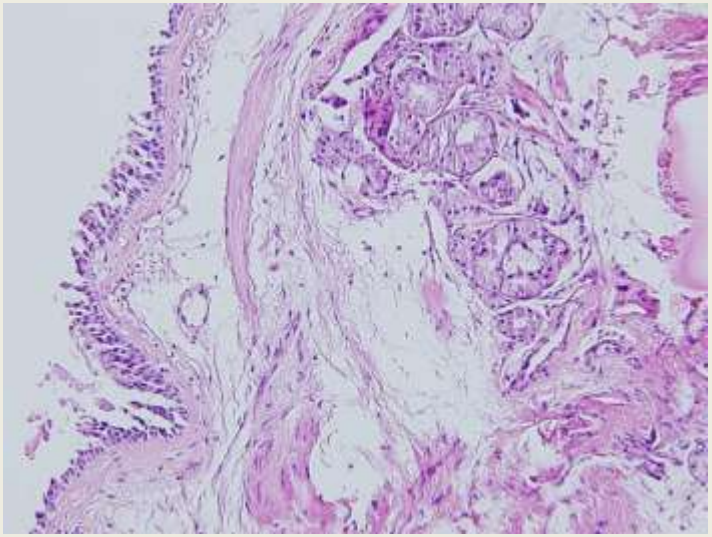
- HF Jet ventilation
  - Small volumes (2 to 3 ml/kg)
  - High frequency gas exchange (100-200/min)
  - High pressure (100-500 kPa)
  - Gas is pushed in pulse-mode via a thin catheter (14-18 Gauge catheter or side-port of bronchoscope)

Bronchial and transbronchial biopsy

- **To increase diagnostic yield**:
  - **Bronchial biopsy** (BB) and **transbronchial biopsy** (TBLB) should be combined in sarcoidosis with **transbronchial needle aspiration** of lymph nodes (TBNA) and **bronchoalveolar lavage** (BAL)
  - TBLB should be combined with BAL in other ILDs
  - **Multiple specimens** should be taken during one procedure (optimally at least 5)
  - Preservation of specimens: specimens are fixed in formol making quick transport to a histopathologic lab unnecessary
    - *Leonard C et al. Eur Respir J 1997*
    - *Shorr AF et al. Chest 2001*
    - *Navani N et al. Respirology 2011*

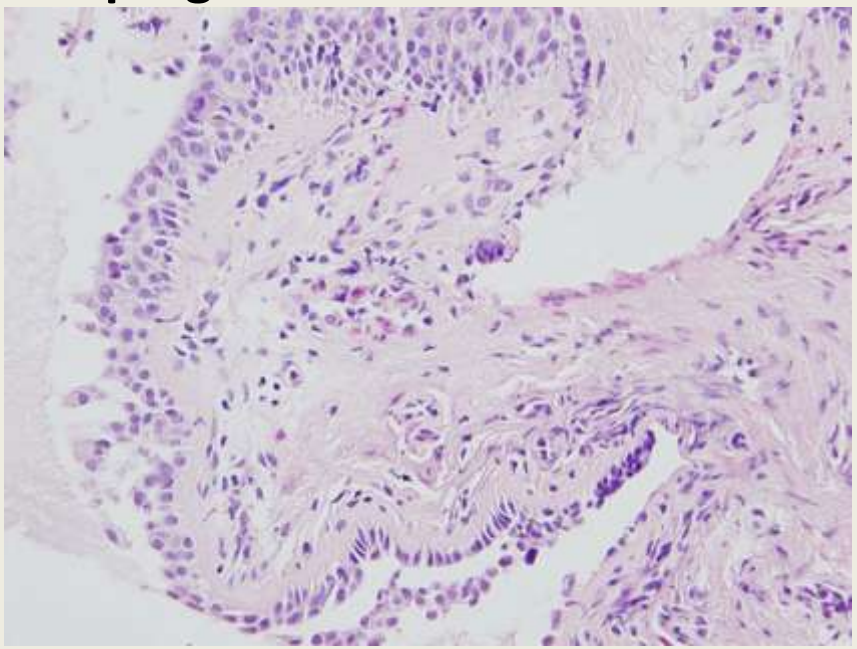
Bronchial biopsy

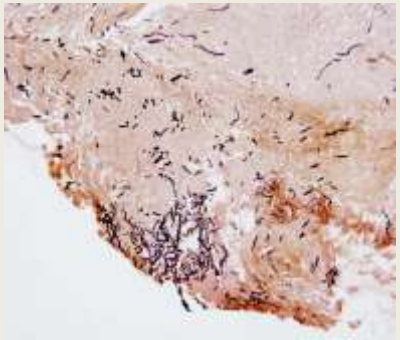
- **BB is indicated in diseases with pathological changes in airway mucosa**, mainly in diseases with airway involvement, mainly sarcoidosis
- Diagnostic and differential diagnostic yield
- **Technical workup**: forceps biopsy of bronchial mucosa, optimally at the bronchial carinae of different lobes and segments
  - *Shorr AF et al. Chest 2001*

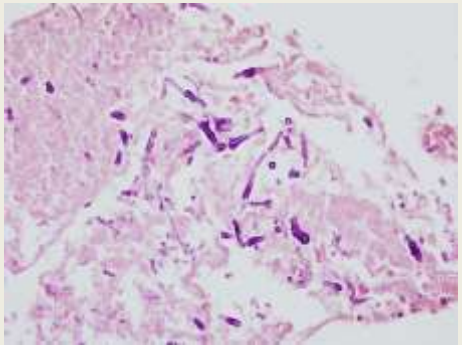


Bronchial biopsy in asthma with ABPA and sarcoidosis

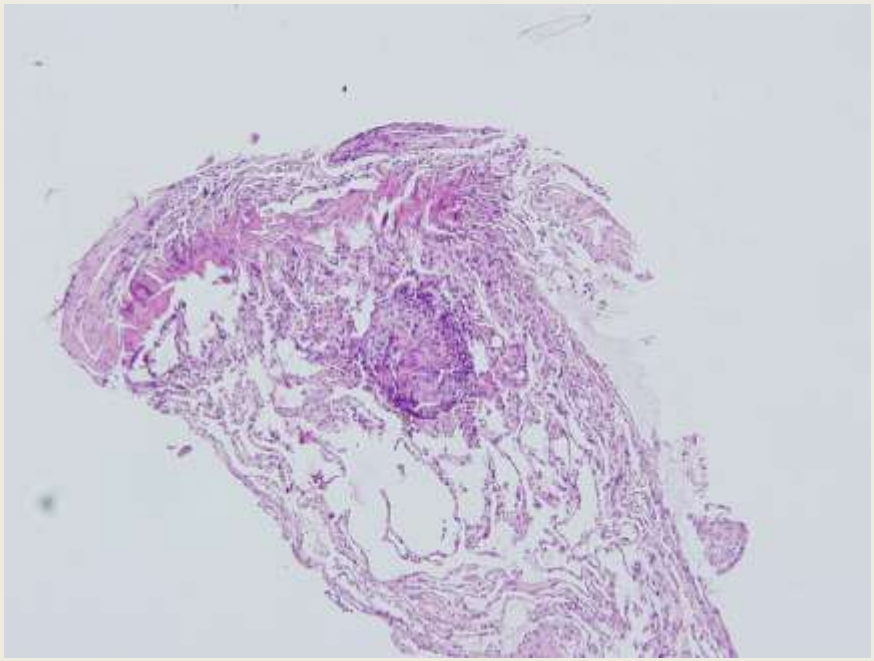
Allergic bronchopulmonary aspergillosis





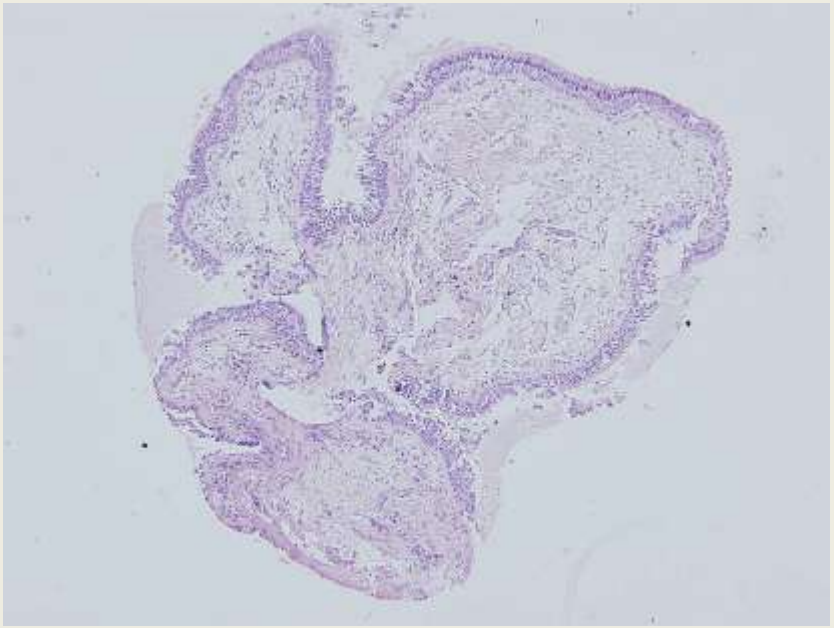


Sarcoidosis



Transbronchial lung biopsy - TBLB

- **TBLB is indicated in diffuse lung diseases and in the diagnosis of solid (tumorous) lesions**
- In general, it increases diagnostic yield of bronchoscopy by 30%
- In ILDs diagnostic yield of TBLB has been shown mainly in **sarcoidosis**, and to a lesser extent in **hypersensitivity pneumonitis and smoking-related ILDs**, dif dg versus **disseminated tumors**
- In its classic form TBLB is not suitable for diagnosis of most fibrosing ILDs
  - *Descombes E. et al. Monaldi Arch Chest Dis 1997*
  - *Anders GT et al. Chest 1988*

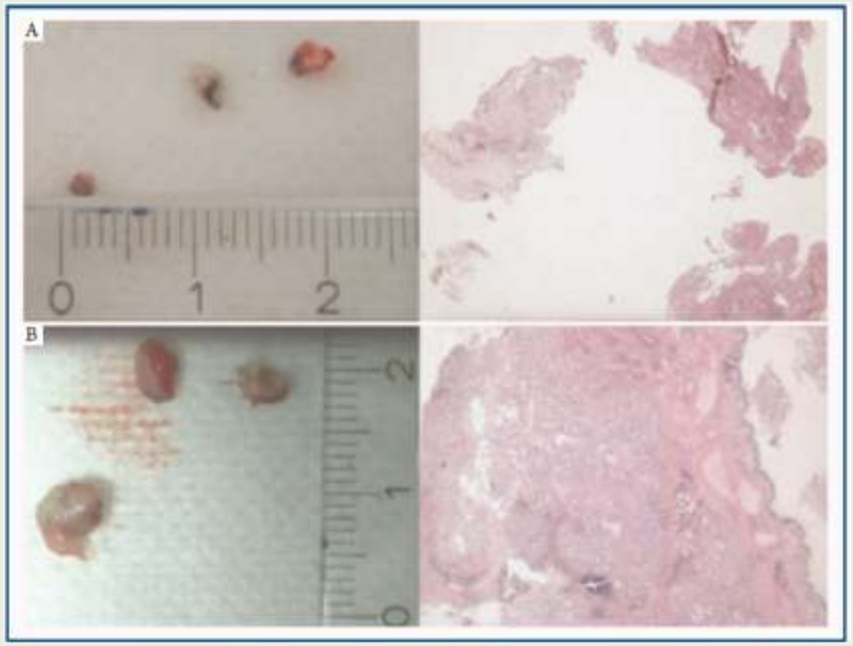


TBLB complications

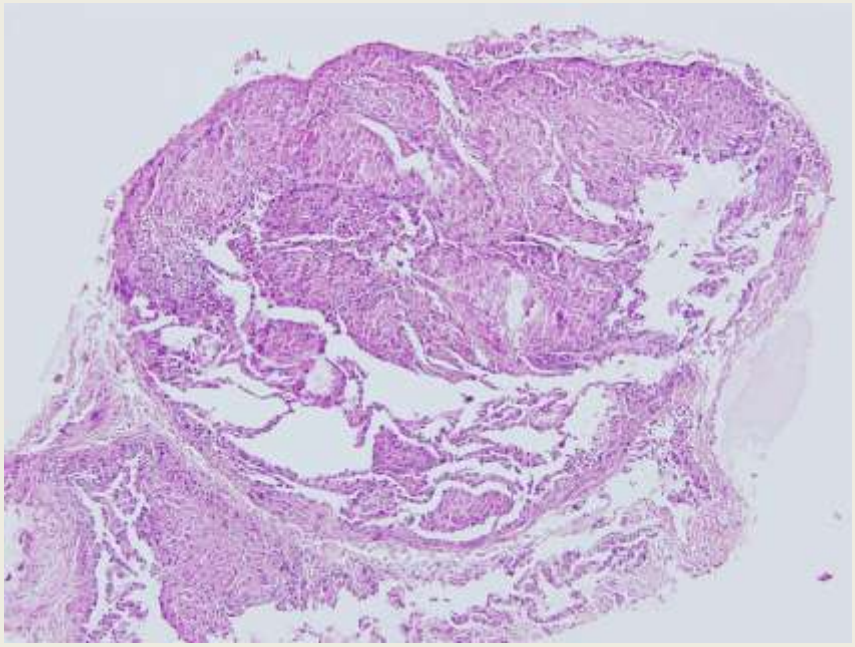
- Pneumothorax
- Bleeding
- Incidence of complications: 6%; mostly pneumothorax (5.8%, 3.8% requiring intercostal drainage)

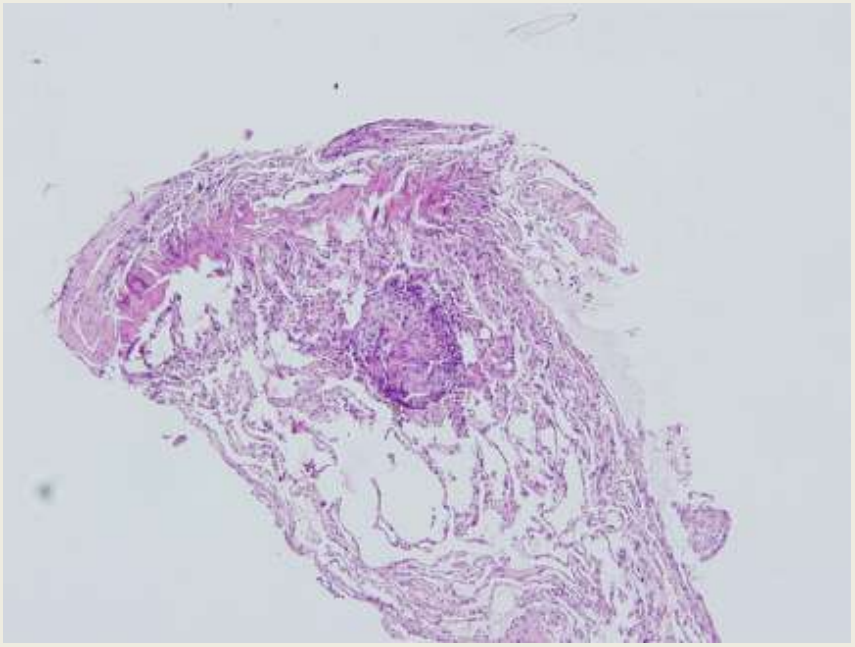
TBLB diagnostic yield in ILDs

- **Diagnosis of sarcoidosis-** is up to 70% and almost 100% when combined with TBNA and BAL
- In other ILDs the diagnostic yield is low – rarely useful in hypersensitivity pneumonitis or SRIF
- **Substantially increased diagnostic yield when a cryobiopsy is performed**
  - *Hetzel J. et al. Eur Respir J 2012*



TBLB- granuloma in sarcoidosis



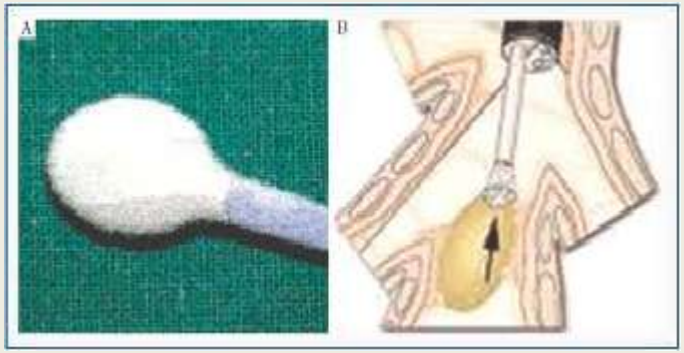


Transbronchial cryobiopsy - TBLC

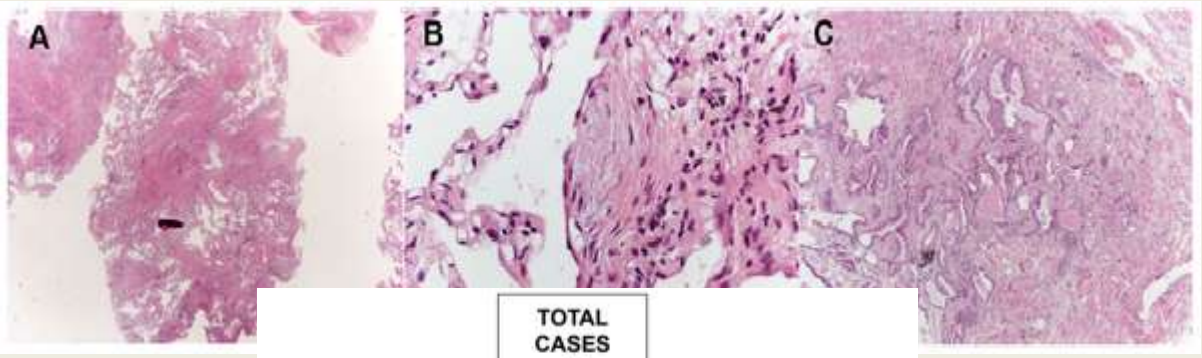
- Transbronchial cryobiopsy: a new tool for lung biopsies.

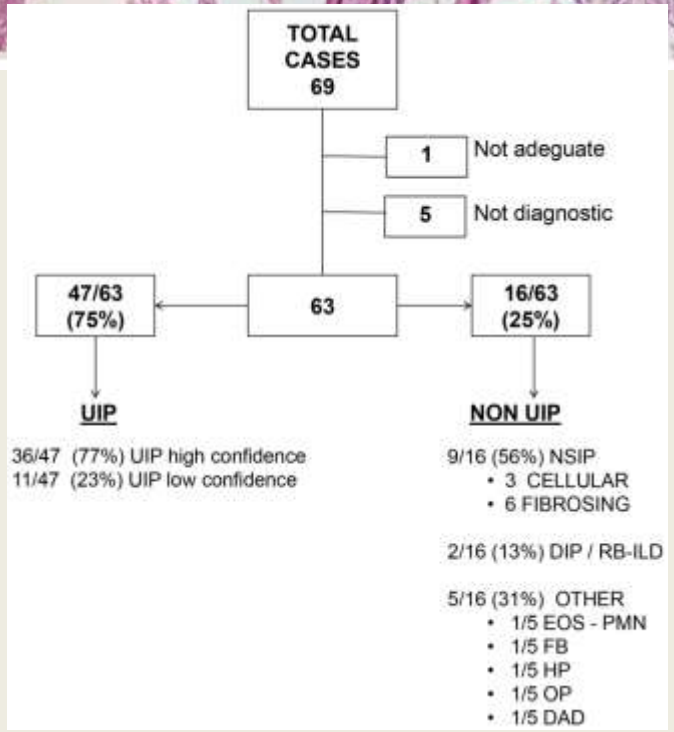
  Babiak A et al. Respiration 2009

- Method: flexible cryoprobe connected to source of CO2 - temperature at the tip of probe −75 °C- duration of cooling 5 - 6s, fluoroscopic control



Diagnostic yield from TBLC

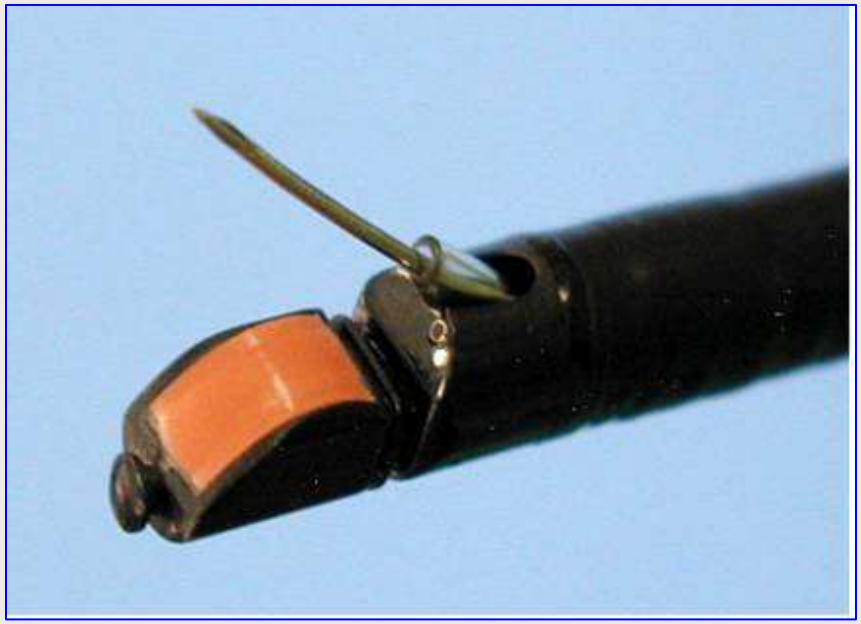




Casoni et al. Plos One 2013

Transbronchial needle aspiration – TBNA - EBUS

- **TBNA - EBUS** mainly valuable in diagnosis of sarcoidosis
- Combination of BAL, TBLB (TBLC) and TBNA-EBUS increases probability of obtaining a diagnosis to ≈ 100%
- Differential diagnosis of tumorous involvement of mediastinal lymph nodes
- **TBNA is suitable not only for cytologic evaluation but also for histologic** - part of tissue or cytoblock
- **Preservation of samples** – saline is best, plus quick transport for further histopathologic processing
  - *Navani N et al. Respirology 2011*

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2008Feb19 18:34


GI3
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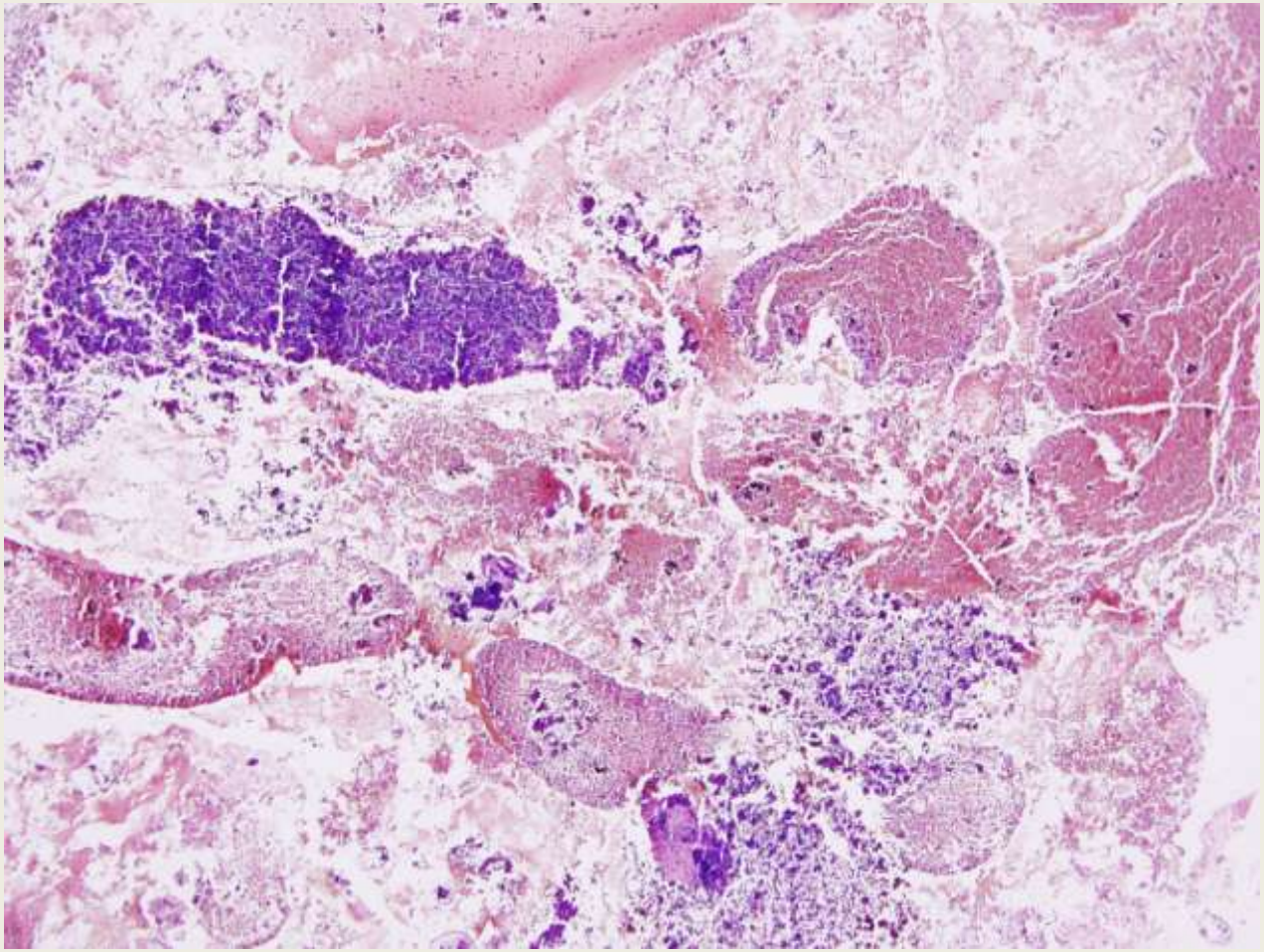
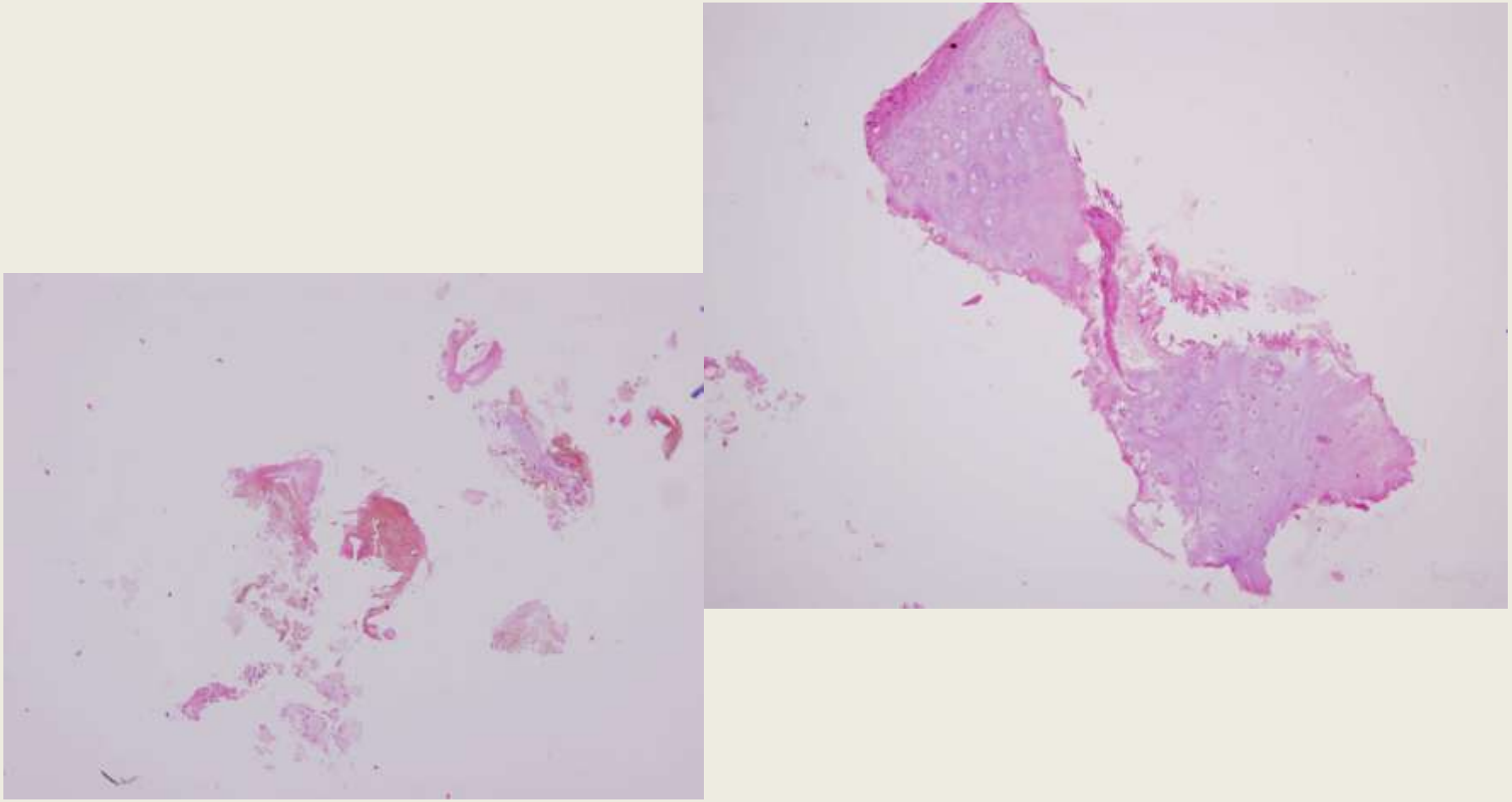
EBUS- TBNA cytoblock and slices from cylinder of tissue retained in needle

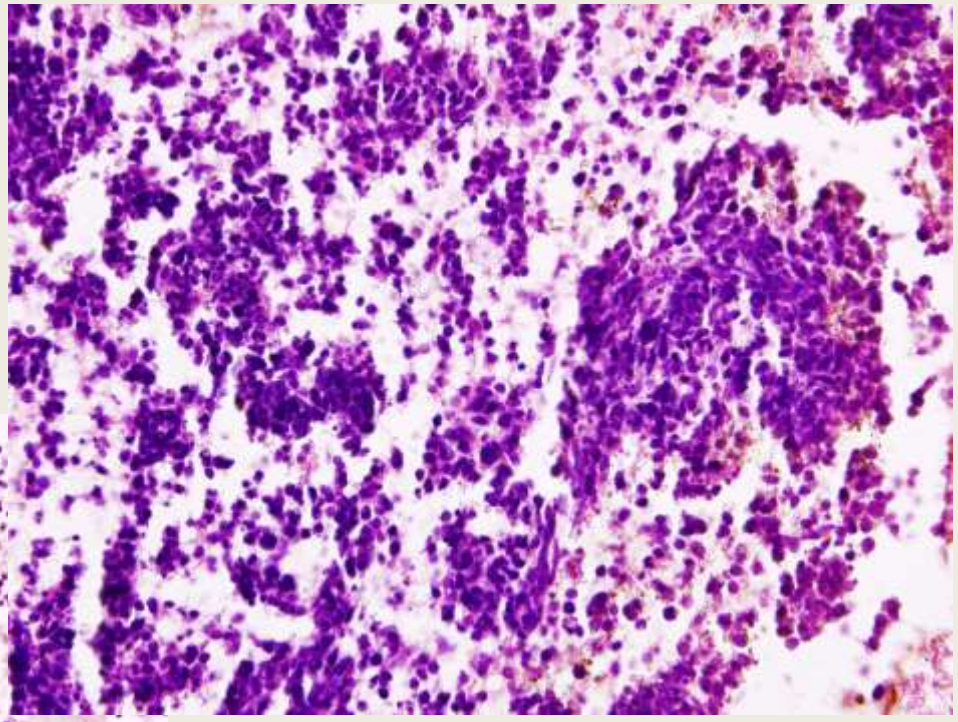
EBUS- TBNA- low magnification

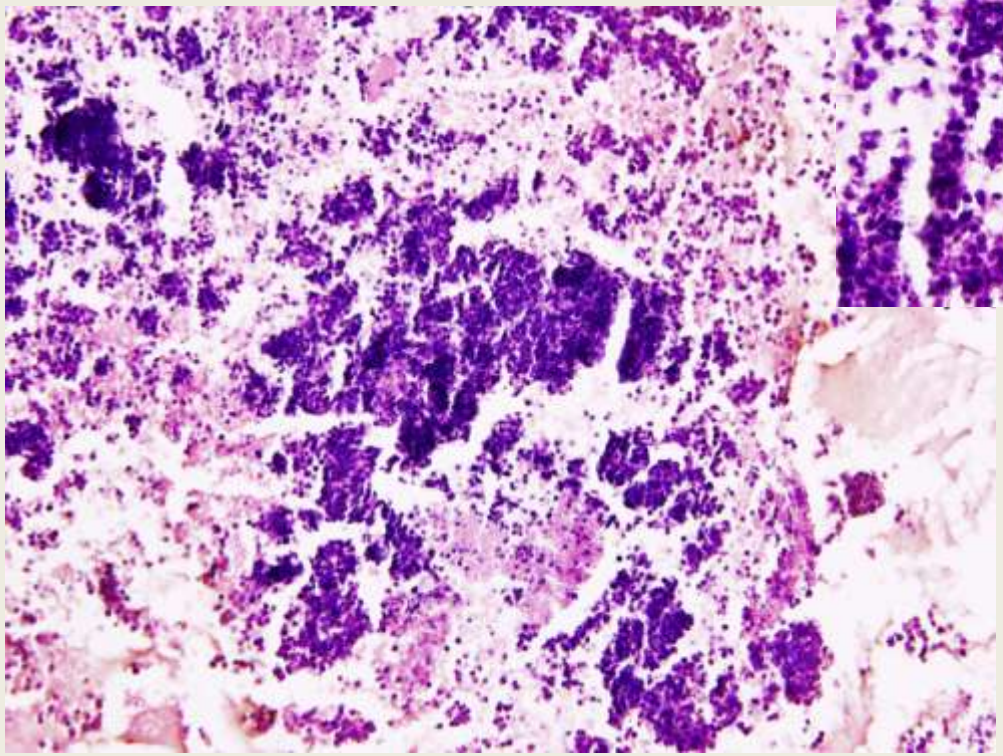


EBUS- TBNA- cartilage

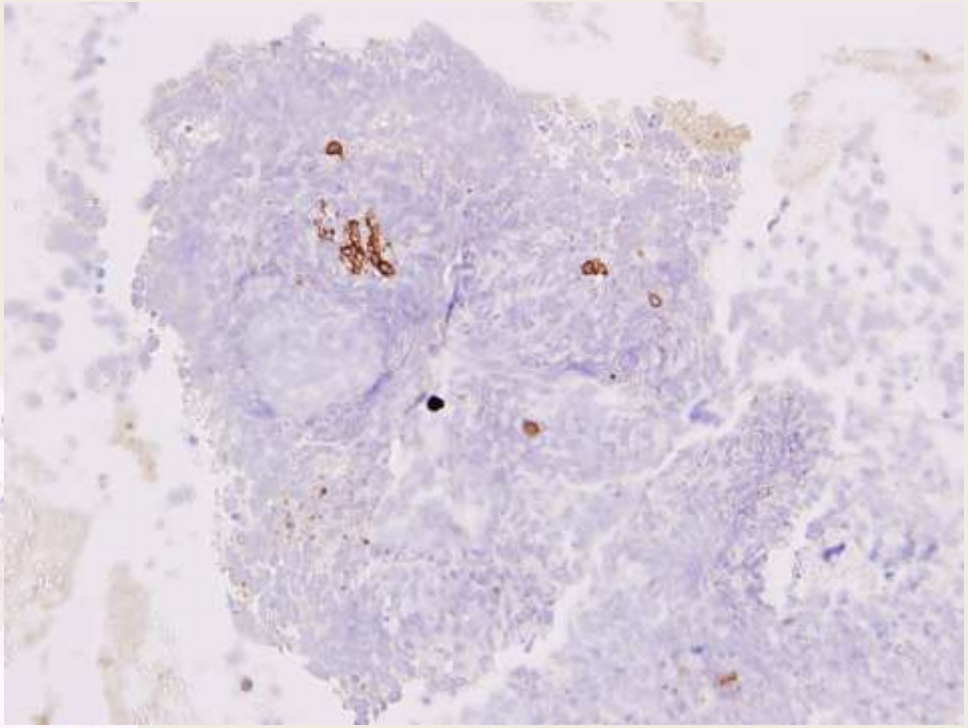


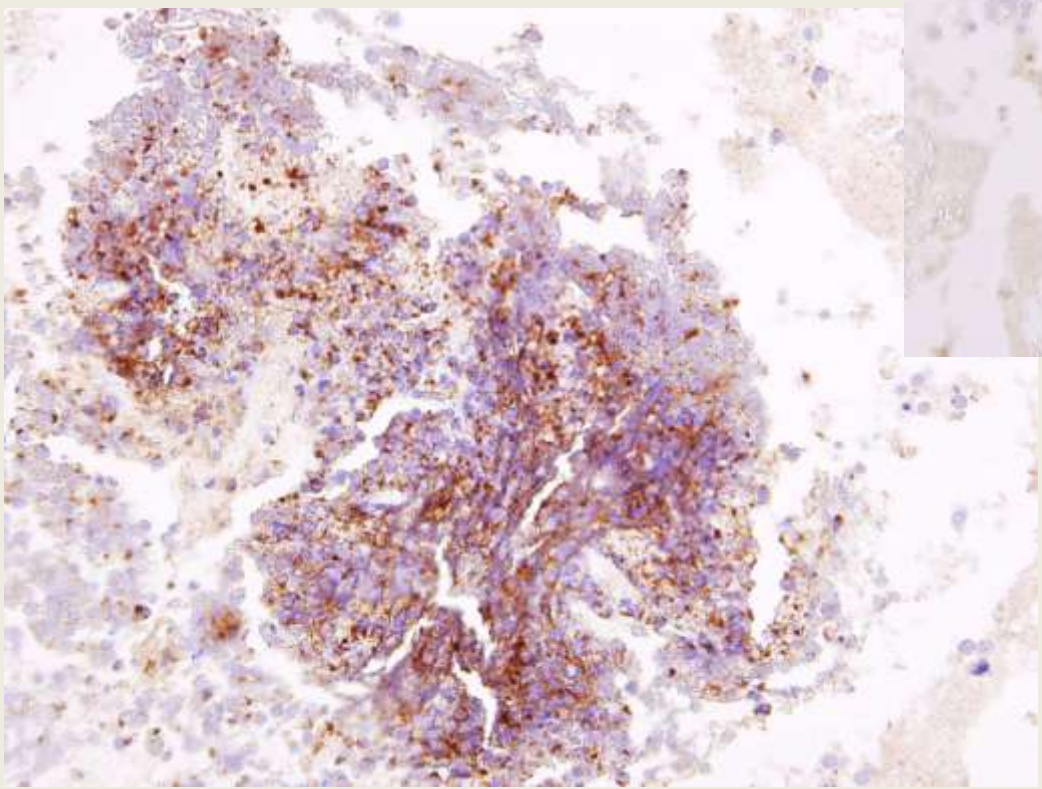
EBUS-TBNA SCLC



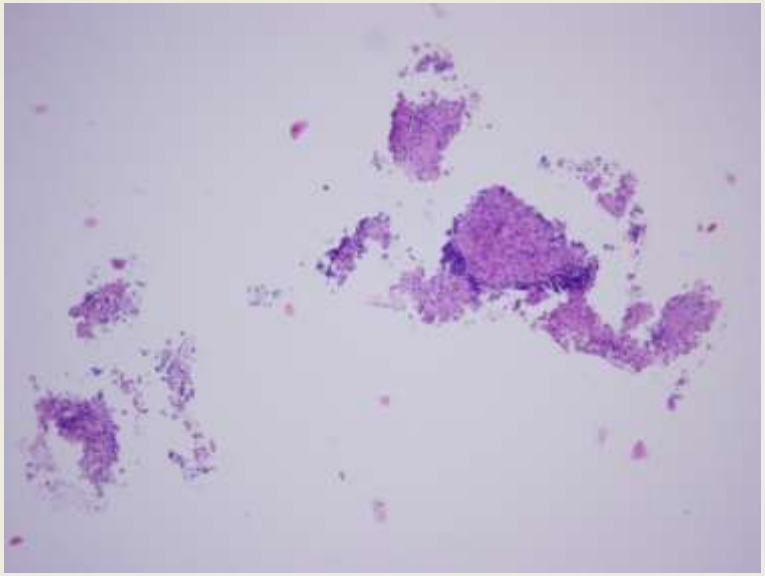


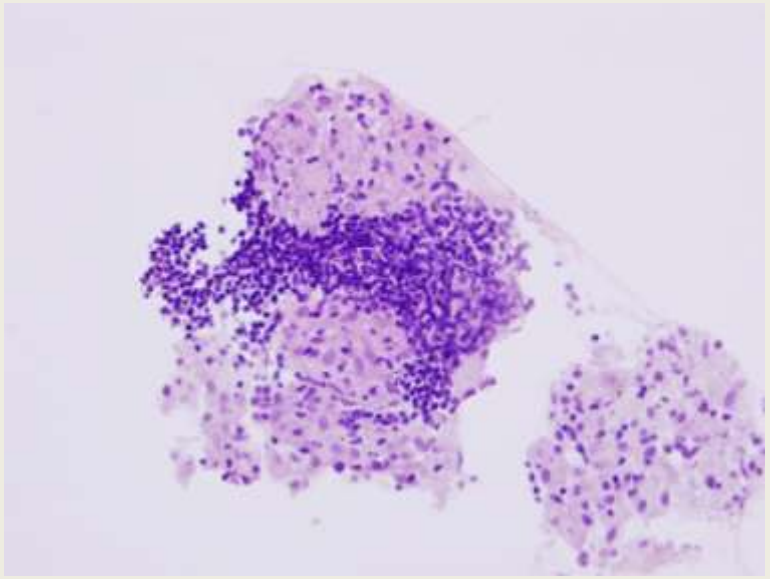
EBUS- TBNA SCLC CD20 EMA

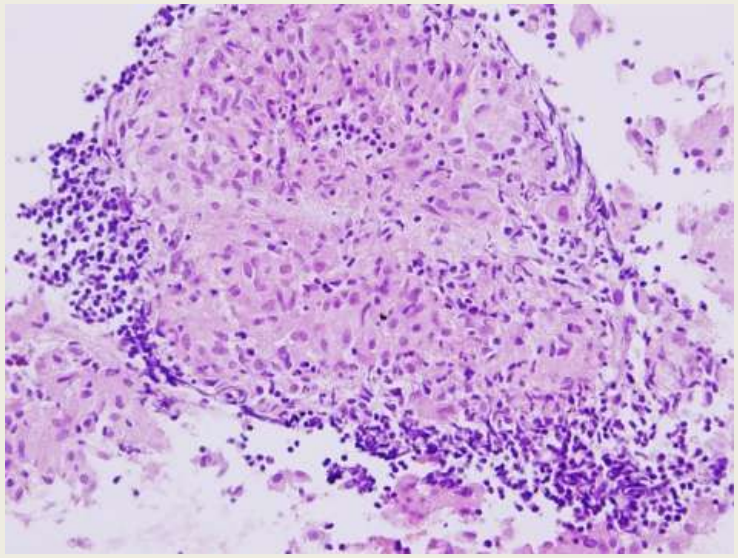




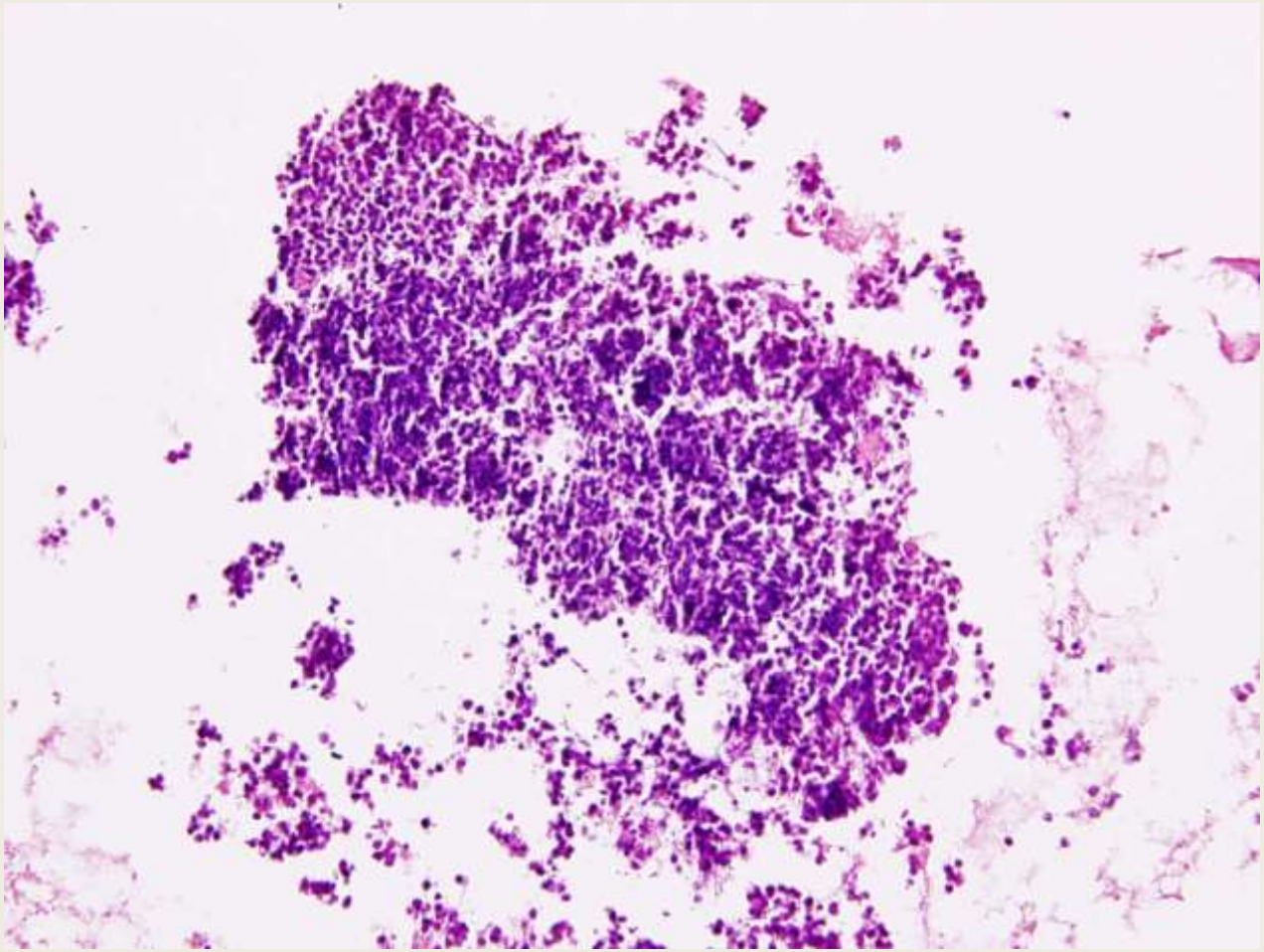
EBUS- TBNA sarcoid granuloma







EBUS-TBNA normal lymph node



Conclusions

- Bronchoscopy has a substantial role in the diagnosis and differential diagnosis of ILDs
- Better diagnostic yield is obtained by combining the methods; i.e. BAL, TBLB, TBLC, EBUS-TBNA
- The samples obtained are suitable for cytologic and in most cases for histopathologic evaluation (preserved as native or fixed in formol)
- **Combining bronchoscopic methods and introduction of new ones (TBLC) allows patients to avoid surgical lung biopsies**

Thank you for your kind attention