



AAPA 2026 **Annual Conference**

Here Comes the Sun:
Illuminating the Future of Pathology

September 13-17, 2026

Sheraton Phoenix Downtown • Phoenix, AZ

#AAPAfall26





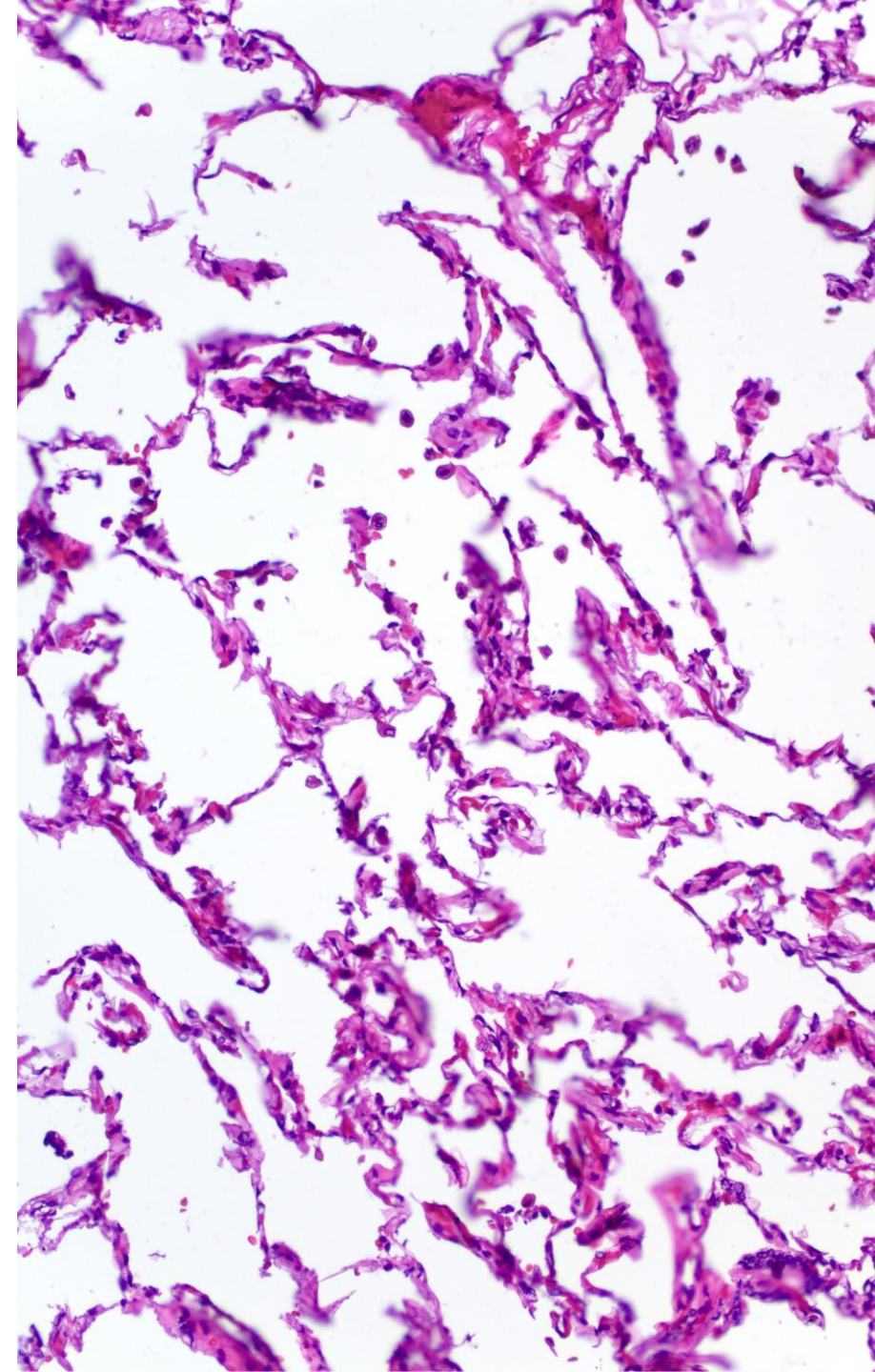
A BREATH OF FRESH AIR

HOW TO APPROACH LUNG SPECIMENS WITH EASE

Yasmeen M. Butt, MD

Associate Professor and Consultant
Mayo Clinic Arizona

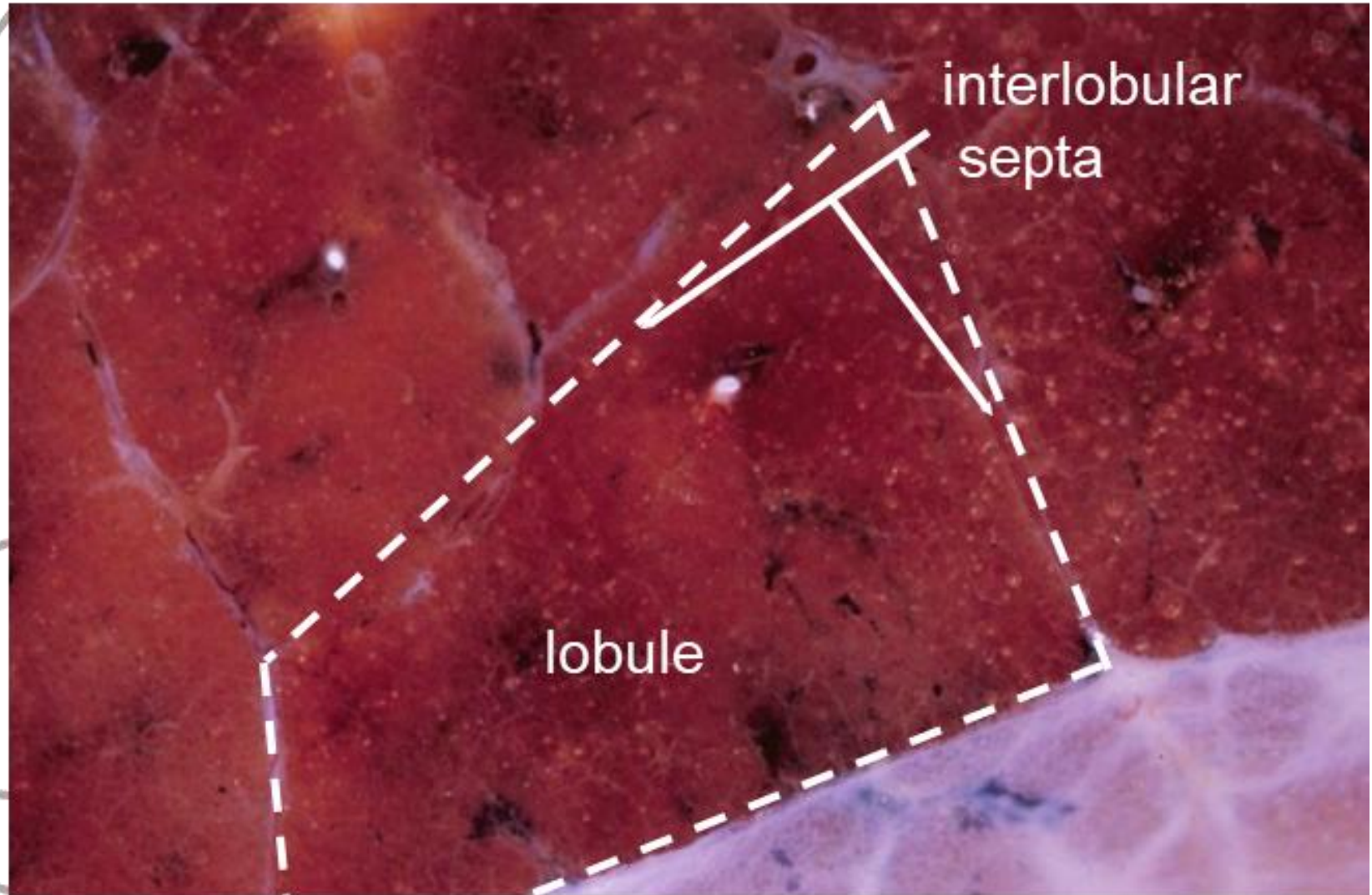
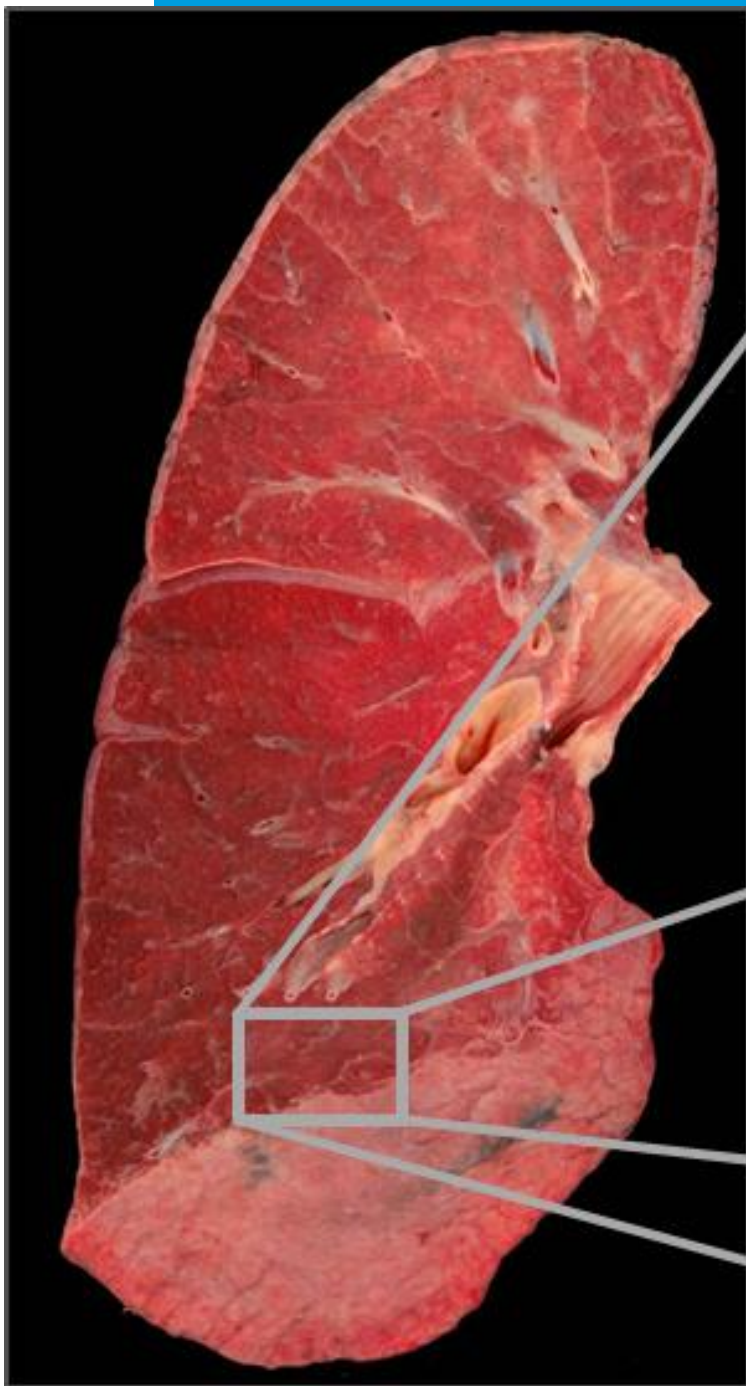
AAPA 2026 Annual Conference
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LEARNING OBJECTIVES

- Become familiar with the optimal way to handle different types of lung specimens.
- Learn the critical elements of the current CAP template for lung cancer as related to macroscopic examination of lung specimens.
- Become familiar with potential solutions to challenges in handling lung specimens, including during frozen section.

LUNG ANATOMY

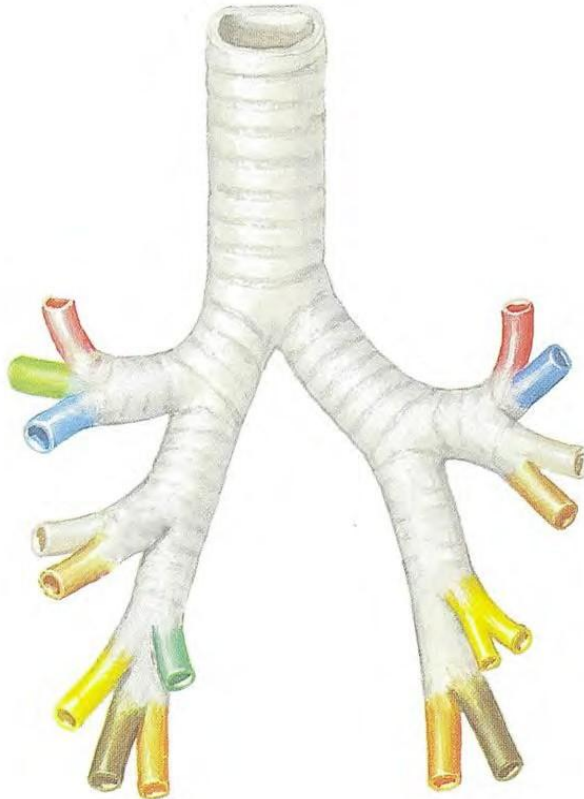




GROSS PULMONARY ANATOMY

BRONCHOPULMONARY SEGMENTS

- Tracheobronchial Tree (conduction system)



- Dichotomous Branching
 - R=10 seg; L=8-10 seg

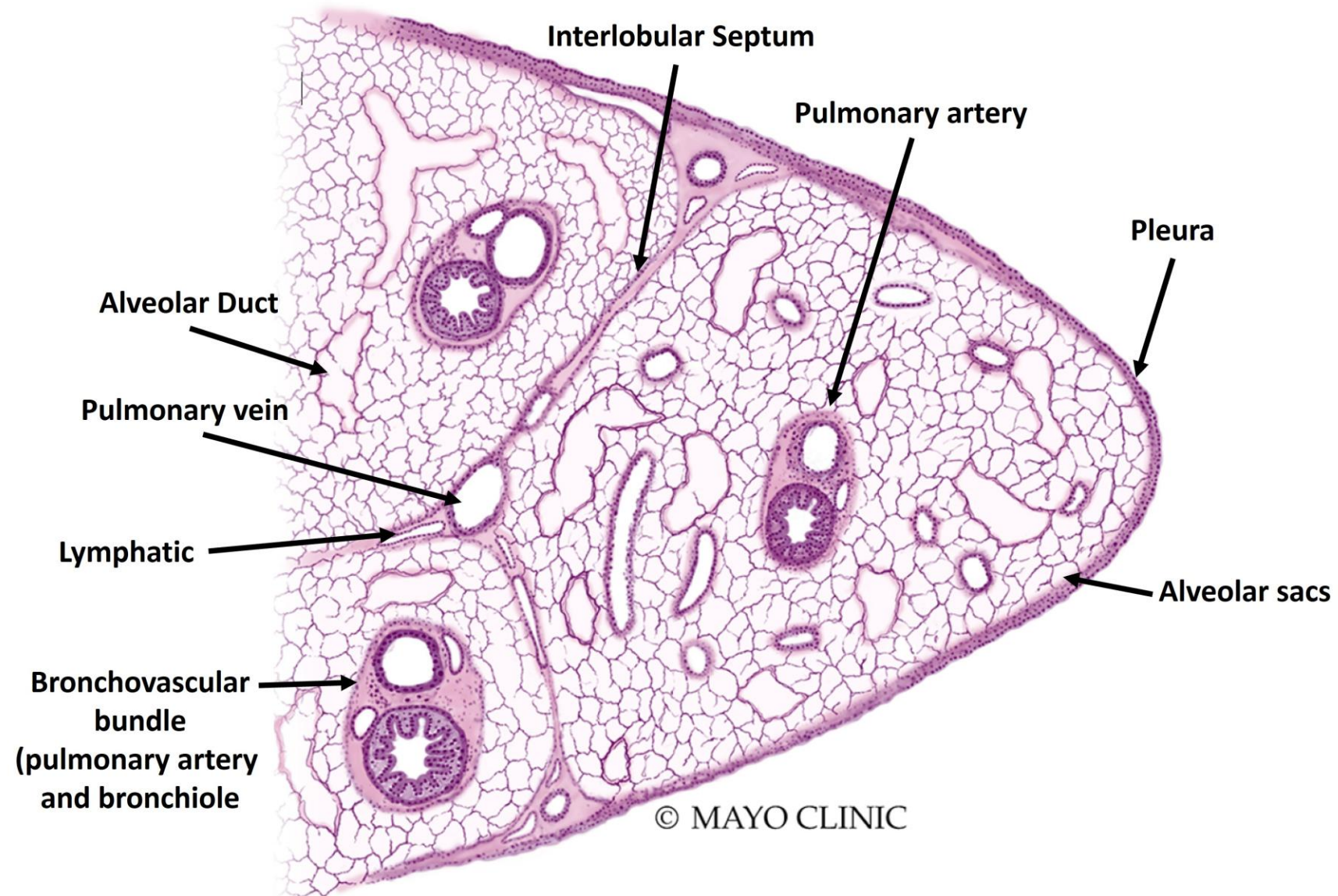
Bronchi

- > 1 mm in diam
- Cartilage
- Mainstem → lobar → segmental

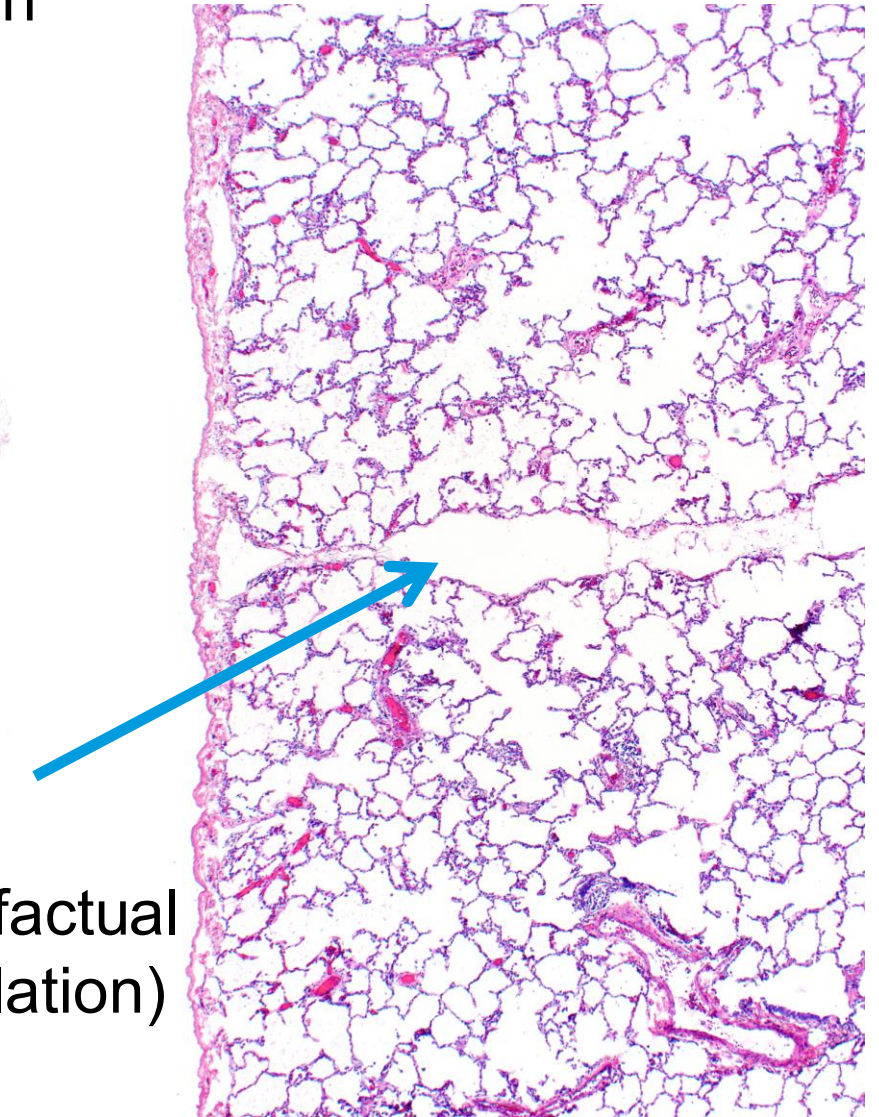
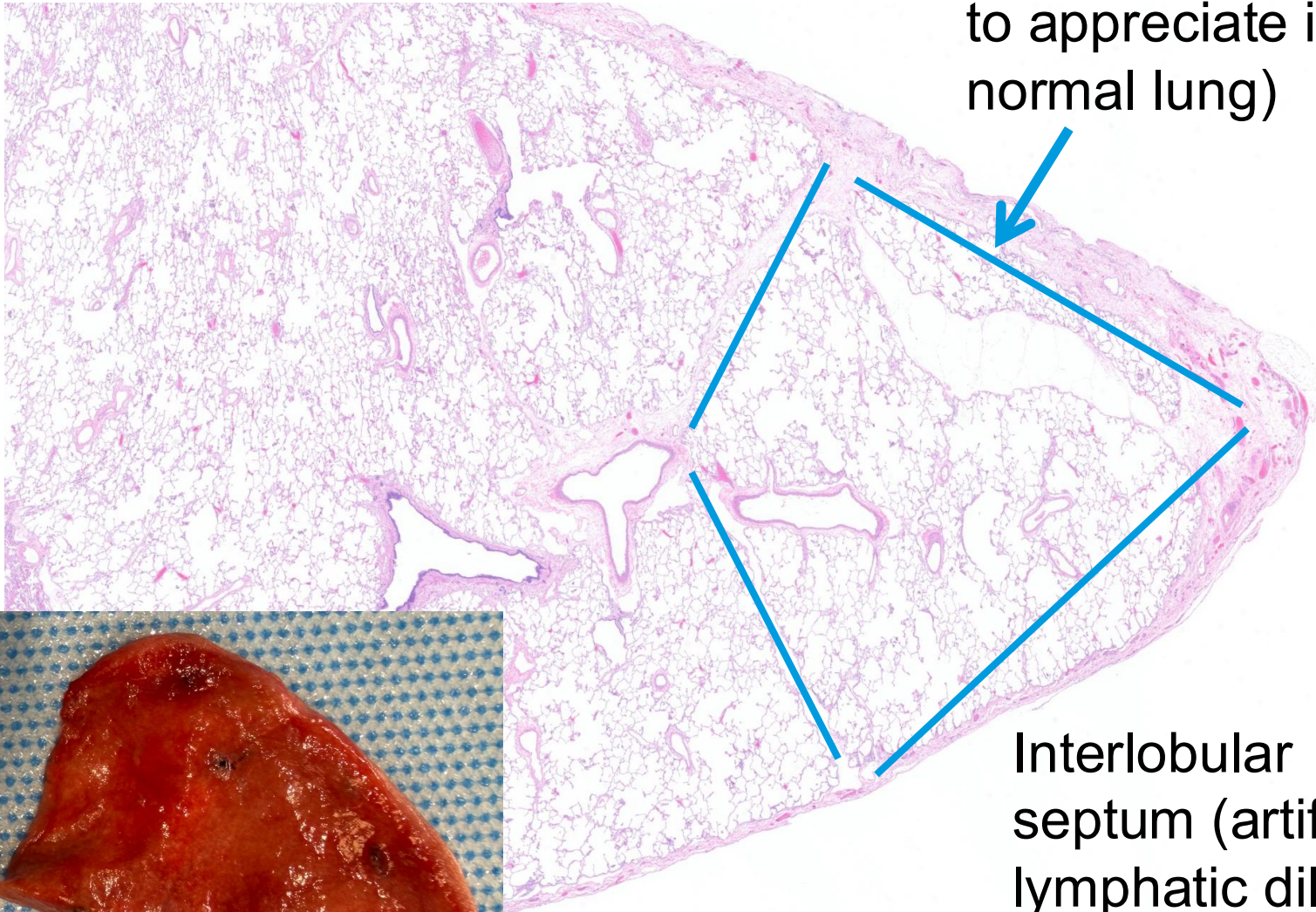
Bronchioles (conducting airways)

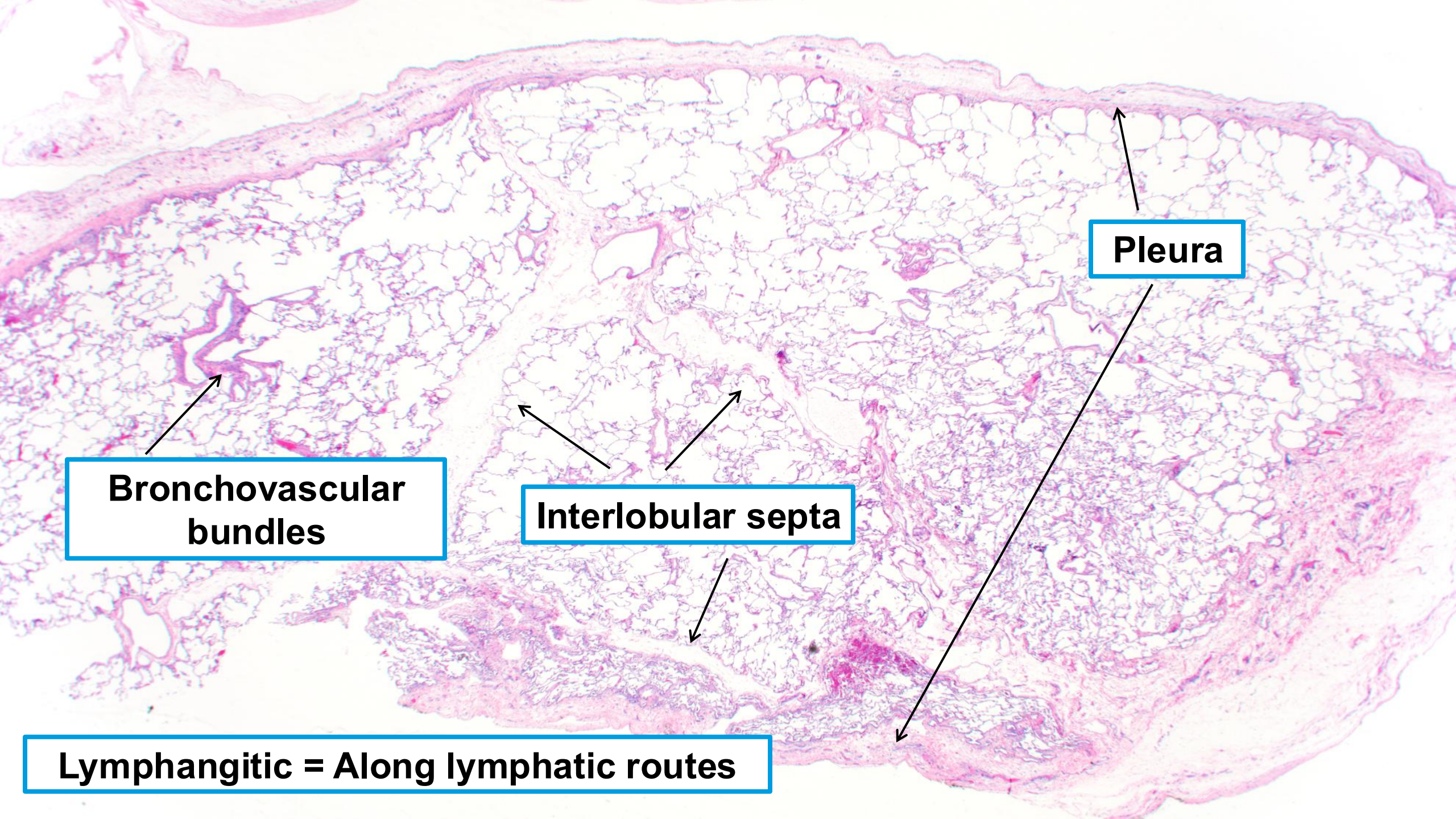
- < 1 mm in diam
- No cartilage
- Bronchioles → Terminal bronchioles → respiratory bronchioles

MICROSCOPIC PULMONARY ANATOMY – SCHEMATIC



MICROSCOPIC PULMONARY ANATOMY - LOBULE





Pleura

**Bronchovascular
bundles**

Interlobular septa

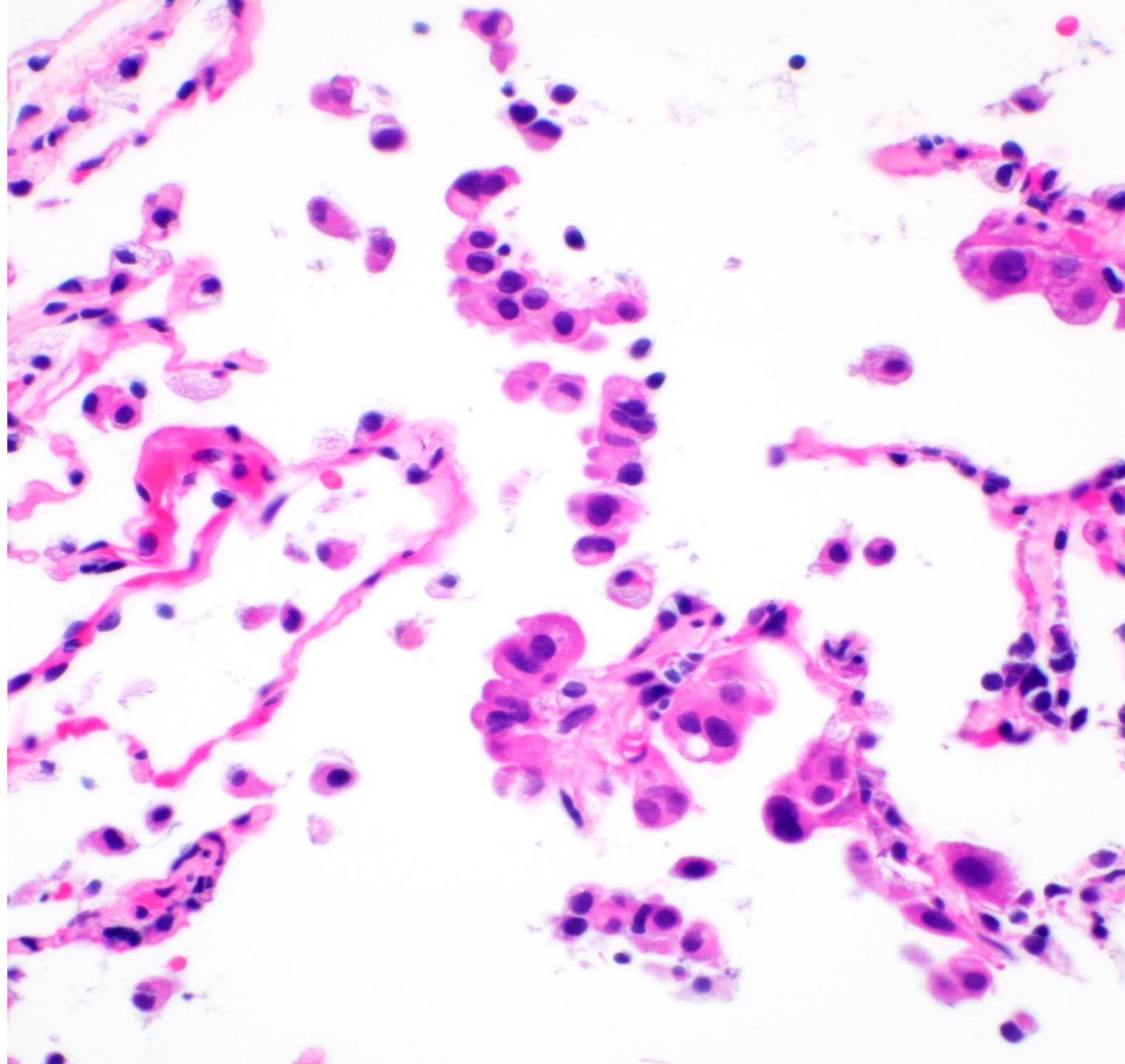
Lymphangitic = Along lymphatic routes

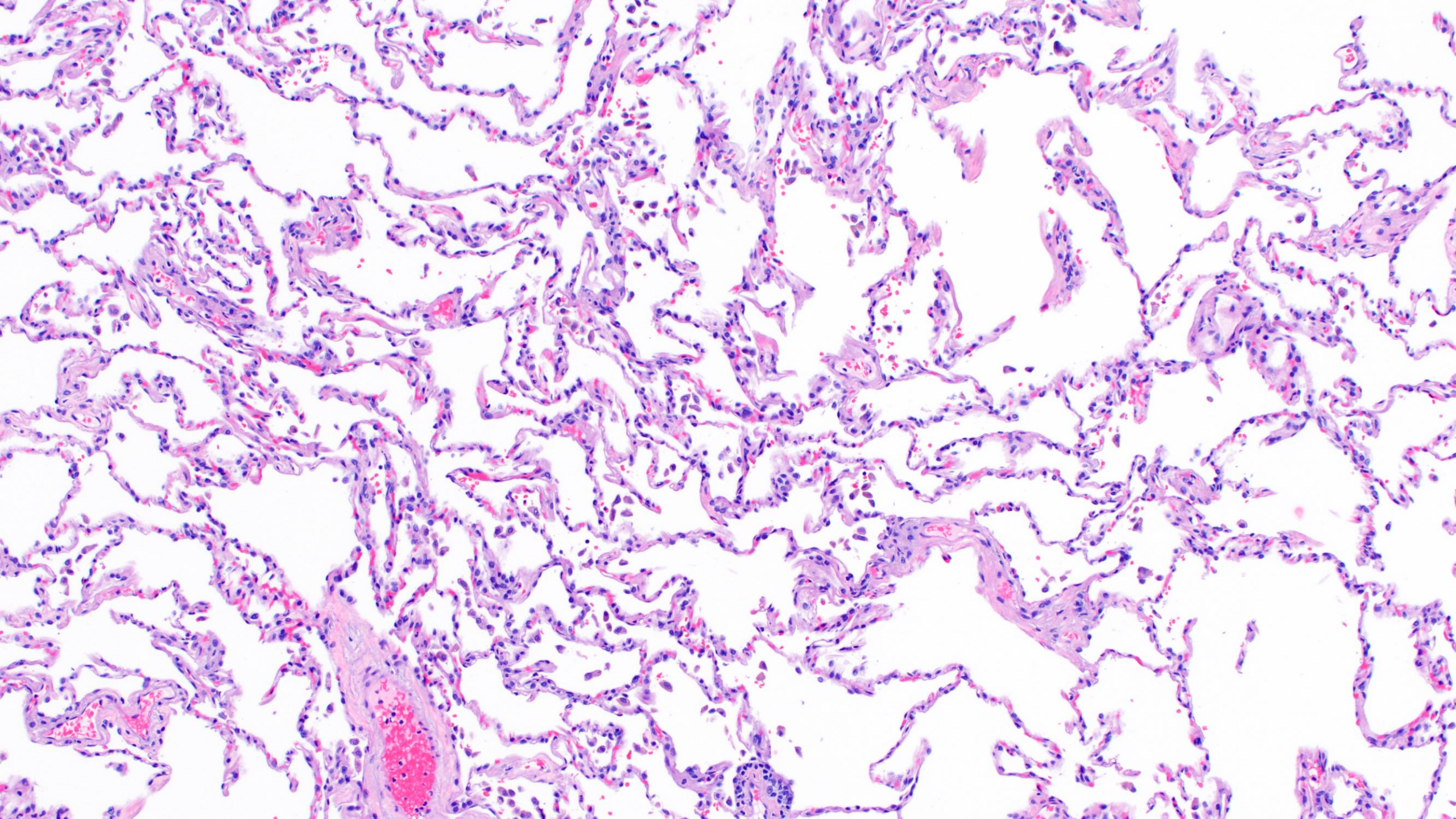
PULMONARY VASCULAR SYSTEMS : DUAL BLOOD SUPPLY

- Pulmonary Arteries
 - Originate from right heart (entirety of blood volume from right ventricle – deoxygenated)
 - Elastic (proximal vessels) and muscular types
 - Deliver blood to the capillary beds in alveolar septa for respiration
- Bronchial Arteries
 - Originate from left heart (aorta)
 - Supply airways and blood vessels themselves with oxygenated blood
 - Muscular type

LUNG CHALLENGES

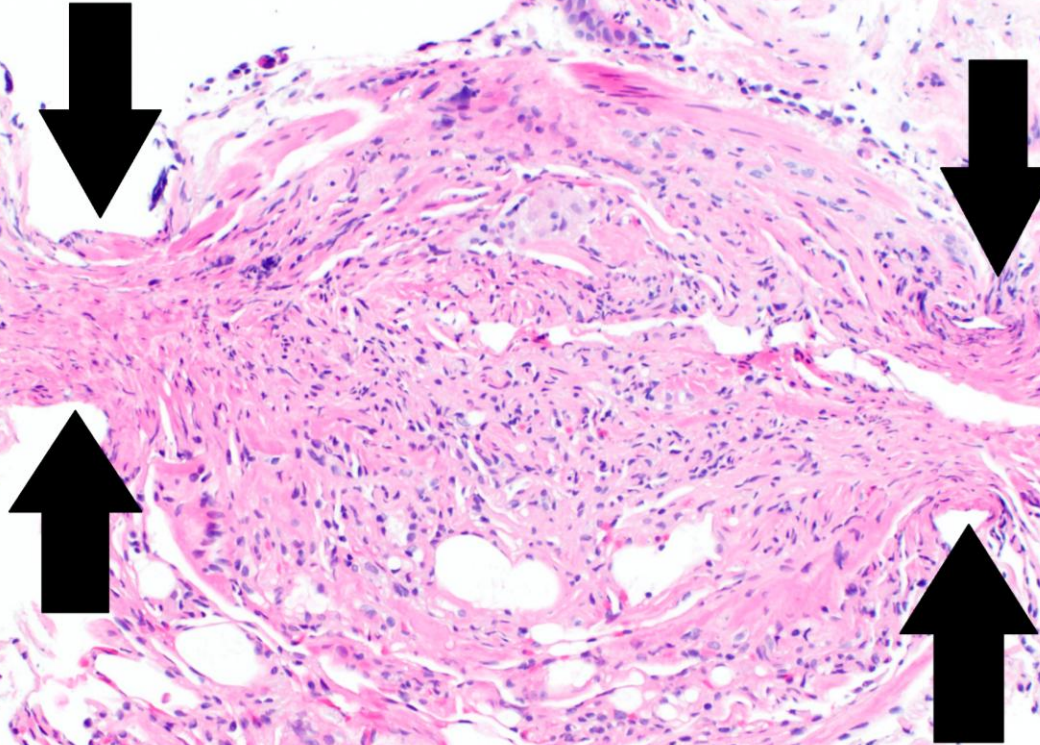
- It's a sponge that collapses
- It's filled with blood
- 'Ground glass' lesions can be challenging to identify on fresh specimens

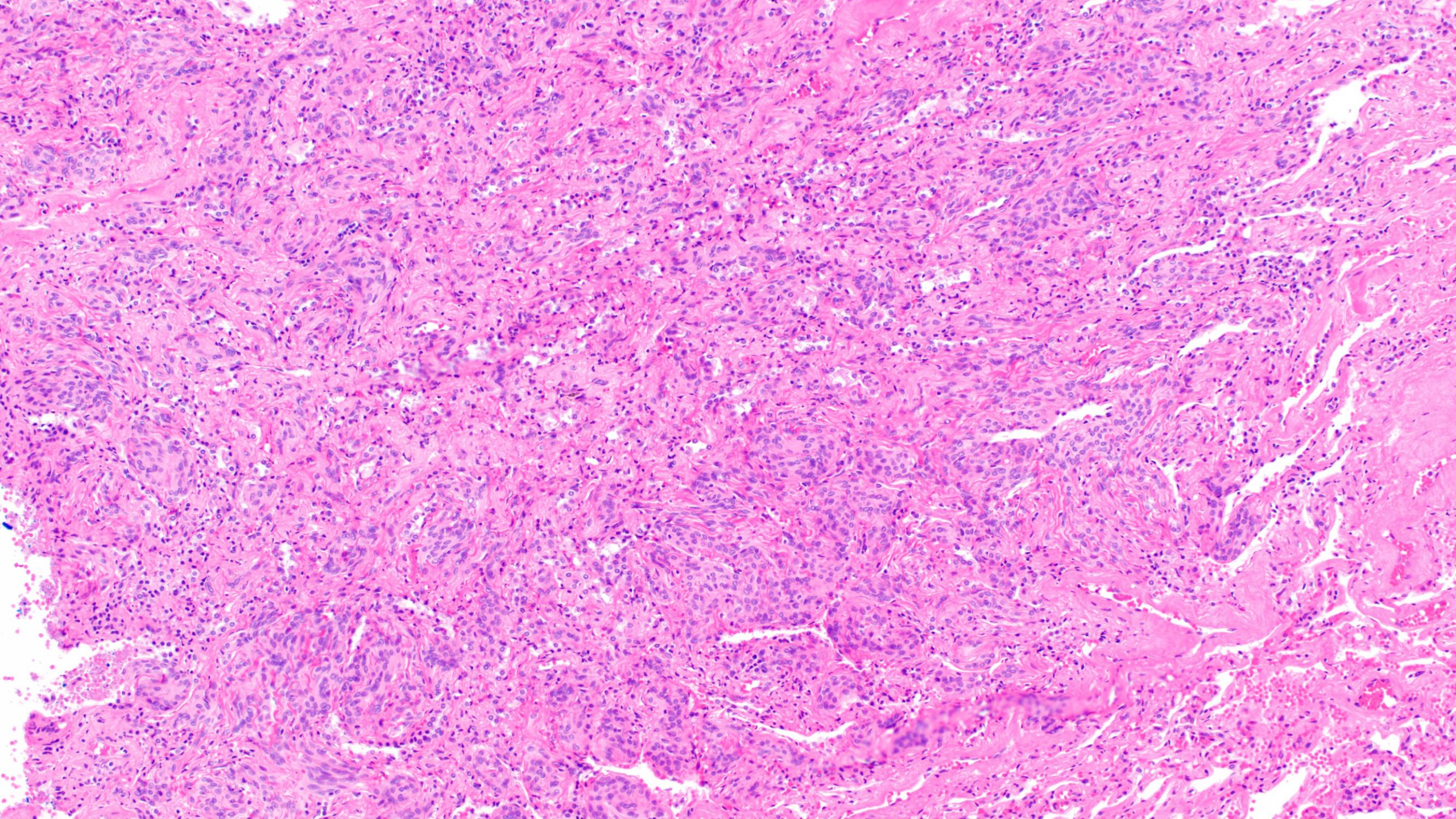




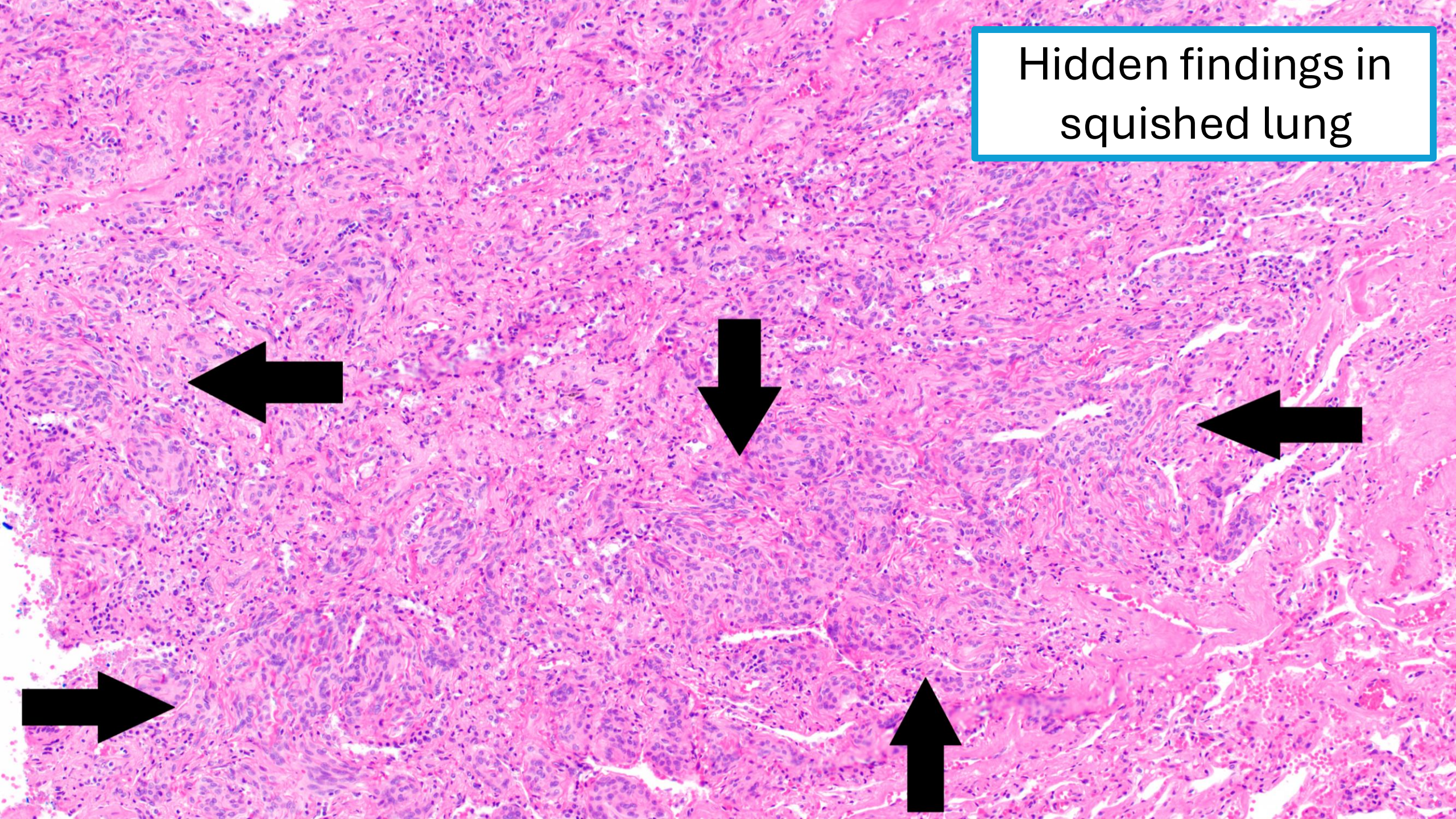
Forceps pinch points

Transbronchial
Biopsy





Hidden findings in
squished lung



LUNG SPECIMENS

- Biopsies
 - Transbronchial biopsies
 - Endobronchial biopsies
 - Cryobiopsies
- Wedge resections
 - Neoplastic
 - Non-neoplastic
- Segmentectomy
- Lobectomy
- Pneumonectomy
 - Explants
 - Rare proximal tumors
- Pleura
 - Cut into strips (not flat into cassettes)

Clinical
History

Radiology

FIXATION – BASIC GUIDELINES

- Non-neoplastic wedges
 - Remove staple line and shake it in formalin!
 - Don't let these float stapled in formalin
- Neoplastic wedges/segmentectomies
 - Leave staple line on, cut towards it, breadloaf and fix
- Lobectomies
 - Remove bronchovascular and any parenchymal margins, breadloaf and fix

Do not inject formalin into a lung that is still stapled – can damage tissue and cause artifact

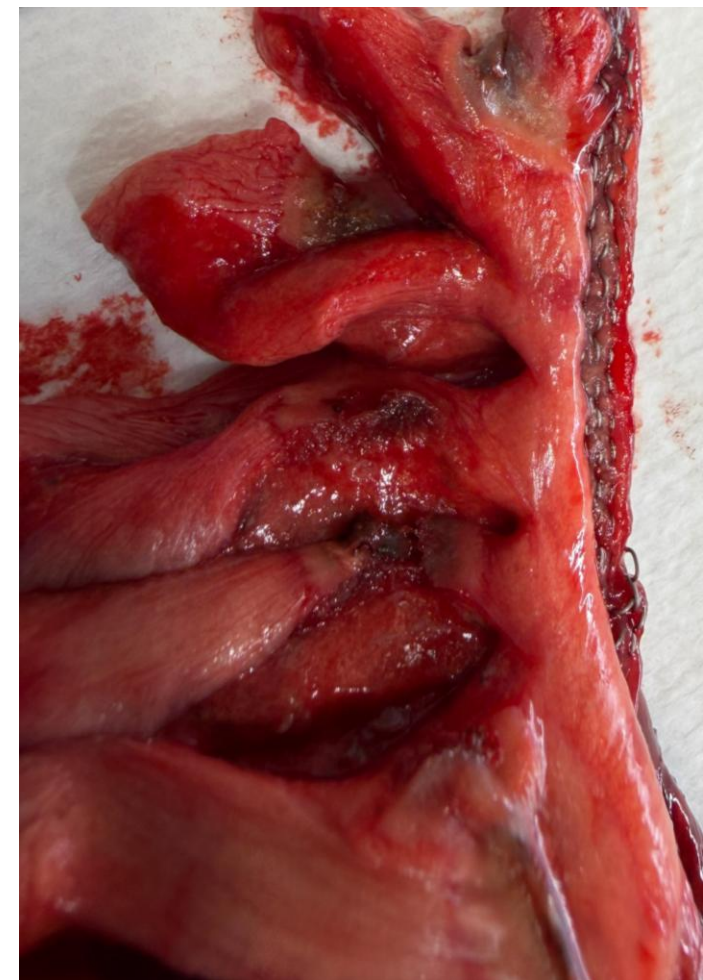
FIXATION – BASIC GUIDELINES

- Pneumonectomies
 - Tumor
 - Remove bronchovascular margins
 - Breadloaf and fix
 - Explant
 - Remove bronchovascular margins
 - Fibrotic lung: coronal sections
 - Non-fibrotic lung: can inject formalin through bronchi



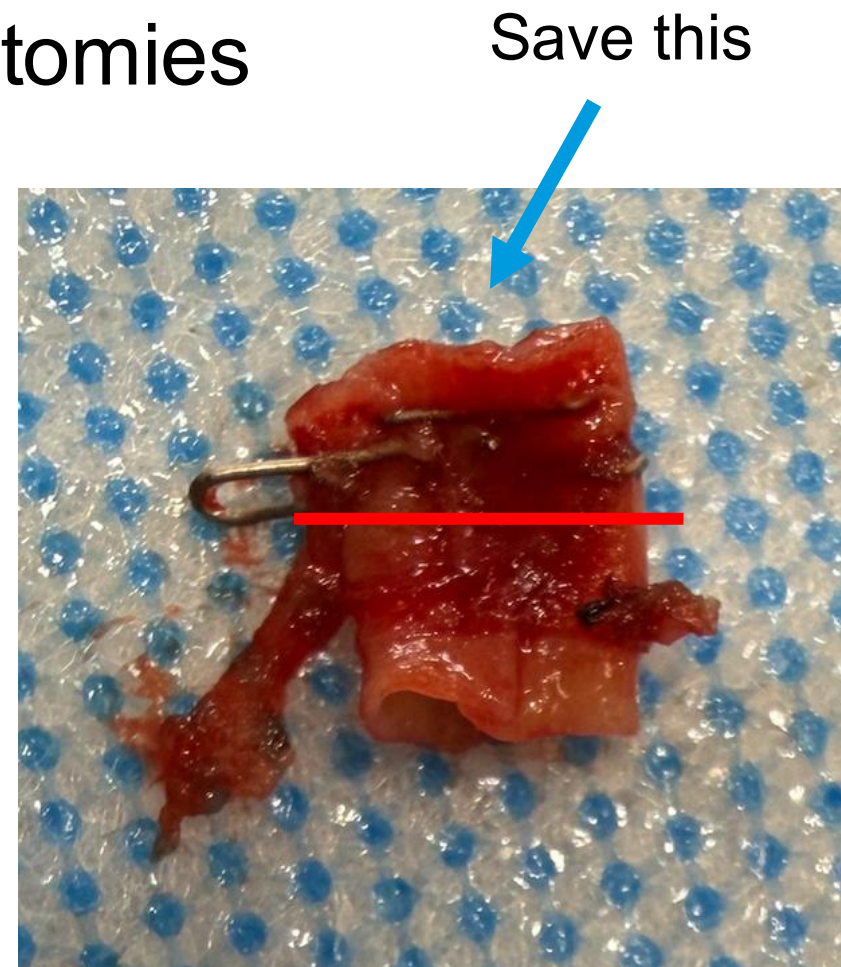
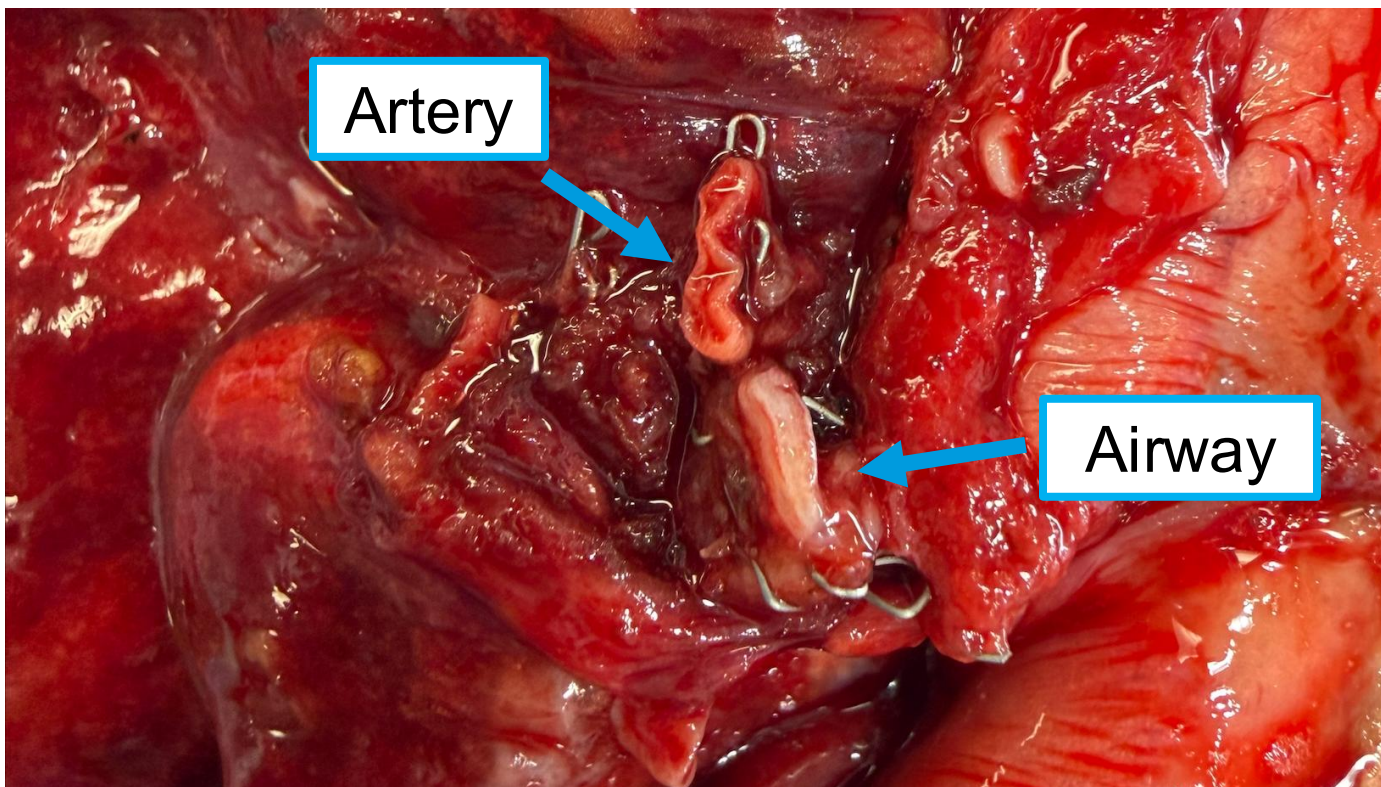
BASIC GUIDELINES

- Neoplastic wedges/segmentectomies



BASIC GUIDELINES

- Neoplastic segmentectomies/lobectomies

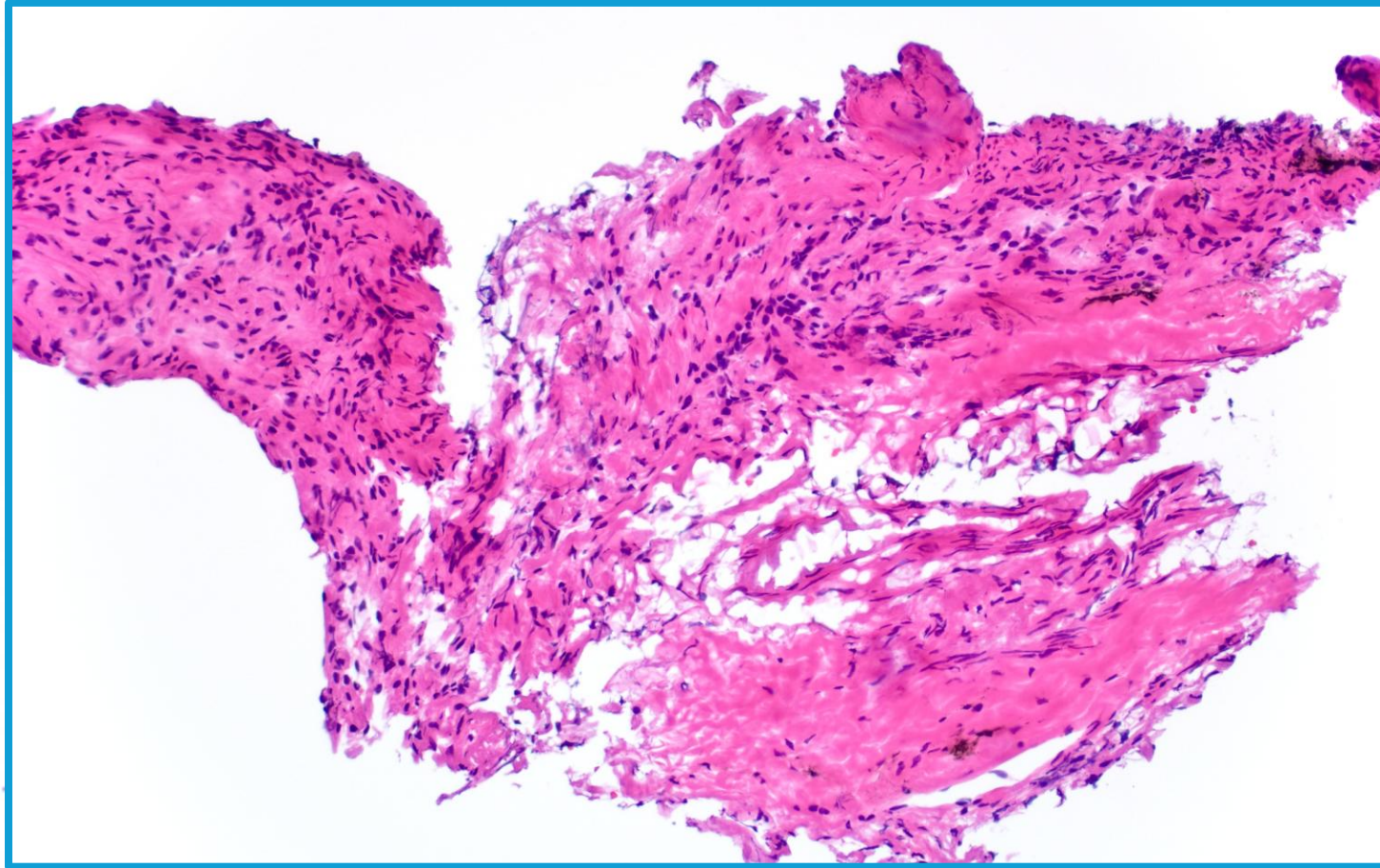


CAN YOU FREEZE THE STAPLE LINE?



- Trim above the staples
- Pull staples

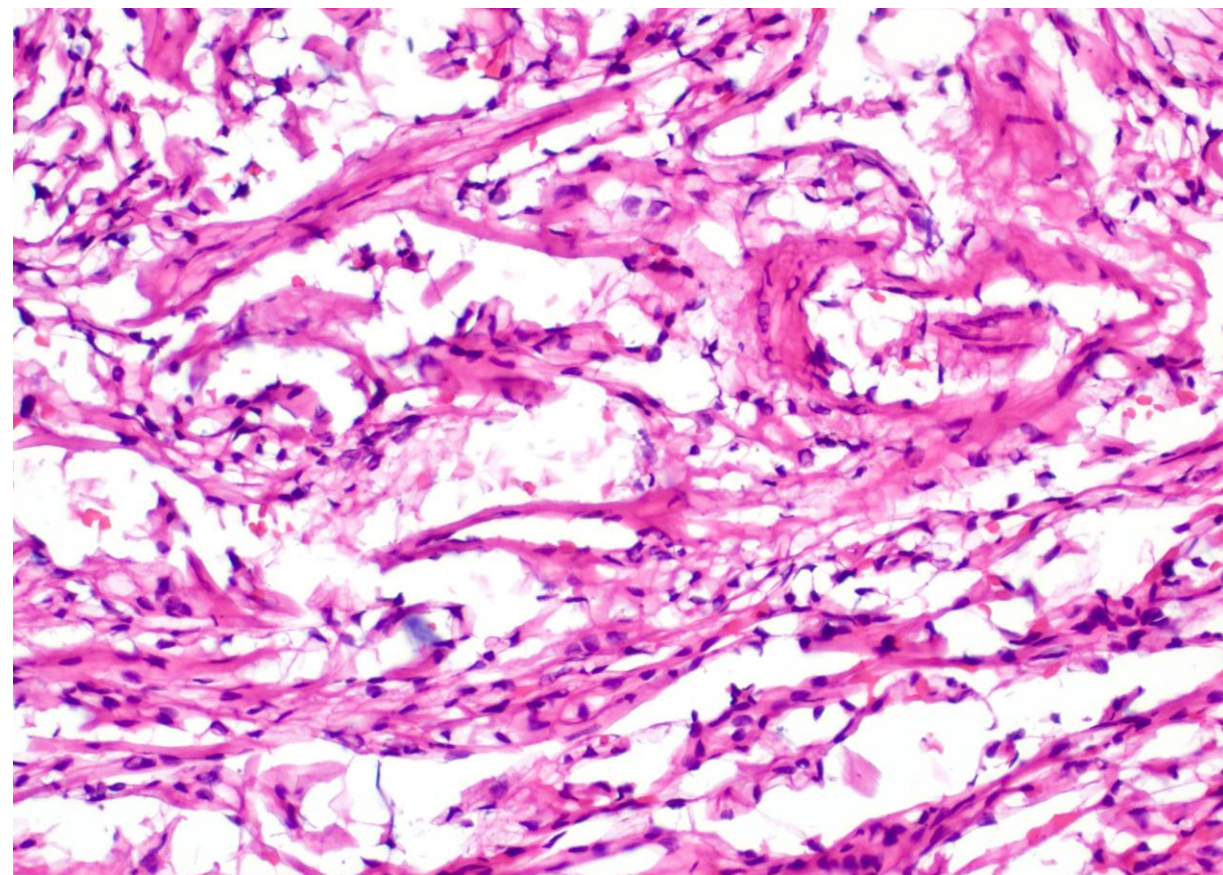
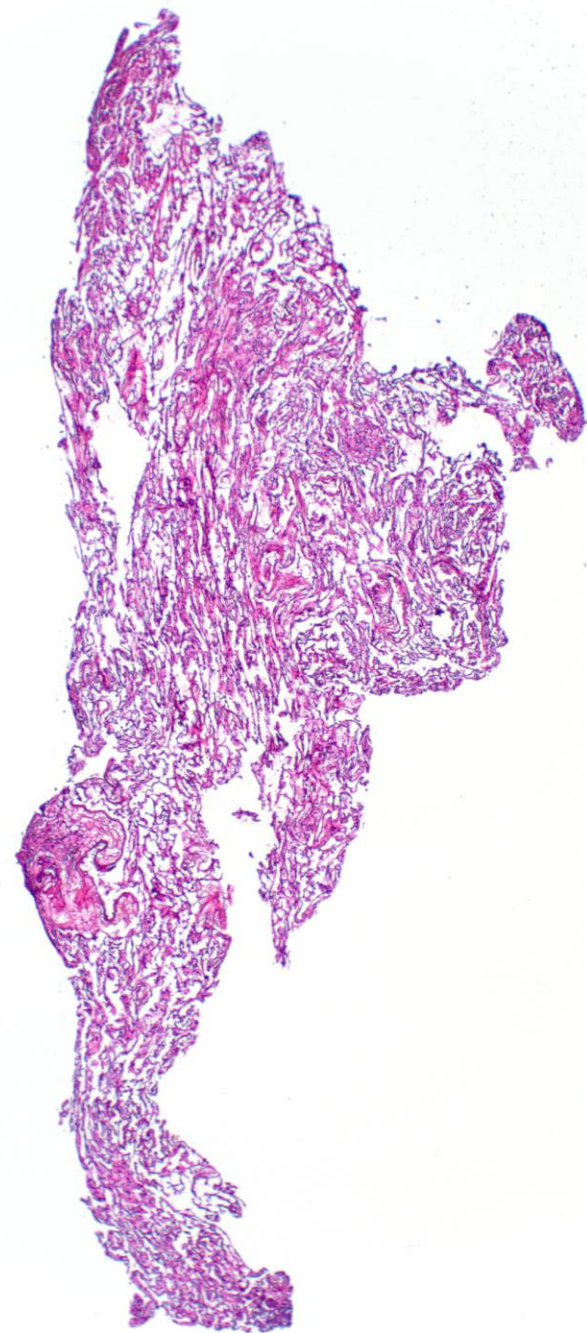
Standard shaved staple line specimen
(crushed, challenging to read)



How to help??

(GENTLY) SWISH/SHAKE

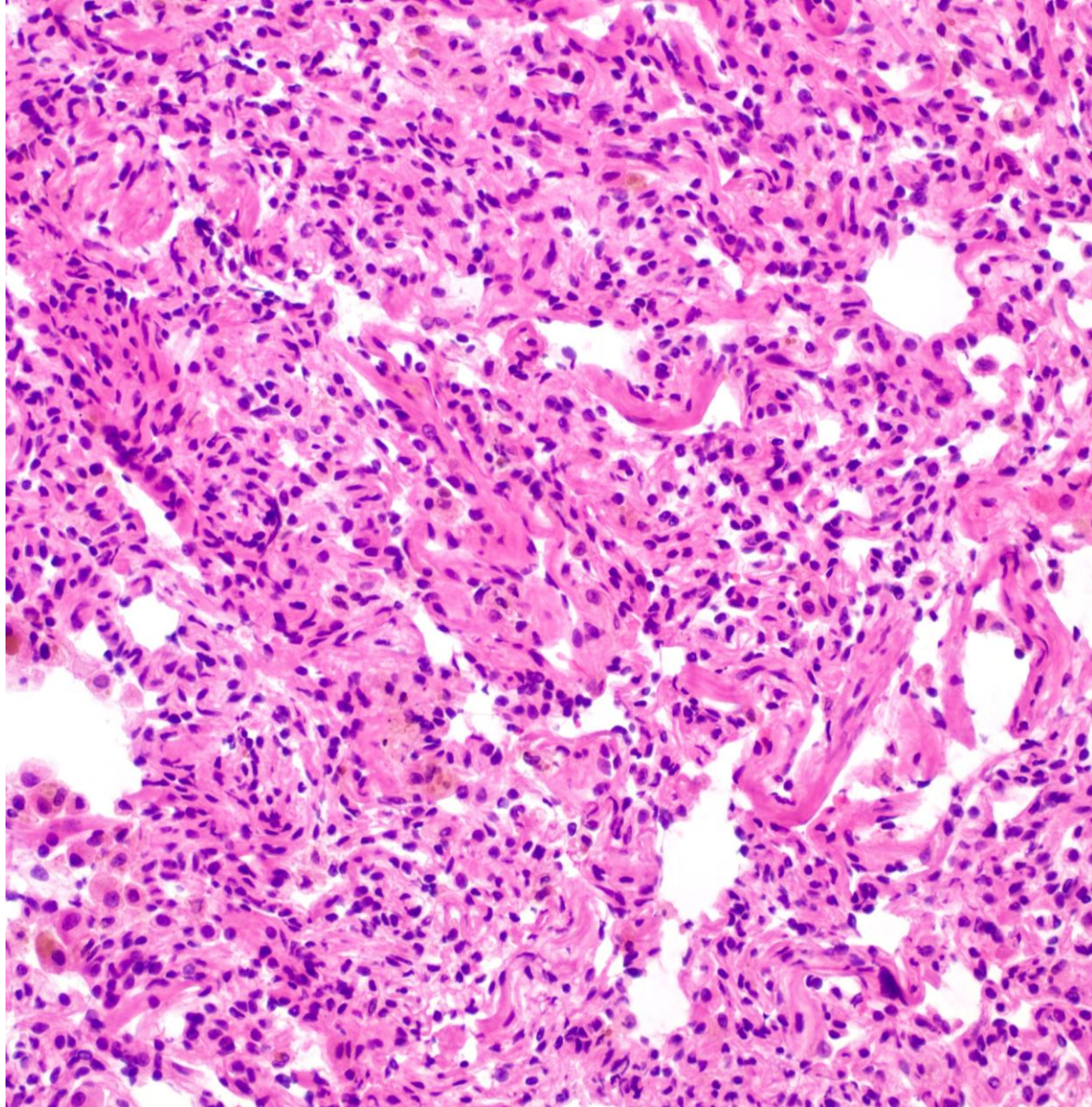




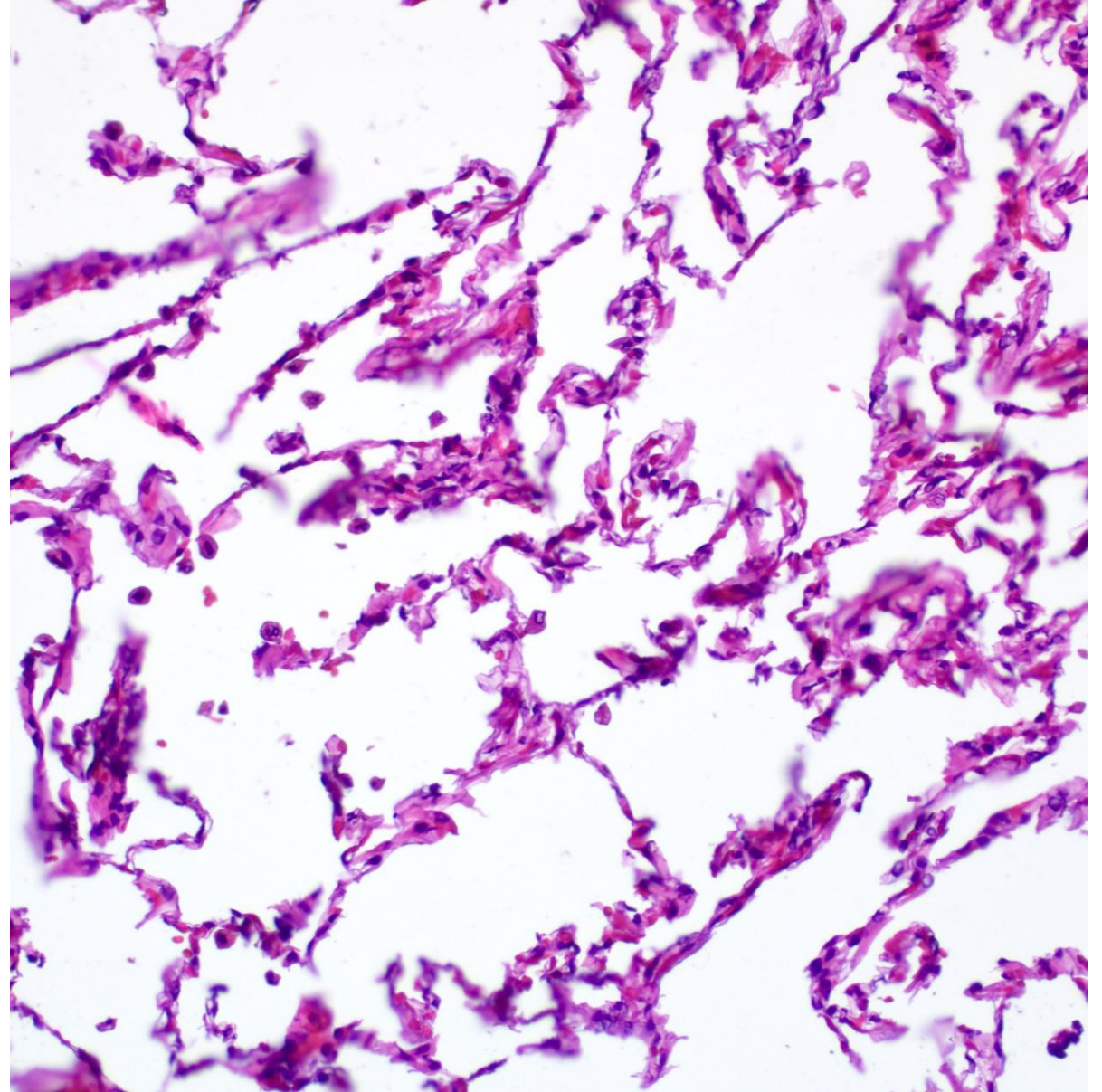
**CAN ALSO BE HELPFUL TO
IDENTIFY GROUND GLASS
LESIONS**



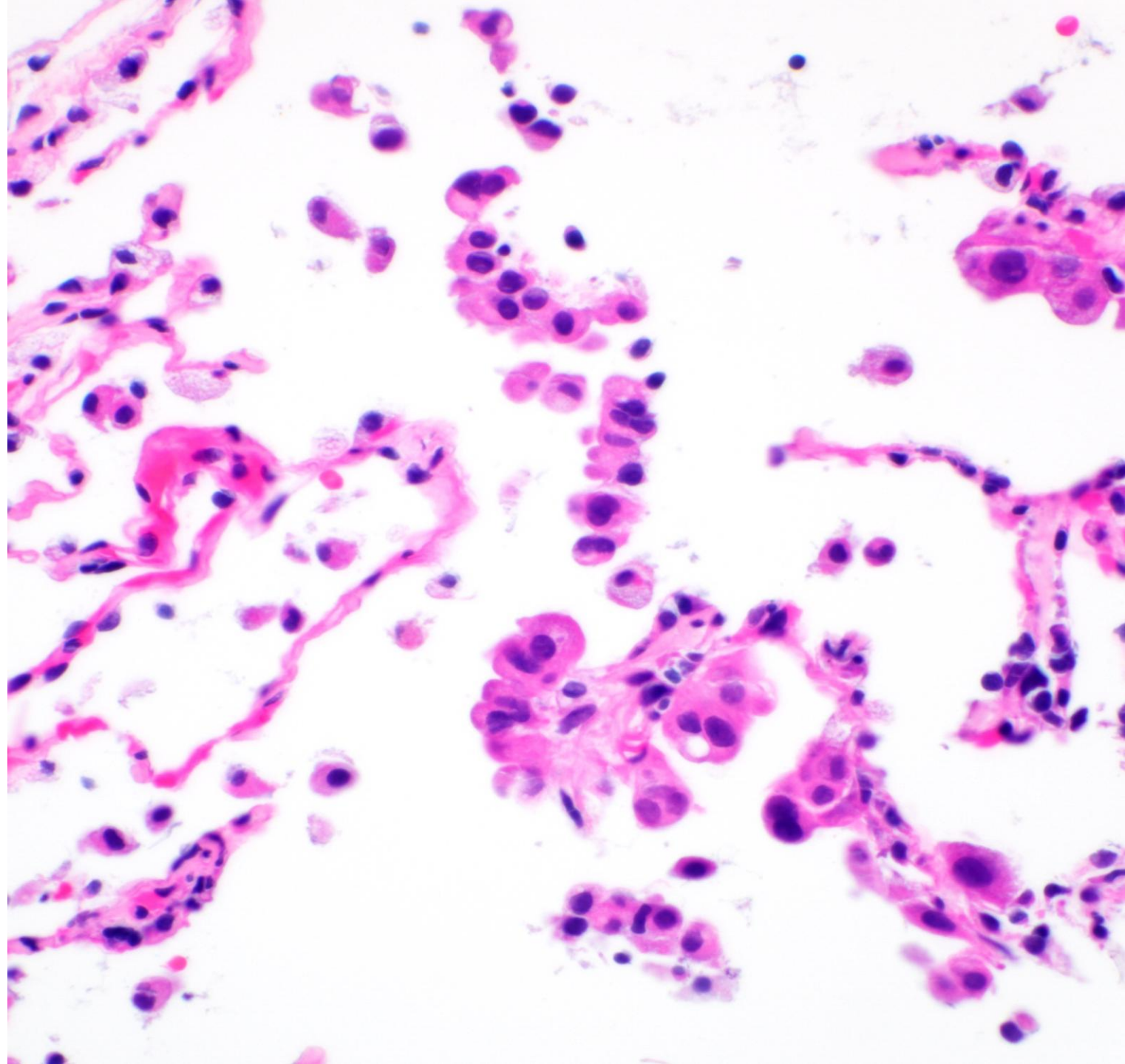
NOT SHAKEN



SHAKEN



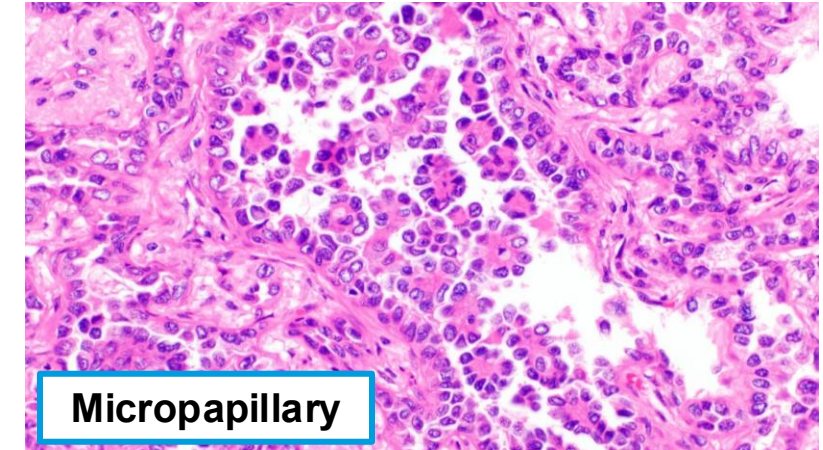
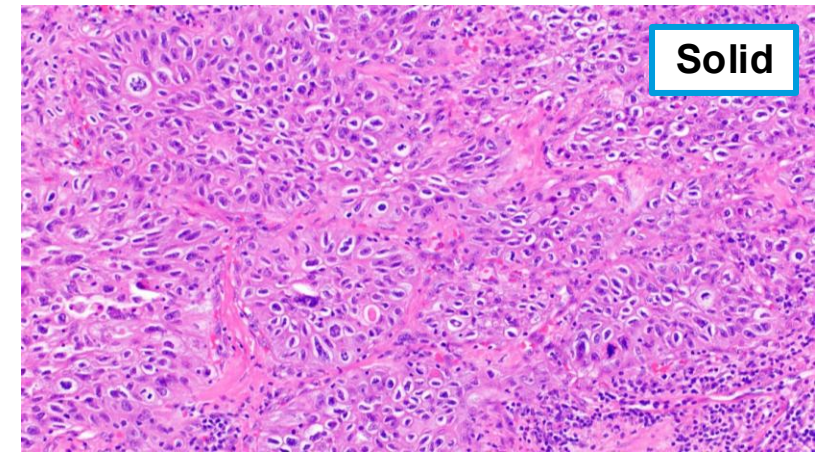
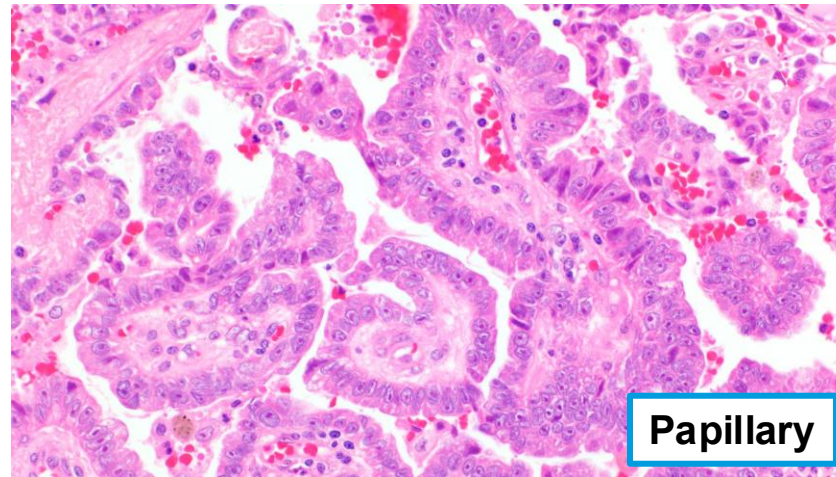
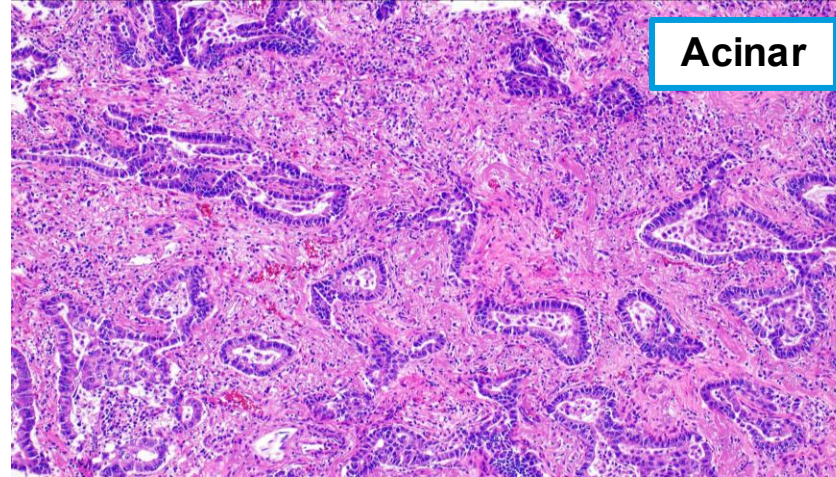
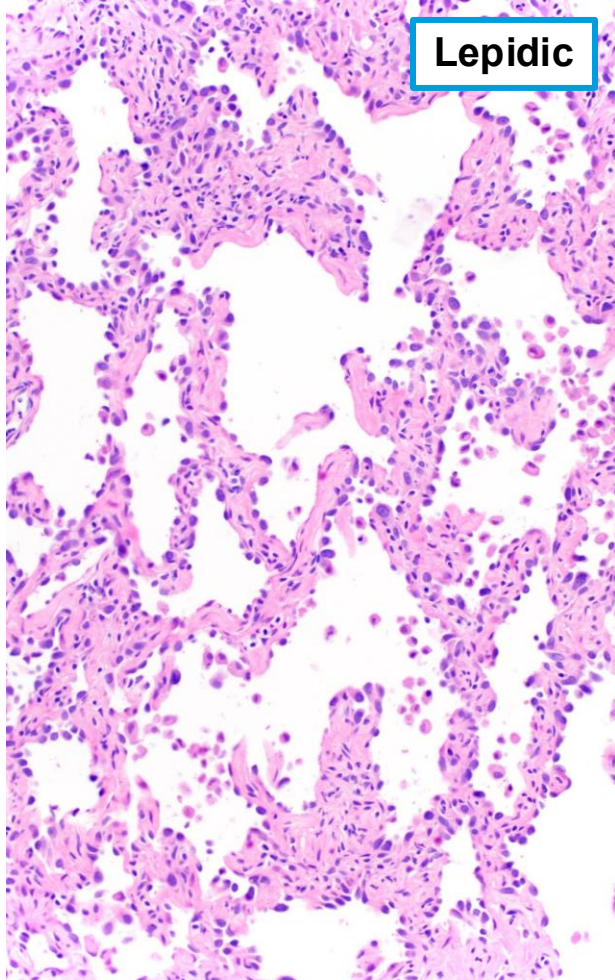
- Gives a chance to find subtle carcinomas with a degree of confidence



CAP TEMPLATE – IMPORTANT ELEMENTS FOR GROSSING

- Size, size, size
 - → pT staging in the lung is based on (invasive) tumor size
 - Know what the imaging says
 - Measure carefully yourself
 - When in doubt, photograph/share, block out area

HISTOLOGIC SUBTYPES



- Lepidic and micropapillary = ground glass
- All other patterns = solid appearing

PITFALLS IN MEASURING TUMOR SIZE

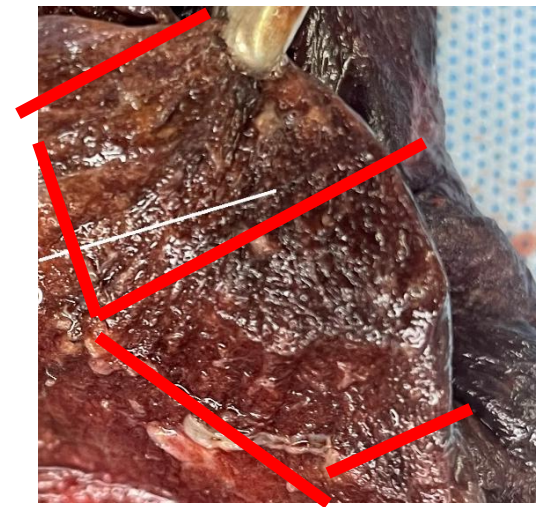
- Non-invasive lung carcinoma = lepidic pattern = ground glass = difficult to see (especially in fresh specimens)!
- Fixation is VERY helpful (even briefly)



How to
cut this?



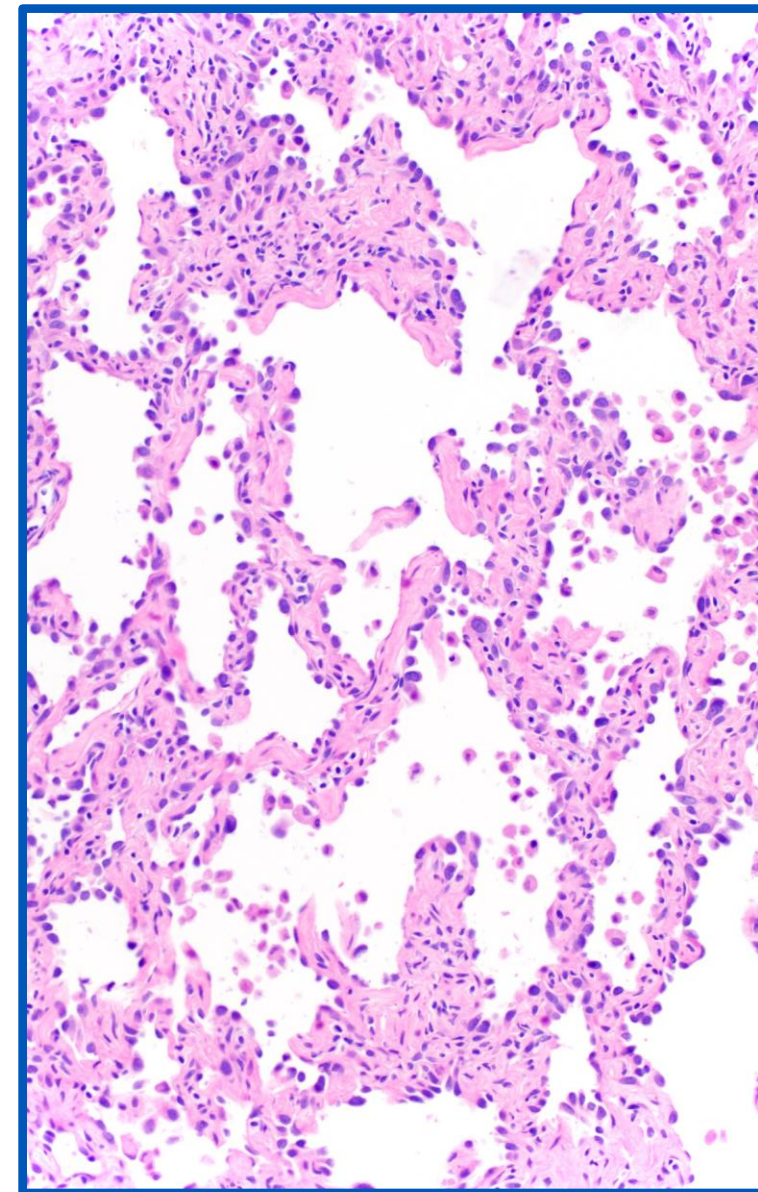
Trim it, will
fit in 1 block

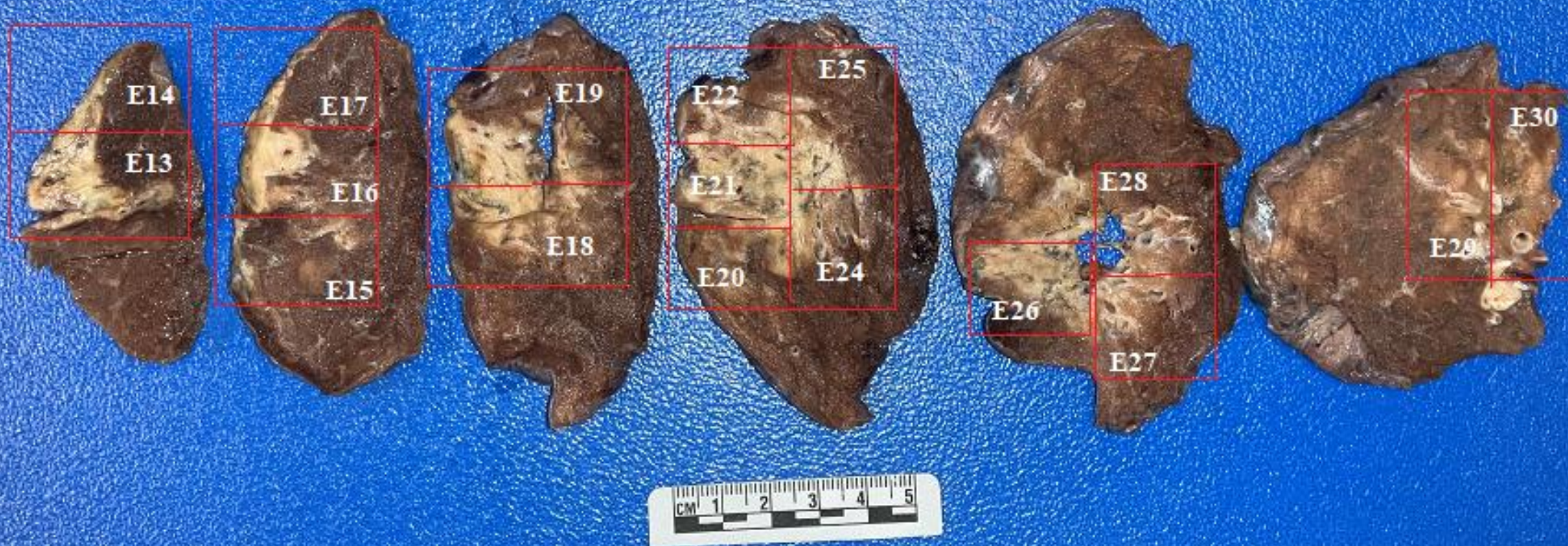


2 blocks with
at least a few
mm around
the edges

HOW MUCH OF A TUMOR TO PUT IN?

- For larger tumors >3 cm, at least one full face (potentially mapped) and representative from any areas that look different
- For smaller tumors <3 cm, consider submitting entirely
- Ground glass lesions, submit entirely
 - Adenocarcinoma in situ (AIS)
 - Pure lepidic less ≤ 3.0 cm
 - Minimally invasive adenocarcinoma (MIA)
 - Lepidic predominant ≤ 0.5 mm of invasion (any pattern other than lepidic)
- For post-treatment cases, map and submit entirely





Mapping helpful in
post-treatment cases

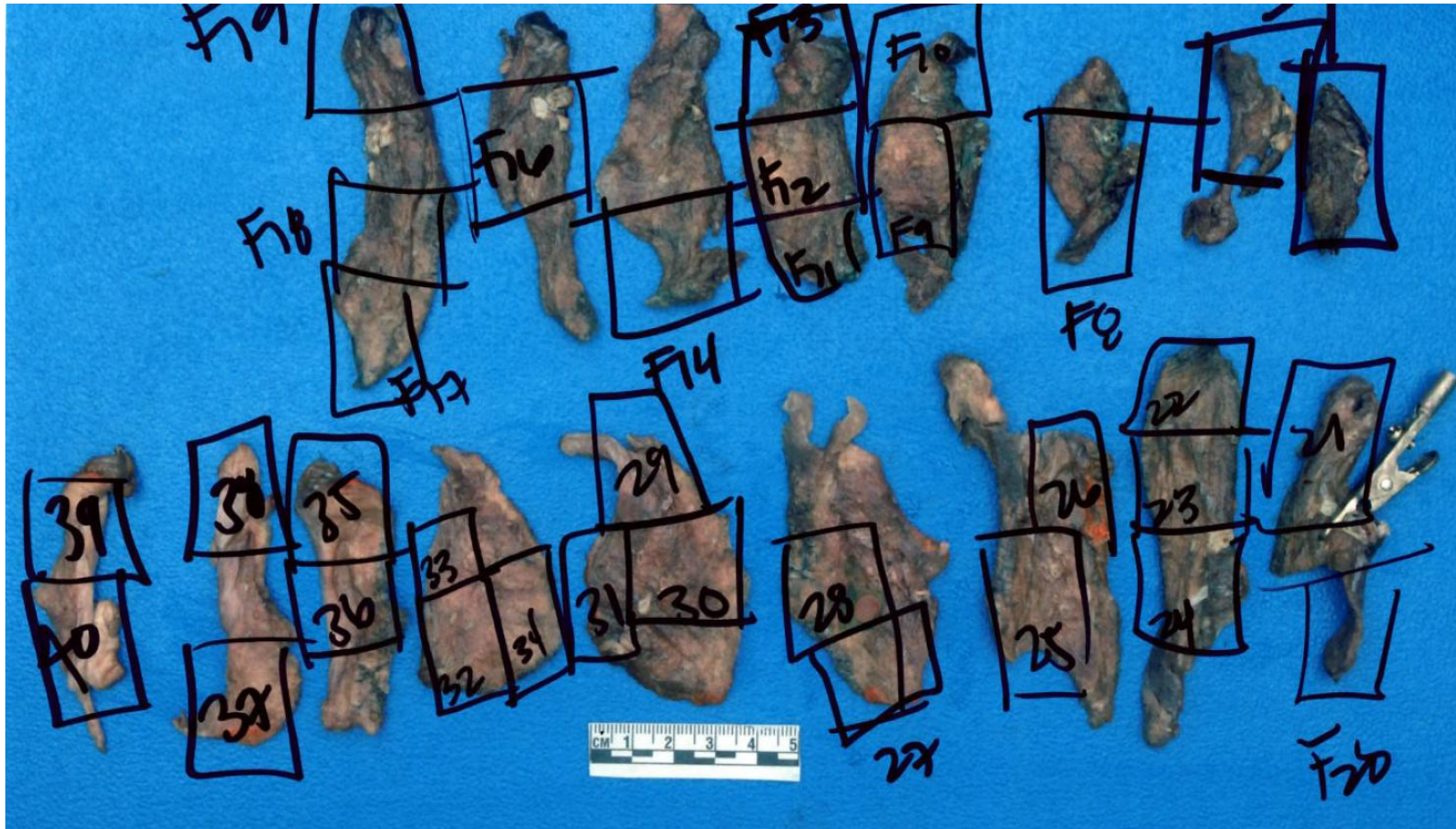
IMPORTANCE OF RADIOLOGY

- What are they looking for?
- Lobectomy
 - 4.5 cm mass identified (very obvious!)
 - Report signed out, oncologist gives a call
 - Turns out there was a 0.9 cm ground glass lesions elsewhere in the lobe that wasn't appreciated grossly
 - Amended report (unhappy everyone)



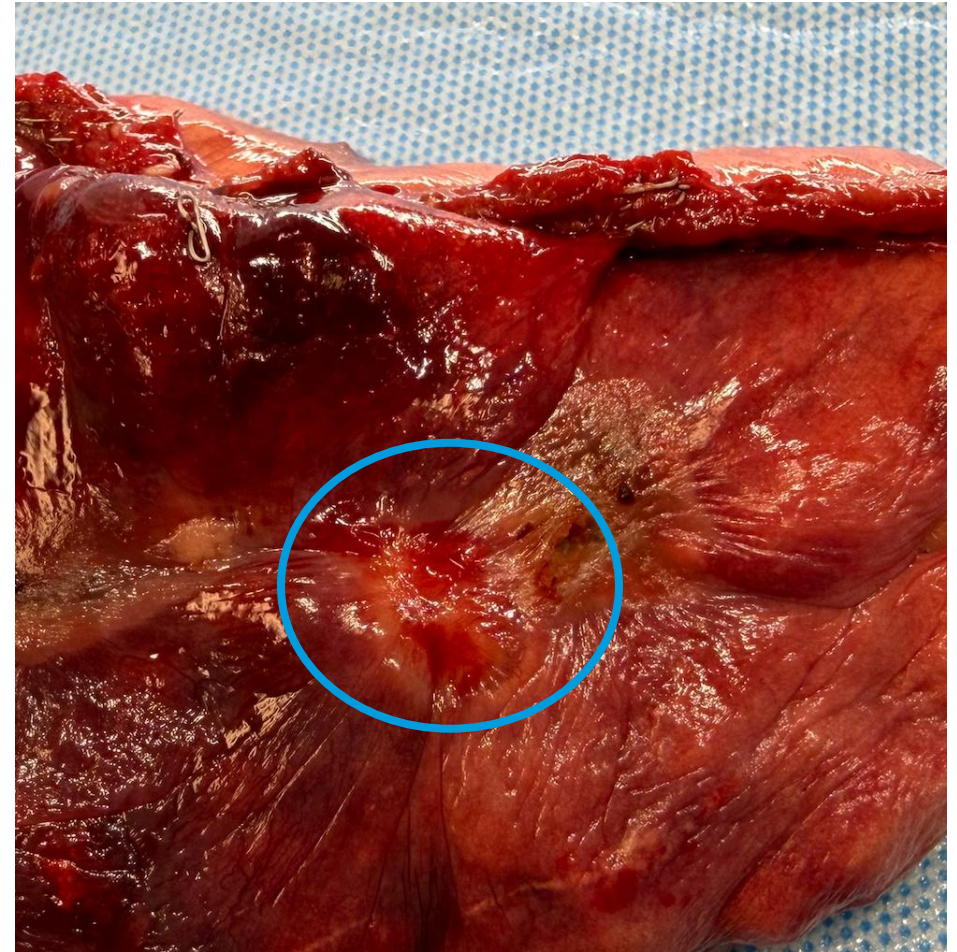
IMPORTANCE OF RADIOLOGY

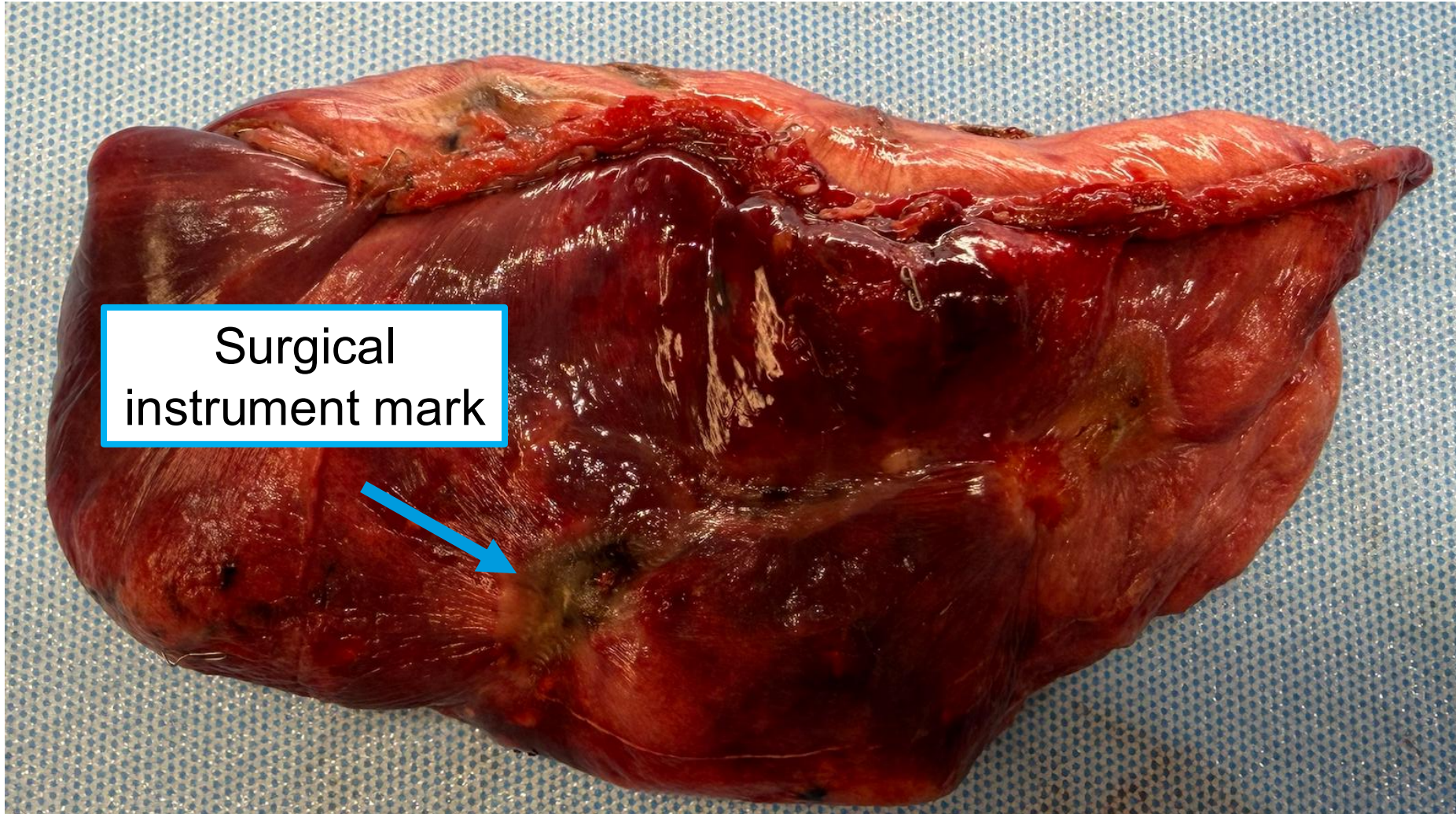
- Also helpful to know where to look when specimen is intact to avoid this...



CAP TEMPLATE – IMPORTANT ELEMENTS FOR GROSSING

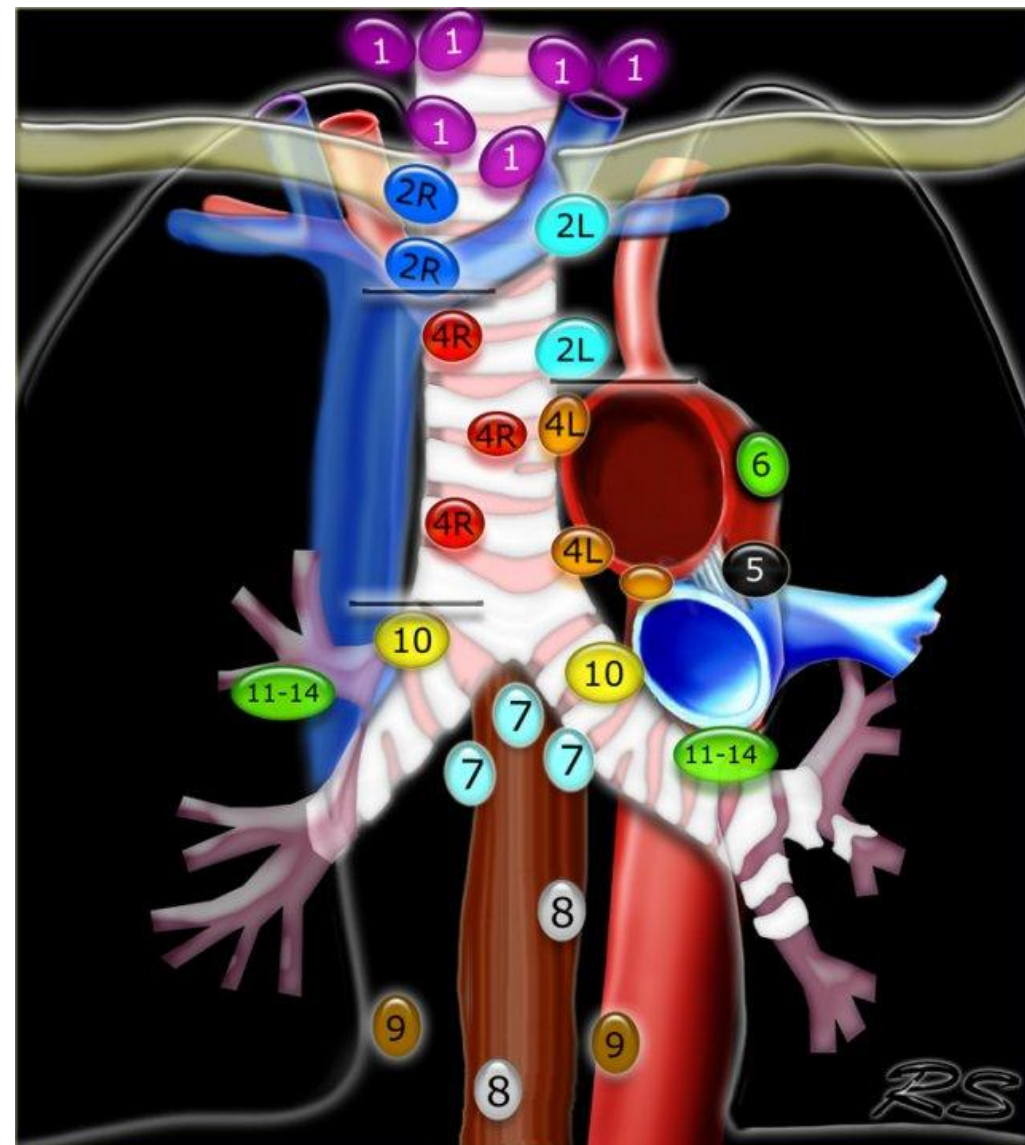
- Visceral pleural involvement
 - In a tumor staged as pT1 based on size (≤ 3 cm), if present will upstage to pT2a
- Sample well in puckered areas
- Unless cut off chest wall, pleura $\neq$ margin (ink not needed)





LYMPH NODE STATIONS

- N1 Nodes
 - Hilar, Lobar and (sub)segmental Nodes 10-14
- N2 Nodes
 - Inferior Mediastinal Nodes 7-9
 - Aortic Nodes 5-6
 - Superior Mediastinal Nodes 2-4
 - Supraclavicular nodes 1



Remember, lymphatics run in the pleura –
look carefully for pleural nodules

NODULE #3

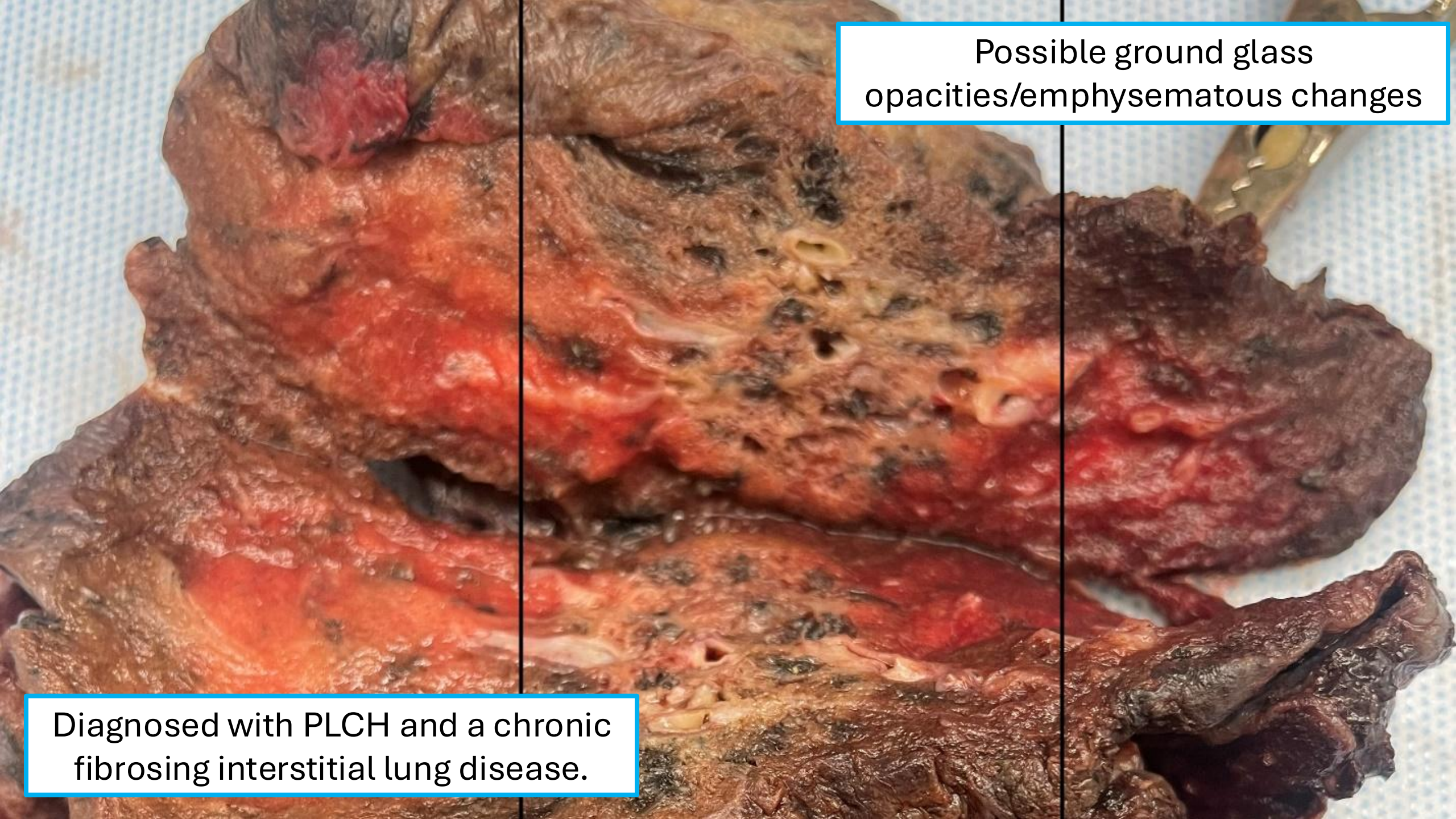


The image shows a gross pathology specimen, likely a lung, with a large, dark, irregular mass. A line points from the text 'NODULE #3' to a specific area on the mass. The mass is dark red to black, with some lighter, yellowish areas. The background is a blue, textured surface.

TUMOR CASES – A PLEA FOR THE NON-TUMOR

- You found it – great! No other nodules/masses? Done?
- Look at the remainder of the lung and sample anything out of the ordinary *and* take representative sections of ordinary appearing lung





Possible ground glass
opacities/emphysematous changes

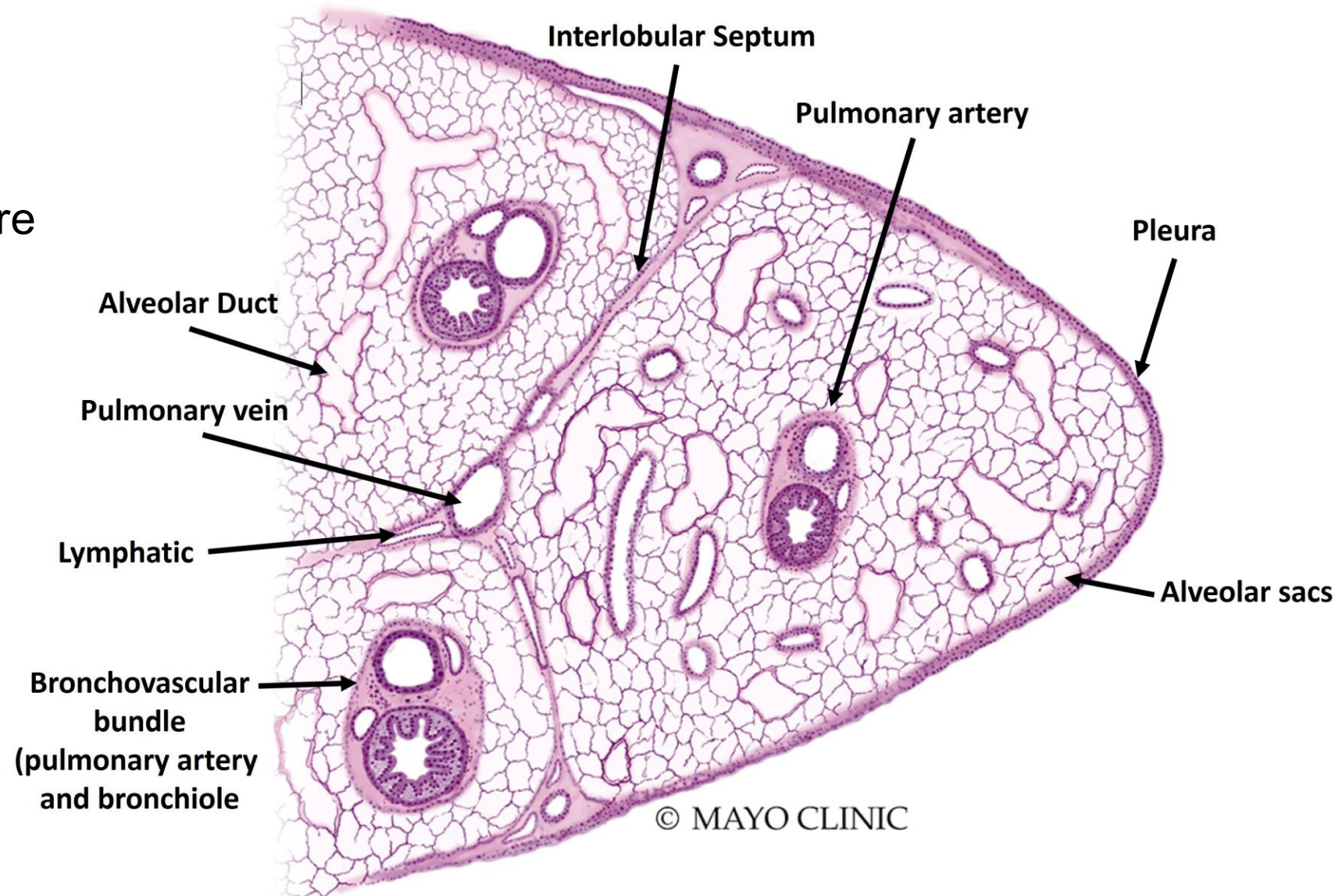
Diagnosed with PLCH and a chronic
fibrosing interstitial lung disease.

NON-NEOPLASTIC CHANGES IN TUMOR CASES

- A common consult to evaluate for background interstitial lung disease from a tumor resection case
- Very challenging if only one or no sections were taken!
 - Can have secondary reactive changes adjacent to tumor that mimic chronic fibrosing interstitial pneumonias
- Can save the patient a future additional procedure

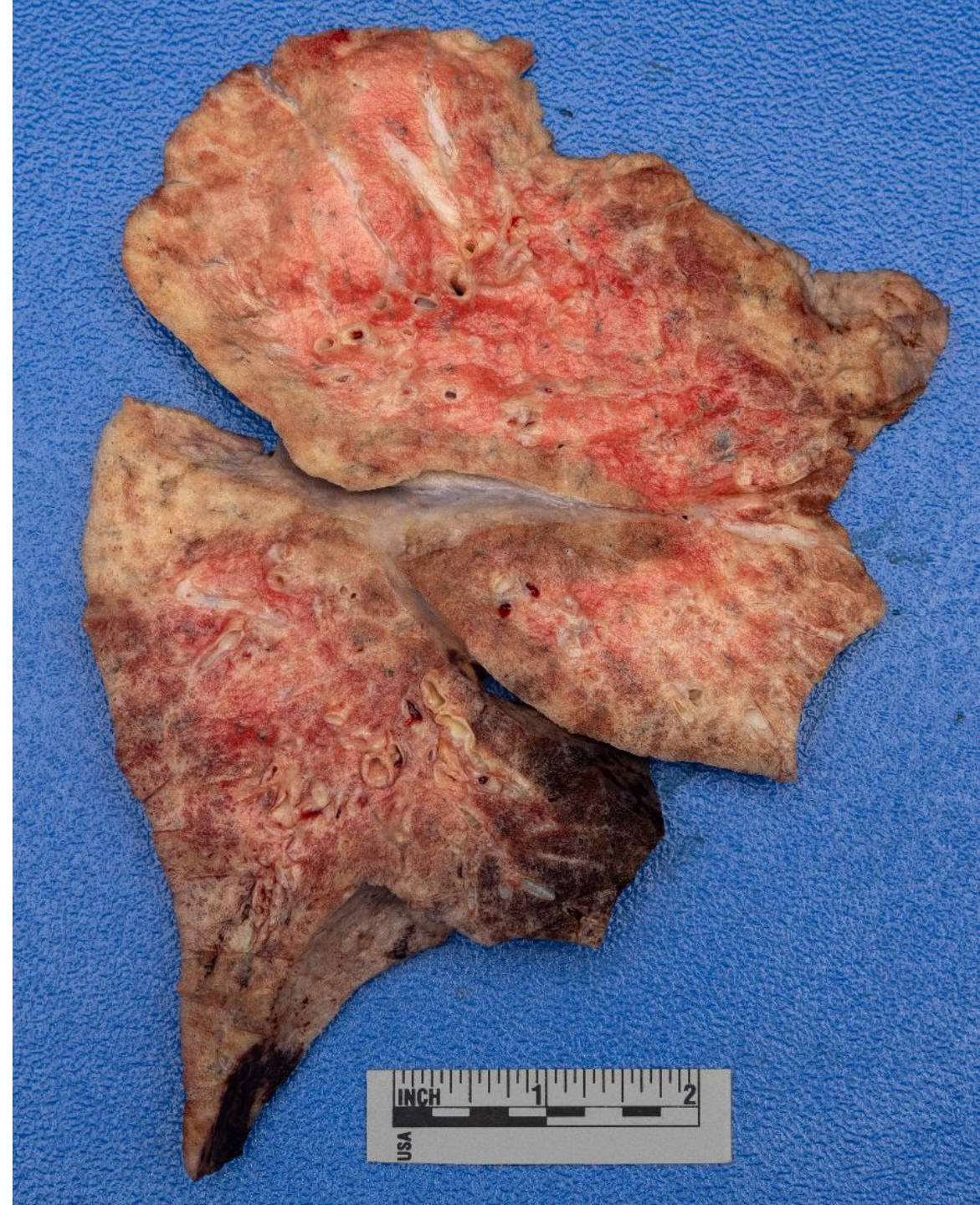
APPROACH TO INTERSTITIAL LUNG DISEASE

- Pattern-Based
 - Which areas of the lung are involved?
 - Homogenous or heterogeneous?
 - Diffuse or focal?
 - ✓ Unilateral vs. bilateral



NON-NEOPLASTIC SAMPLING

- Sample each lobe
- The Worst
- The Best
- The Interface
- + anything that looks different
 - Not uncommon to find cancer arising in the background of ILD
 - Still need margins and nodes



TAKE HOME POINTS

- Key CAP Elements
 - Size of tumor
 - Margin distance
 - Lymph node stations
 - Visceral pleural involvement
 - Remember the background non-neoplastic lung
 - Ground-glass tumor may be hard to see
 - Don't shave too close
 - Correlate with size on imaging
- Fixation is your friend, staple lines are not
- Consider shaking a specimen!

THANK YOU!
ANGELA WOODWARD, M.S., PA (ASCP)
TARA SHREINER, PA (ASCP)
MEGAN GREENE, M.S., PA (ASCP)
AIMEE RIPLEY, M.S., PA (ASCP)
MAYO CLINIC MEDICAL PHOTOGRAPHY

QUESTIONS & ANSWERS

