

# CRYOBIOPSIES : READY FOR PRIMETIME?

MARC FORTIN, MD

INSTITUT UNIVERSITAIRE DE CARDIOLOGIE  
ET DE PNEUMOLOGIE DE QUÉBEC



## DISCLOSURE OF CONFLICT OF INTEREST (OVER THE PAST 2 YEARS)



Marc Fortin

I have no conflict of interest.

# CONVENTIONAL TRANSBRONCHIAL BIOPSIES



- RETROSPECTIVE
- UIP, N = 21 (CONFIRMED BY SLB IN 20)
- CTBB
- 18 ADEQUATE SAMPLES
  - DX IN 7 (33%)
  - CONSISTENT WITH UIP IN 2 (9.5%)
  - NON SPECIFIC INTERSTITIAL FIBROSIS IN 9 (43%)

- RETROSPECTIVE, N = 33, SUSPECTED UIP, ALL UNDERWENT SLB AND CTBB
- STEP 1 : MDTM HRCT AND HX
- STEP 2 : CTBB
- STEP 3 : SLB
  
- 4 HRCT DIAGNOSTIC/ 29 NO DEFINITIVE DIAGNOSIS
  - 6 (18%) CONFIDENT DIAGNOSIS/NO SLB RECOMMENDED (3 UIP POSSIBLE ON HRCT)
    - 100% CONCORDANCE TBB/SLB
  - 23 NOT CONFIDENT IN DIAGNOSIS/SLB RECOMMENDED
  
- CTBB
  - 6 INADEQUATE (18%)
  - 14 NON DX (42%)
  - 13 DIAGNOSTIC (39%)
    - 9 UIP, 3 HP, 1 OP
    - 8/13 (62%) CONCORDANCE WITH SLB

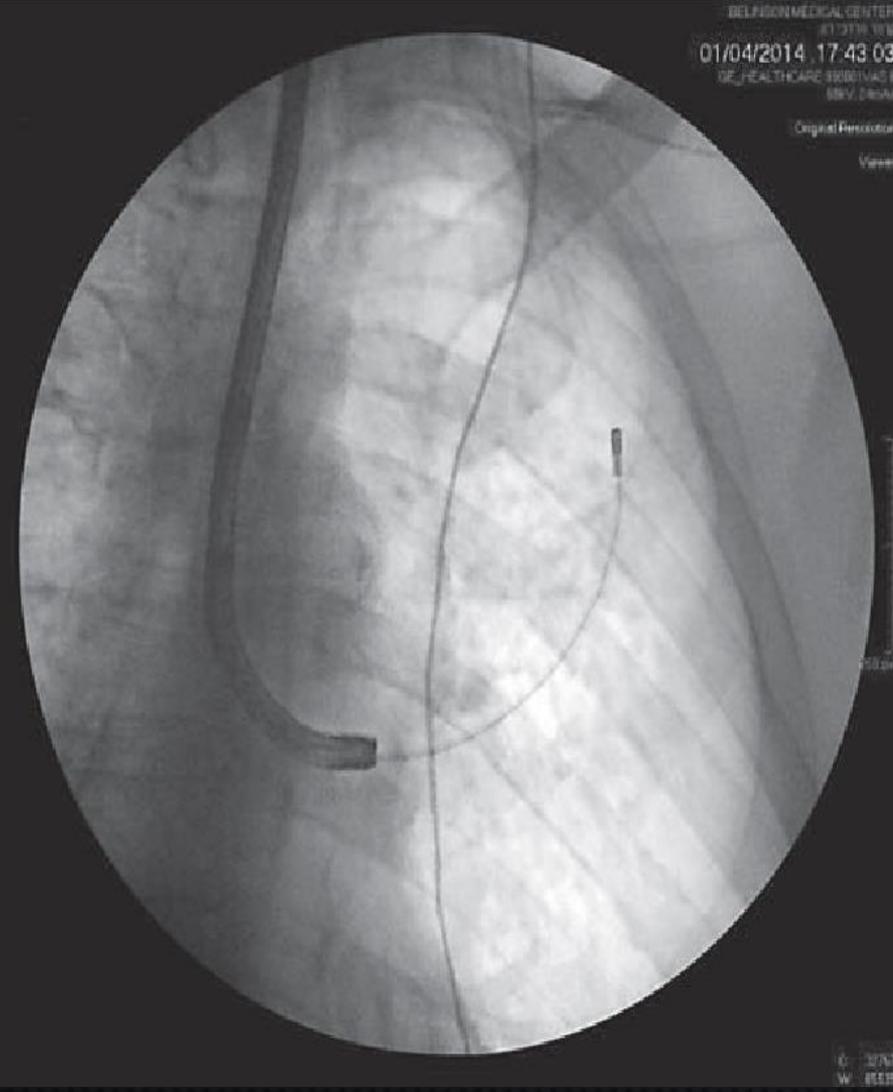
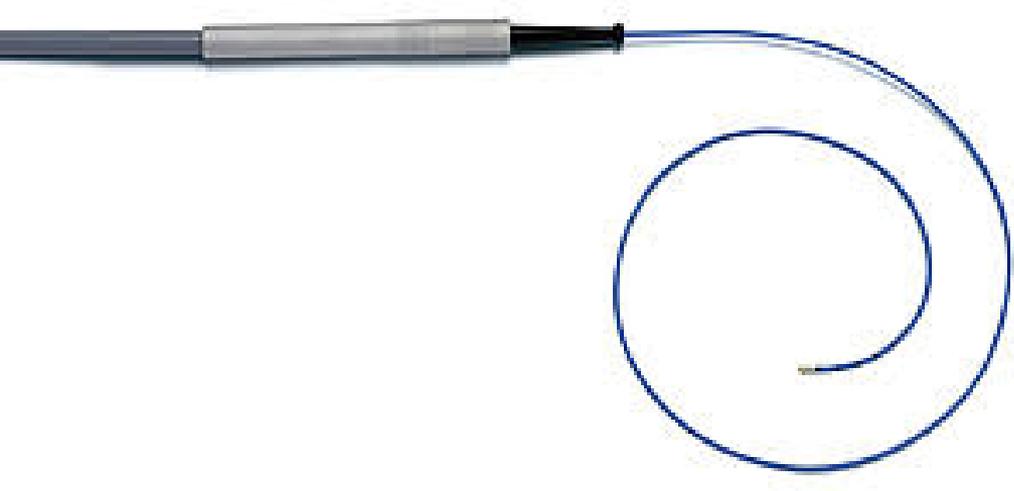
# NOT ALL ILD ARE EQUAL

- N = 130 SUSPICION OF SARCOIDOSIS
- EBUS VS BLIND TBNA, ALL CTBB
  
- 117 SARCOIDOSIS
- CTBB DIAGNOSTIC IN 70%
  - PARENCHYMAL OPACITIES ON CT IN 56%
  
- 3 MINOR BLEEDING
- 1 PTX, NO CHEST TUBE

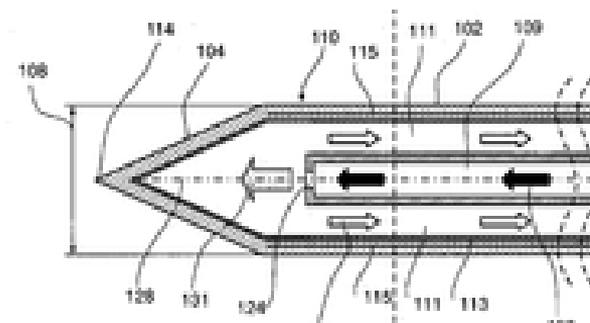
# DIFFERENT APPROACH

- LYMPHANGITIC CARCINOMATOSIS
- NON-INVASIVE ADK
- LYMPHOMA
- OP
- INFECTIOUS (EX : PJP)
- PAP
- ...

# CRYOBIOPSIES



- WORKS BY JOULES THOMSON EFFECT :
  - CO<sub>2</sub> OR NO<sub>2</sub> PRESSURIZED
  - SUDDENLY RELEASED TO ATMOSPHERIC PRESSURE
  - GAS RAPIDLY EXPANDS → DROP IN TEMPERATURE (-80 CELSISUS)



# ONCE UP ON A TIME

- N = 20 (18 MAO, 2 BAO)
- FLEXIBLE CRYOPROBE RECANALIZATION

- MATHUR, CHEST 1996

# WHY?

- LARGER SAMPLES
  - SIZE OF CTBB CORRELATES WITH DIAGNOSTIC YIELD (CURLEY, CHEST 1998)
- FREE OF CRUSH ARTEFACT
- AVOID RISKS ASSOCIATED WITH SLB IN ILD
  - MORTALITY 1.7% IF ELECTIVE, 16% IF NON-ELECTIVE (HUTCHINSON, AJRCCM 2016)
  - 30 DAY MORTALITY : 3.9% vs 0.4%
  - PTX 20% (4% CHEST TUBE) (RAVAGLIA, ERJ 2015)

- N = 41, ILD
- CTBB VS CRYOBX
- SURFACE AREA : 5.8 VS 15MM<sup>2</sup>
- CRUSH ARTEFACT : 42 VS 0%
- 2 PTX, 0 BLEEDING REQUIRING INTERVENTION
- VERY LITTLE INFORMATION ON DX PERFORMANCE

- BABIAK A ET AL, RESPIRATION 2009

# BETTER THAN NOT THAT USEFUL

- ILD
- RCT : CRYOBX VS TBB
- N = 77
- SAMPLE SIZE 15MM<sup>2</sup> VS 3MM<sup>2</sup>
- DX YIELD 51 VS 29%
- MORE MODERATE BLEEDING 56 VS 34%(NS)

- PAJARES, RESPIRATION 2014

# INTERESTING!

- ILD
- N = 117, RANDOMISED
- CRYOBX VS SLB
- MDTM : HISTORY + HRCT REVIEWED THAN CRYOBX OR SLB
- DX CONFIDENCE
  - CRYOBX 29 → 63%
  - SLB 30 → 65%
- COMPLICATIONS CRYOBX
  - PTX 19/58 (33%)
    - 15/19 (79%) CHEST TUBE
    - AVERAGE STAY 6D
  - 0 SEVERE BLEEDING
  - 1 DEATH (VS 2)

# INTERESTING BUT SAFE?

- SINGLE LARGE VOLUME ACADEMIC CENTER
- NEW CRYOBX PROGRAM
- 25 CONSECUTIVE CASES
- DX YIELD
  - DEFINITIVE DX 56%
  - PRESUMPTIVE Dx 20%
- COMPLICATIONS
  - 3 MAJOR HEMORRHAGES (100, 160, MASSIVE)
    - 1 LIFE-THREATENING WITH PROLONGED HYPOXEMIA
  - 2 PTX
  - 1 HYPERCAPNIC RESPIRATORY FAILURE
- NOT STANDARDIZED : 60% WITHOUT FLUOROSCOPY, FREEZING TIME, LMA, NO FOGARTY
- PULMONARY HTN NOT EXCLUSION

# LOTS TO LEARN

- N = 19
  - PROPHYLACTIC BRONCHIAL BLOCKER INFLATED
  - FREEZING TIME 4-5s → 3-4s
  - SAMPLES 4-5 → 2-3
- N = 42
- COMPLICATIONS 84 → 14%
  - PTX 26 → 12%
  - 30 DAY MORTALITY 5 → 2%
  - BLEEDING 79 → 0\*%

- HAGMEYER, THORAX IN PRESS

# OVERALL?

- META-ANALYSIS
- 27 STUDIES, 1443 PATIENTS
- DIAGNOSTIC YIELD = 73% (40-95%)
- MEDIAN SPECIMEN SIZE = 23MM<sup>2</sup>
- COMPLICATIONS
  - BLEEDING REQUIRING INTERVENTION : 14%
  - PNEUMOTHORAX : 9%
  - MORTALITY 0,3%

- SETHIS, JOBIP 2019

- FLEXIBLE VS RIGID BRONCHOSCOPY?
- LMA VS TUBE?
- PROPHYLACTIC BRONCHIAL BLOCKER/FOGARTY?
- 1.9 VS 2.4MM PROBE?
- NUMBER OF SAMPLES?
- FREEZING TIME?
- HOW PERIPHERAL?
- WHICH SUSPECTED PATHOLOGY?

READY FOR PRIMETIME?

- INTERIM ANALYSIS
- ILD REQUIRING SLB AFTER MDTM
- SEQUENTIAL CRYOBX AND SLB
- N = 10
- CRYOBX DX YIELD 80%
- PATHOLOGIC AGREEMENT 20%

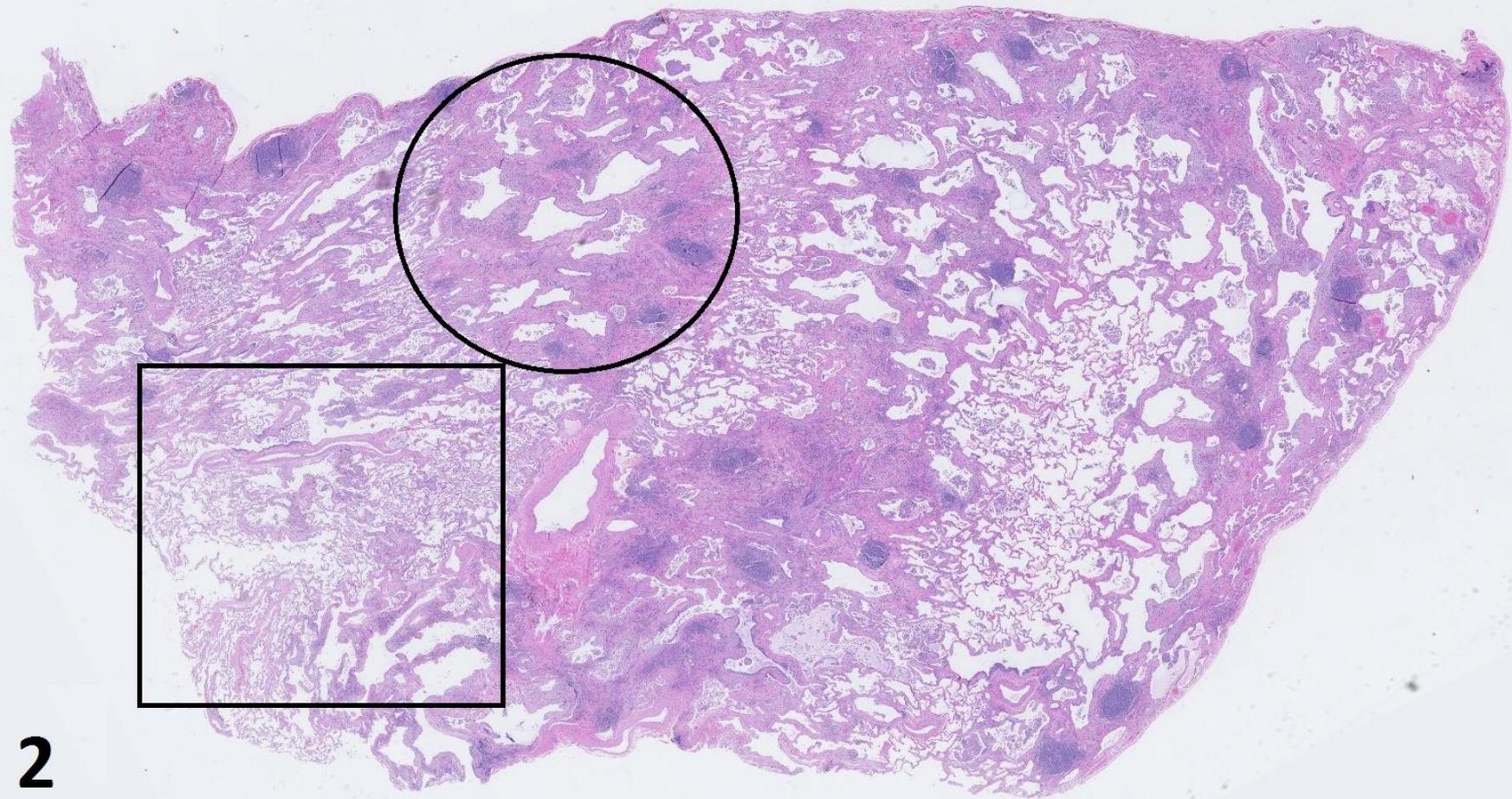
- RUEL, CHEST CONFERENCE 2017

# A DIAGNOSIS VS THE DIAGNOSIS

- NON-DEFINITE UIP ON HRCT
- SEQUENTIAL CRYOBX AND SLB
- N = 21, 2 CENTERS
- CRYOBX DX YIELD 81%
- PATHOLOGIC AGREEMENT 38%
- IF SLB NOT PERFORMED, DIFFERENT TREATMENT IN 52%



- ROMAGNOLI, AJRCCM IN PRESS



2

2.5 mm

# COMPLEXITY OF ILD

- ILD REQUIRING MDTM DISCUSSION
- N = 70
- REVIEWED IN 7 MTDMS
- INTER-MDTM AGREEMENT FOR N1 DX,  $\kappa = 0.5$ 
  - IPF  $\kappa = 0.70$
  - ILD CTD  $\kappa = 0.73$
  - NSIP  $\kappa = 0.42$
  - HP  $\kappa = 0.24$

- WALSH, LANCET RESP MED 2016

# READY FOR PRIMETIME? NO

- SAFE?
  - SAFER THAN SLB BUT I WOULD NOT SAY SAFE
  - EXPERIENCED OPERATOR, AT LEAST LMA, FLUOROSCOPY, BLOCKER/FOGARTY?
- USEFUL?
  - FURTHER DATA REQUIRED, SHOULD CERTAINLY NOT BE ROUTINE
  - MAY VARY FROM PATHOLOGY TO PATHOLOGY

