What's New: Lung Cancer Screening, Diagnostics, and Therapeutics

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Disclosures

I have no financial disclosures or conflicts of interest

Objectives

- Review the newest USPSTF lung cancer screening recommendations and discuss the importance of capturing incidental lung nodules

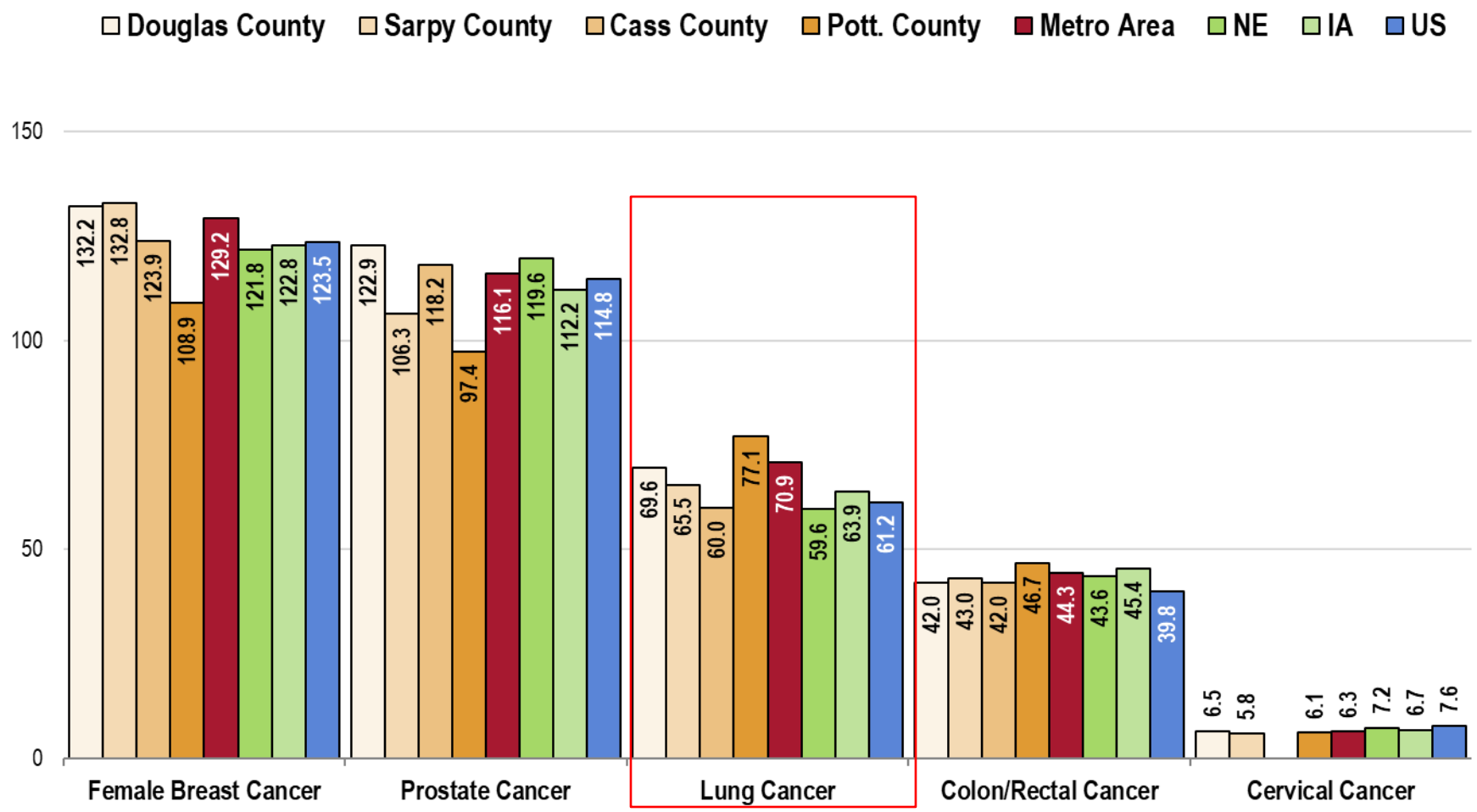
- Discuss the role of biomarkers to aid with risk stratification and re-classification of pre-test probability in lung cancer

- Discuss new technologies in the diagnosis and treatment of lung cancer including robotic bronchoscopy, PDT, and other interventional pulmonary treatments

Lung Cancer Screening and Incidental Findings

Cancer Incidence Rates by Site

(Annual Average Age-Adjusted Incidence per 100,000 Population)



(Professional Research Consultants (PRC) Community Needs Survey

GEOGRAPHIC AREA	Smoking Rates	Incidence per 100,000
Pottawattamie County	**19.3%**	**285.9**
Harrison County	17.1%	303.1
Mills County	16.5%	259.9
Douglas, NE County	16.0%	239.7
Sarpy, NE County	16.0%	231.2
Cass, NE County	16.0%	231.9
Sanders, NE County	16.0%	217.0
Washington, NE County	16.0%	152.8

Lung Cancer Screening and Smoking

- Prevention rather than screening is the most effective in reducing the burden of lung cancer in the long-term.
- Making progress. Declining lung cancer rates and mortality (in men) in the US
- However smoking rates remain high at 15% in the US, and is increasing in many parts of the world.
- The cancer risk does not decline for many years after smoking cessation, therefore lung cancer screening continues to be recommended.

Bach PB, Mirkin JN, Oliver TK, Azzoli CG, Berry DA, Brawley OW, *et al*. Benefits and harms of CT screening for lung cancer: a systematic review. *JAMA* 2022;307:2418–2429

New LDCT Screening Guidelines

- As of 2021, USPSTF has revised its recommendations to screen those age 50-80 (previously 55) who are active smokers or quit within the past 15 years and have a 20 pk/yr hx (formerly 30).

- Recommendation based on review of evidence from 223 studies, largest of which were the NLCST and the NELSON trial (more recent, younger patients) showing a 20 to 25% reduction in mortality respectively

- Screening for lung cancer isn't everything as most nodules are found incidentally.

Incidental vs Screening

INCIDENTAL

- 1.6 million found annually in US
- Many go unaddressed or are lost to follow-up

SCREEN DETECTED

- 75,000 found annually in US
- Less than 10% of those eligible are getting screened
- Limited to lung cancer screening centers

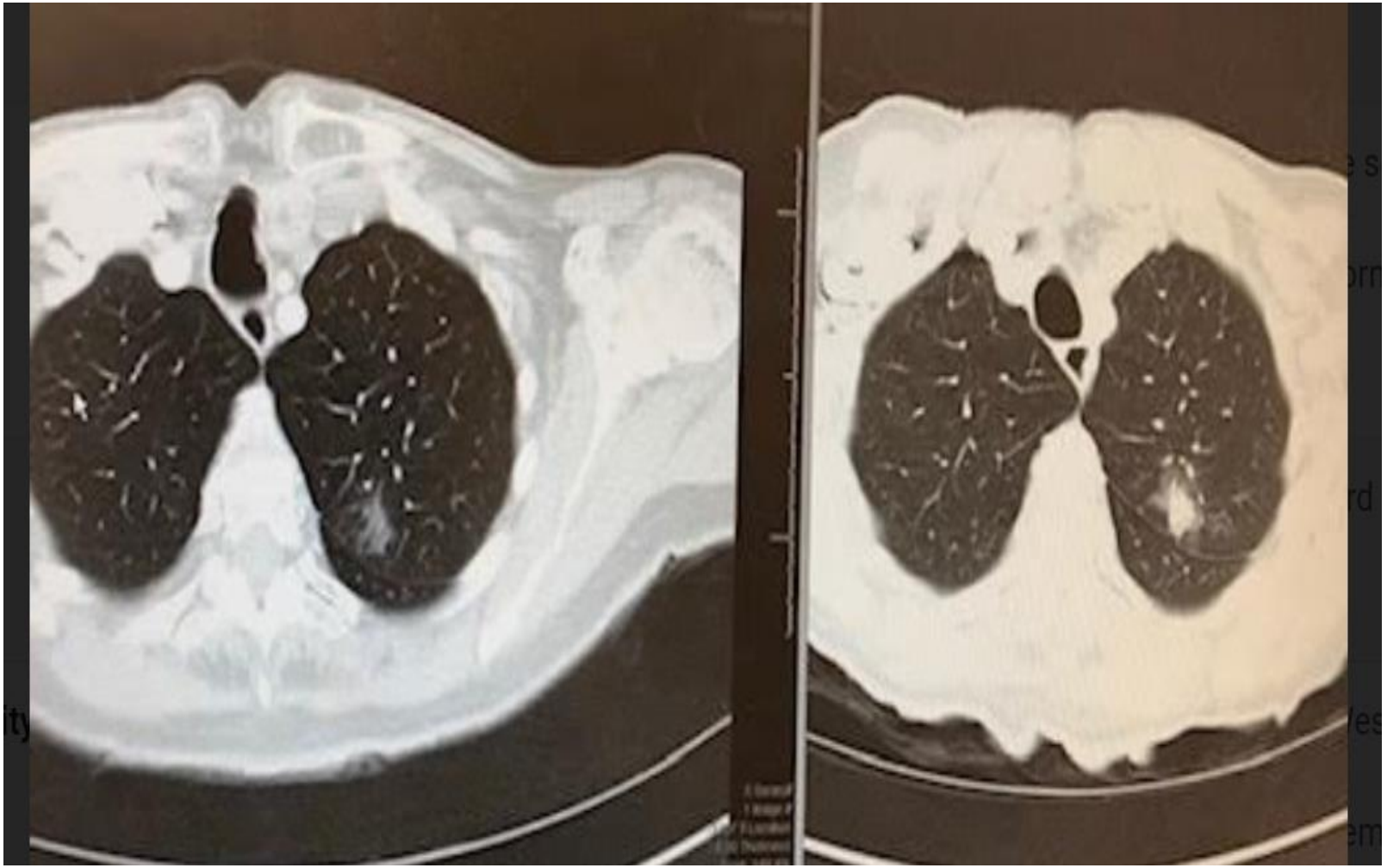
Gould MK, Tang T, Liu IL, Lee J, Zheng C, Danforth KN, Kosco AE, Di Fiore JL, Suh DE. Recent Trends in the Identification of Incidental Pulmonary Nodules. Am J Respir Crit Care Med. 2015 Nov 15;192(10):1208-14.

Incidental Nodule Facts

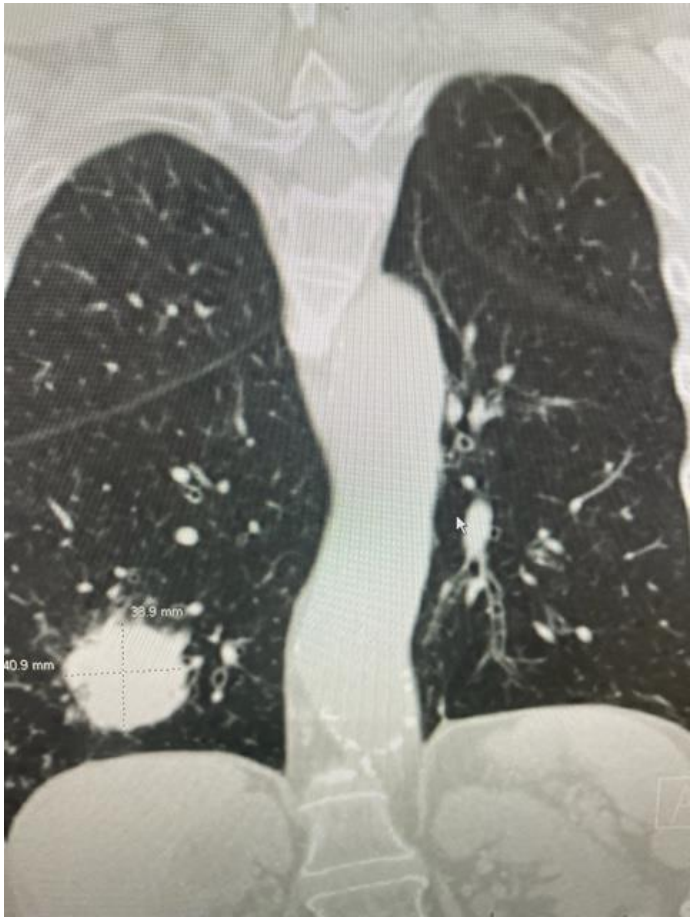
- Found daily in hospitals and emergency rooms all over the country
- 71% of these findings go unaddressed
- 63,000 incidental nodules found between 2006-2012 progressed to lung cancer within two years
- Capturing these patients requires little spend, but lots of coordination

Gould MK, Tang T, Liu IL, Lee J, Zheng C, Danforth KN, Kosco AE, Di Fiore JL, Suh DE. Recent Trends in the Identification of Incidental Pulmonary Nodules. Am J Respir Crit Care Med. 2015 Nov 15;192(10):1208-14.

77 y/o with routine CTA for thoracic aneurysm



ED Abdominal Pain



Coordinated, Comprehensive Effort

Capturing Nodules

- Screening + Incidentals

Improving Diagnostics

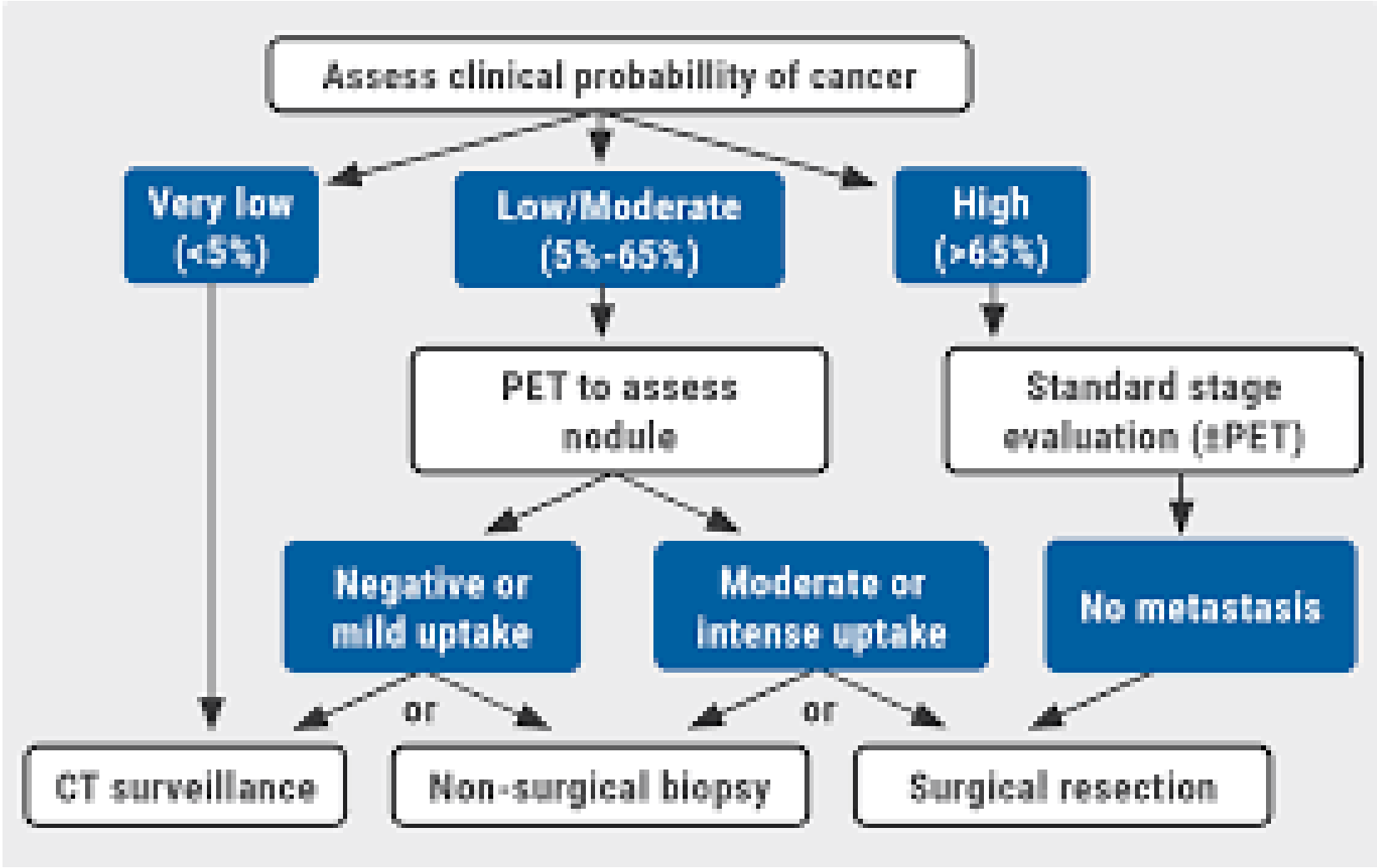
- Better biopsy techniques/staging, decrease diagnostic delay, biomarker/genomic testing

Optimize Treatment

- Medical and Radiation Oncology, bronchoscopic intervention (PDT, stenting, cryo), minimally invasive robotic surgery

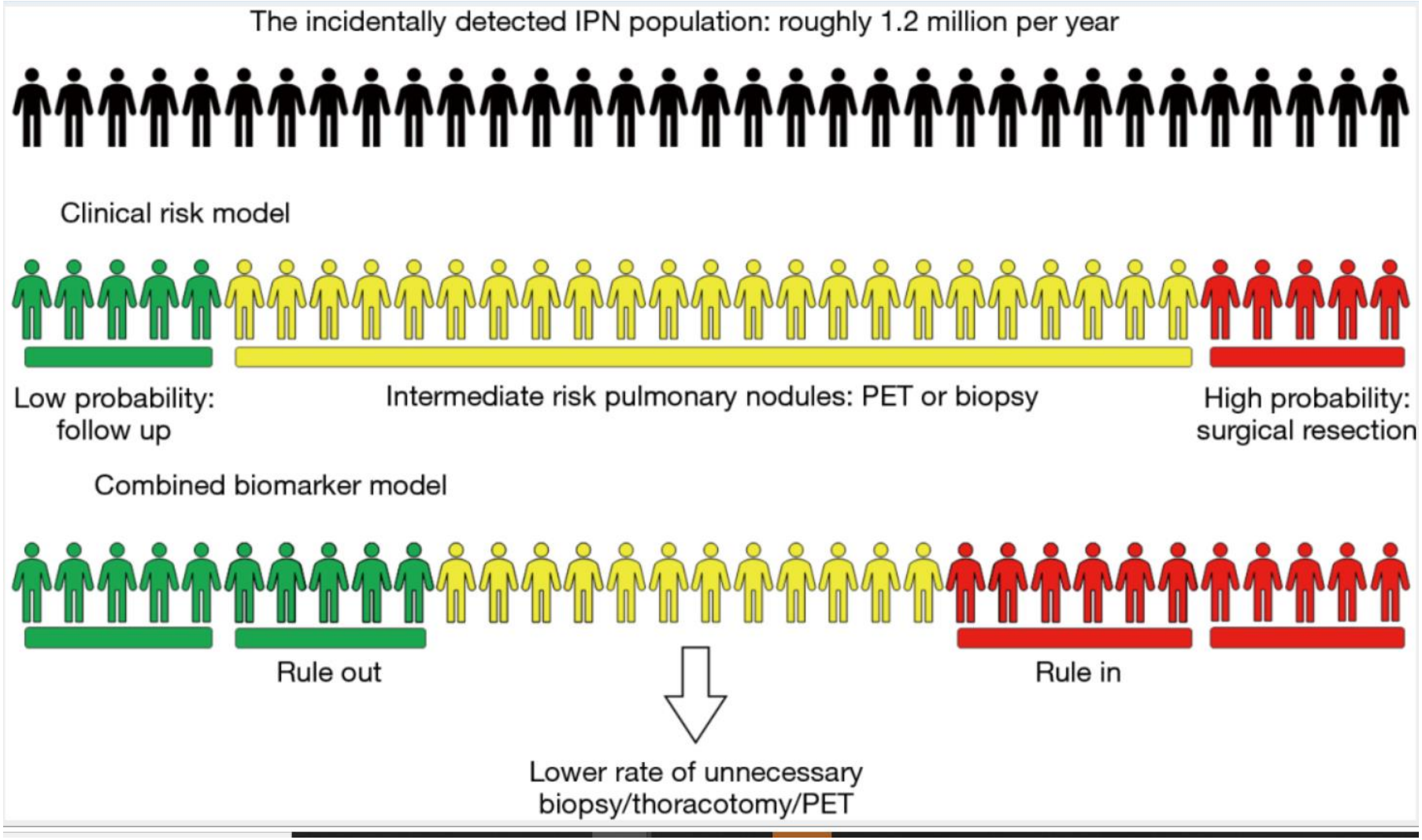
Non-radiographic technologies and re-classification tools

Pre-test Probability for Malignancy



Naidich DP, Bankier AA, MacMahon H, et al. Recommendations for the management of subsolid pulmonary nodules detected at CT. **Radiology** 2013;266(1): 304–317.

A combined biomarker approach can improve risk stratification for patients with lung nodules



Noninvasive biomarkers for lung cancer diagnosis, where do we stand?
Michael N. Kammer[1], Pierre P. Massion

Biomarkers

- Blood-based autoantibody assays (p53, CAGE, SOX2, and others) can help identify nodules that are likely malignant, while measuring blood-based plasma protein levels (LG3BP and C163A) can help identify nodules that are likely benign.

- These blood-based studies can be done prior to biopsy to re-classify a patient's risk for malignancy based on nodule and patient characteristics.

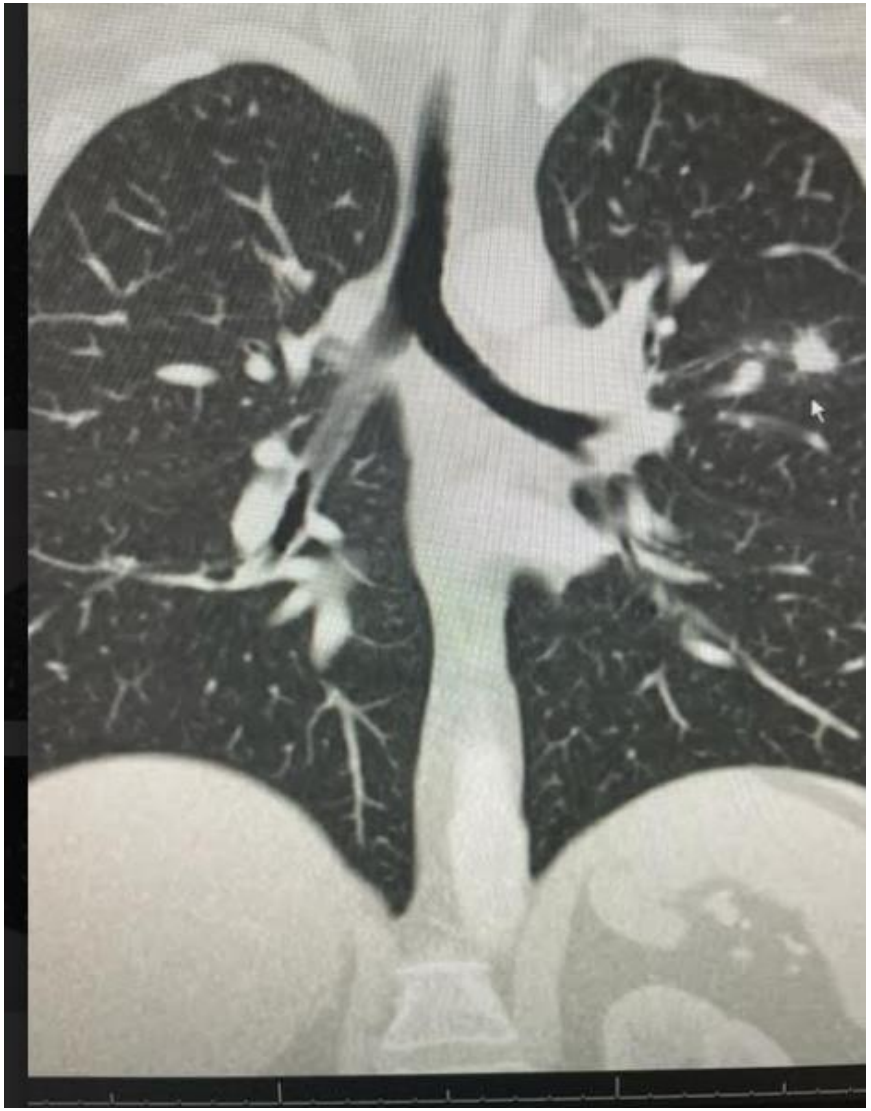
Biomarkers

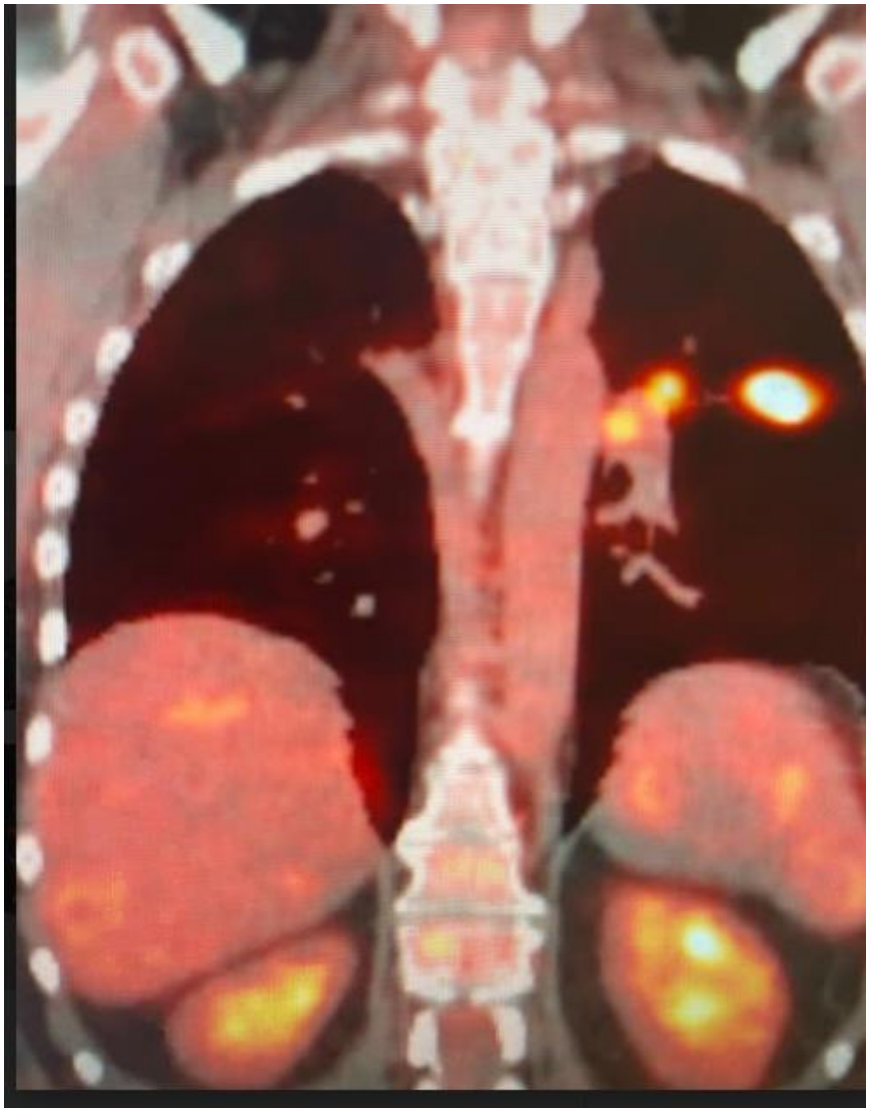
- Can also be useful to help guide decision making for non-diagnostic biopsies
- Genomic sequencing classifiers can detect genomic changes using RNA-sequencing to measure gene expression from the field of injury
- Use algorithms to analyze 500+ genes expressed from brushings of the nasal or bronchial epithelium to further risk stratify.

Robotic-assisted Navigational Bronchoscopy

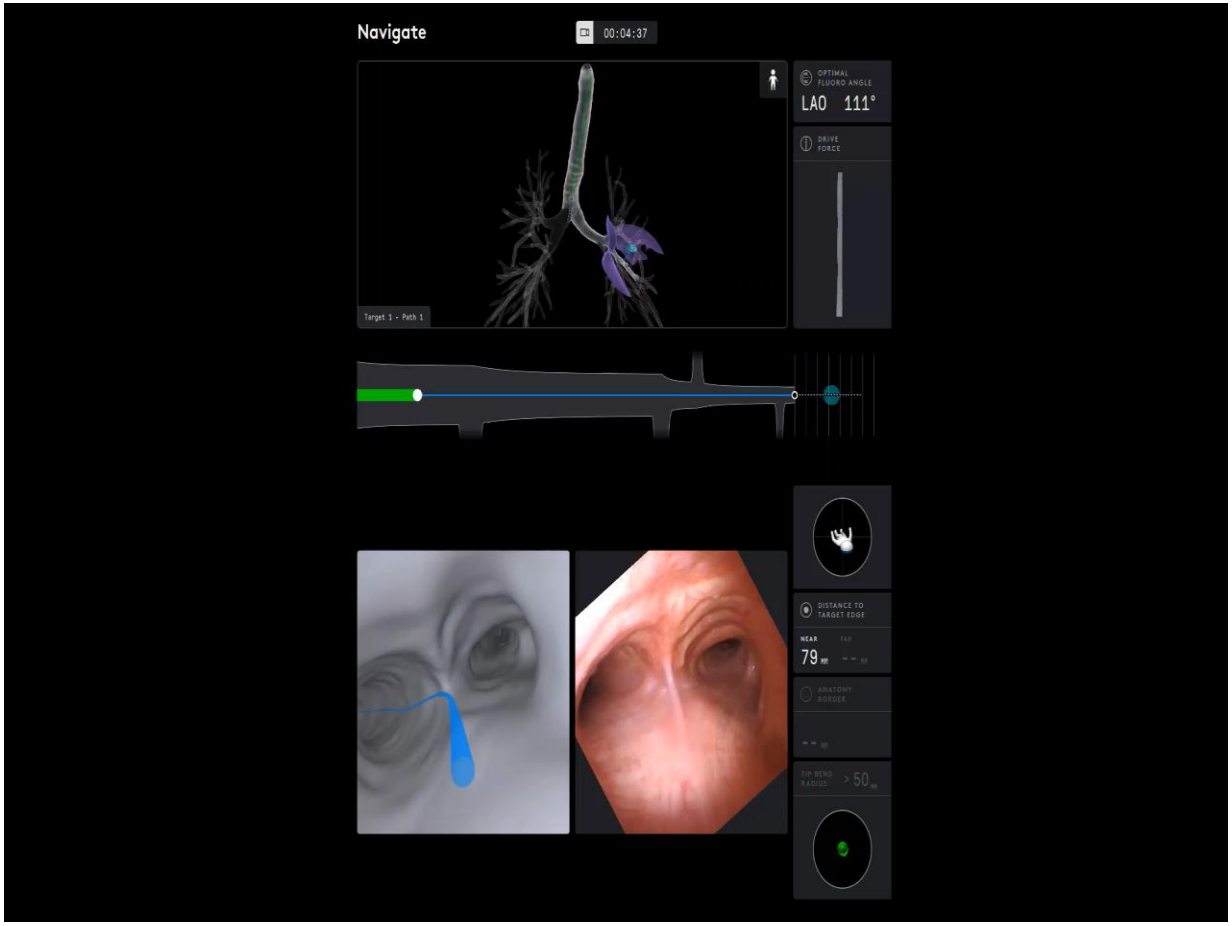
Robotic Bronchoscopy

61 y/o nurse, incidental finding

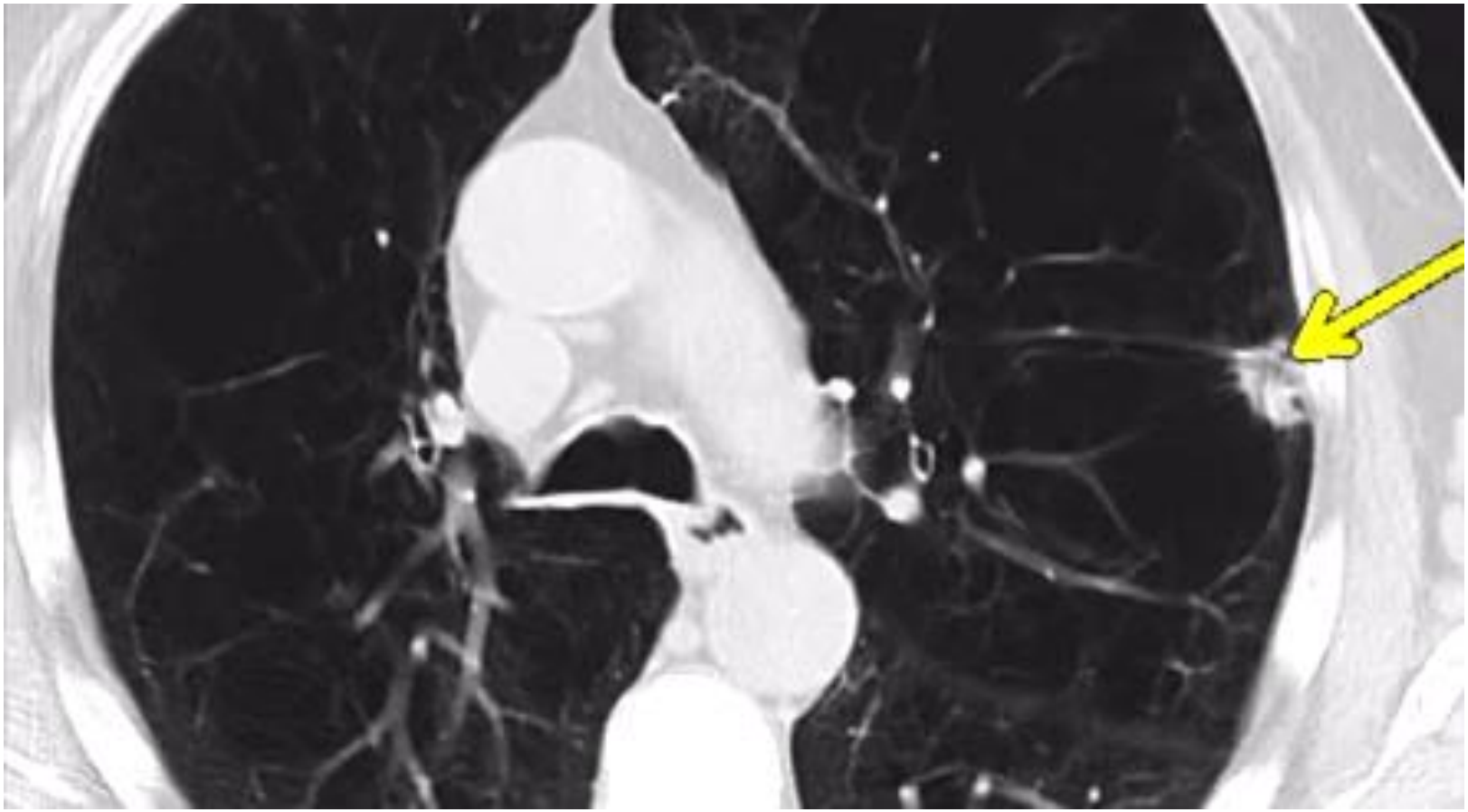




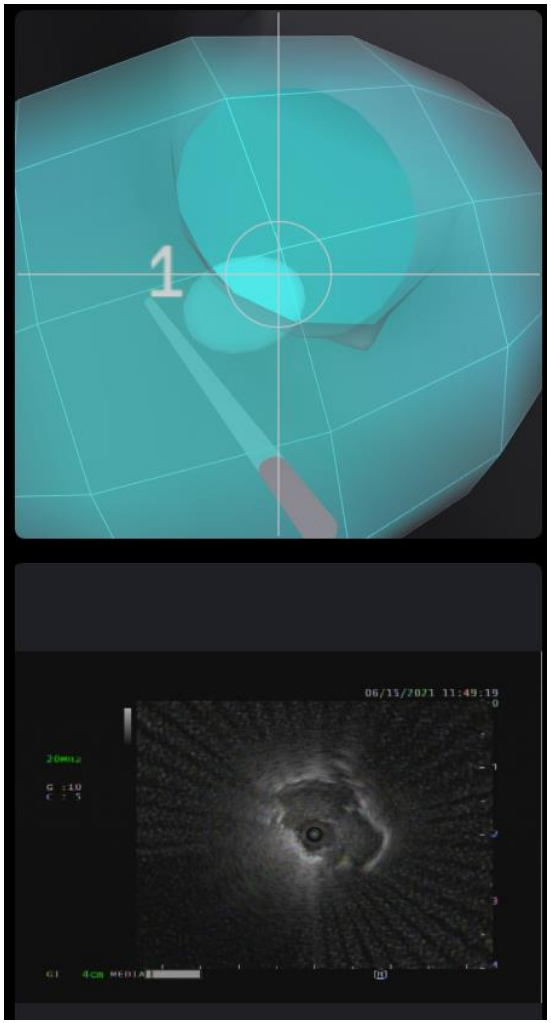
Early Diagnostics-1.2 cm Robotics

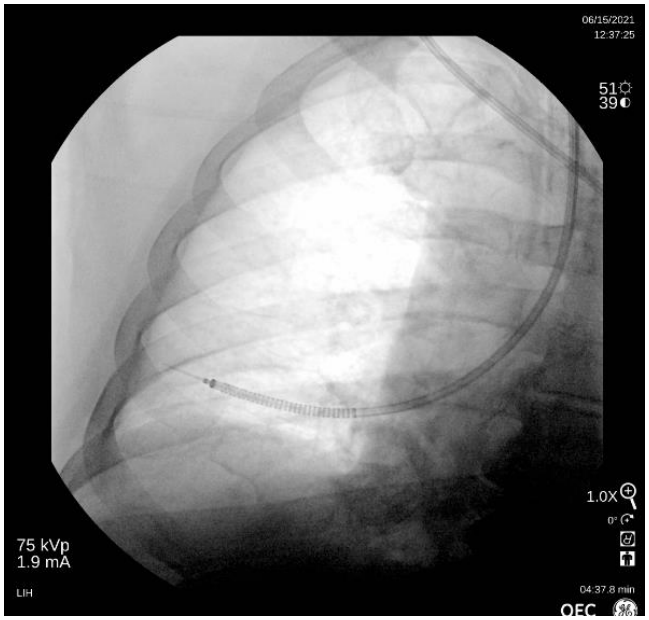


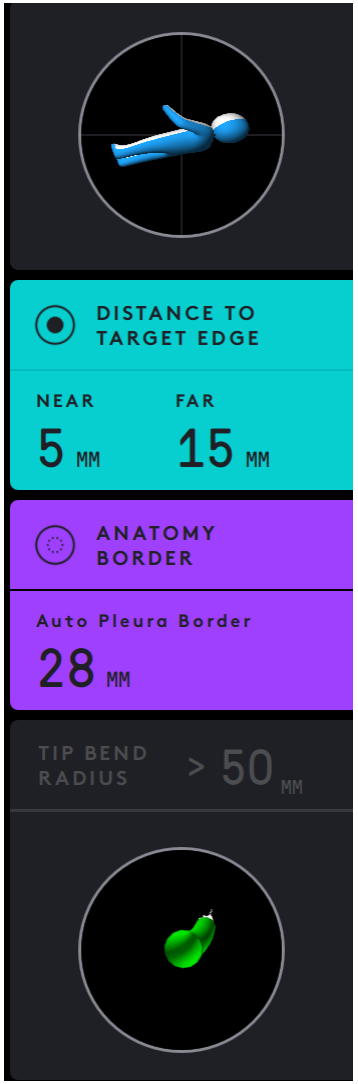
Peripheral Nodule in Emphysematous Bulla



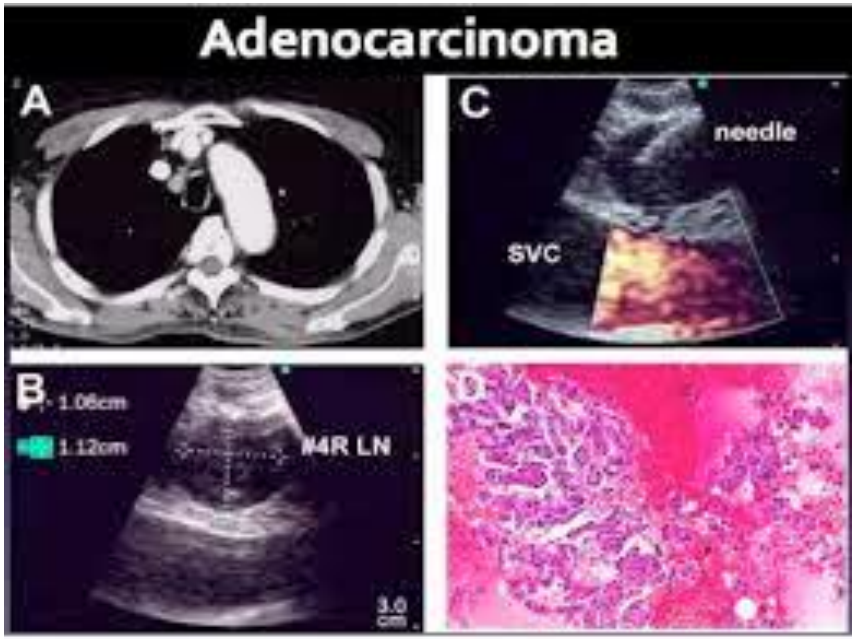
Early Diagnostics-Robotics





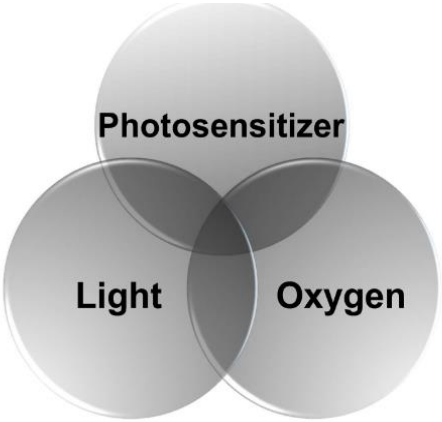


Linear Endobronchial Ultrasound (EBUS)



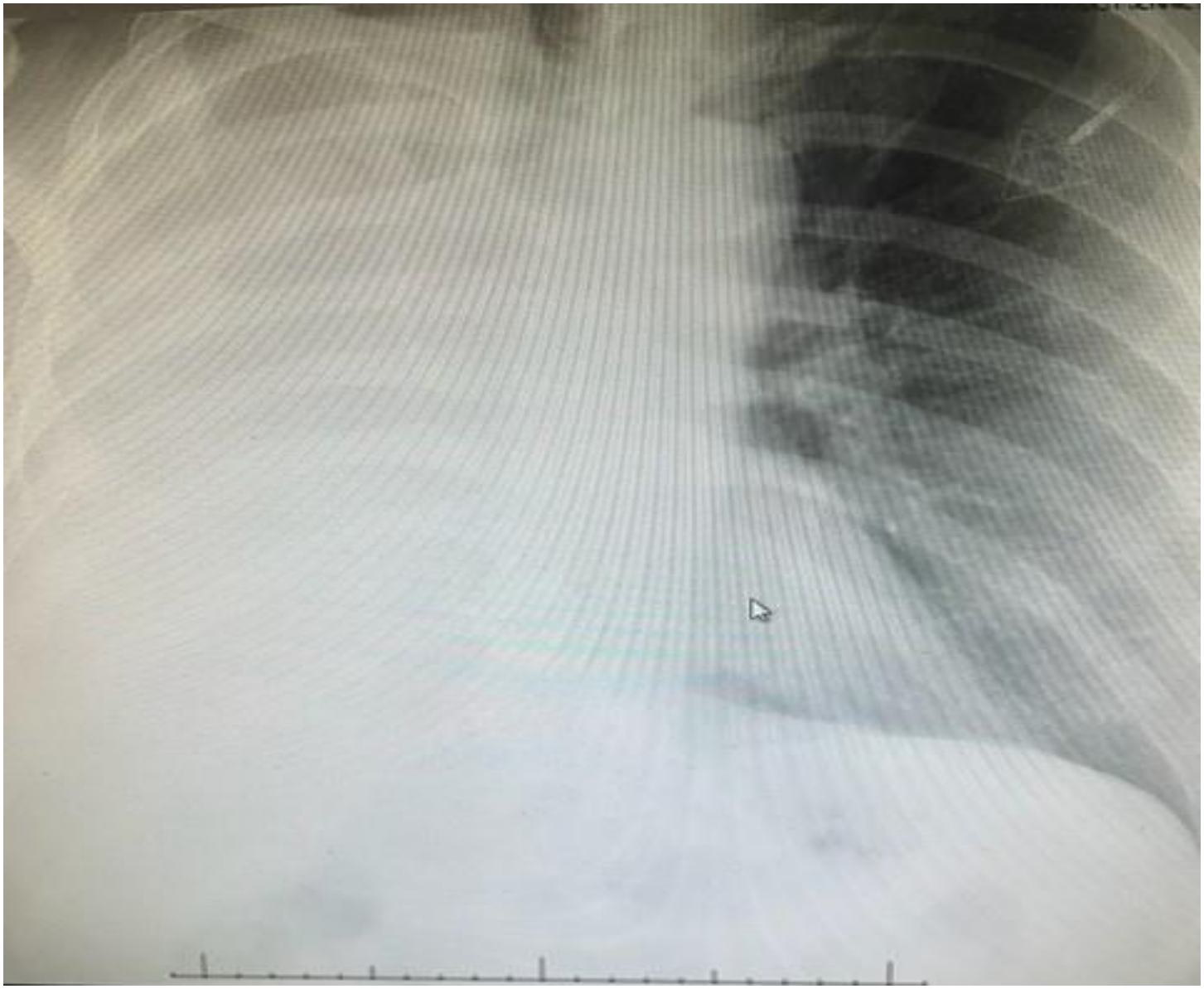
OTHER INTERVENTIONAL PULMONARY PROCEDURES

Photodynamic Therapy (PDT)



- Uses a photosensitizing drug and a particular type of light energy.
- When photosensitizers are exposed to a specific wavelength of light, they produce a specific form of oxygen that destroys tumor cells
- Regional vasoconstriction and additional tumor cell death

62 year old with Squamous Cell

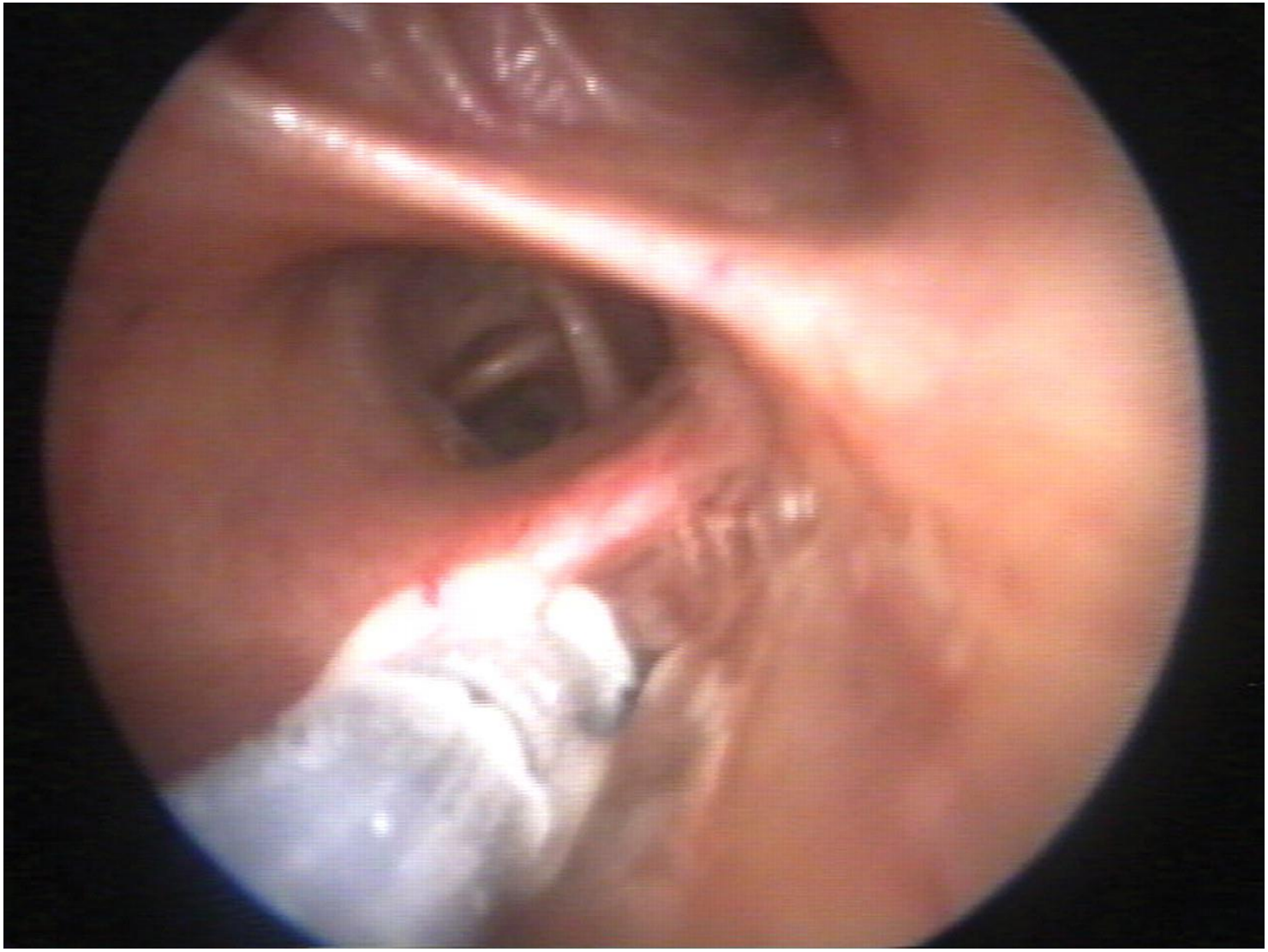


Right mainstem bronchus closing

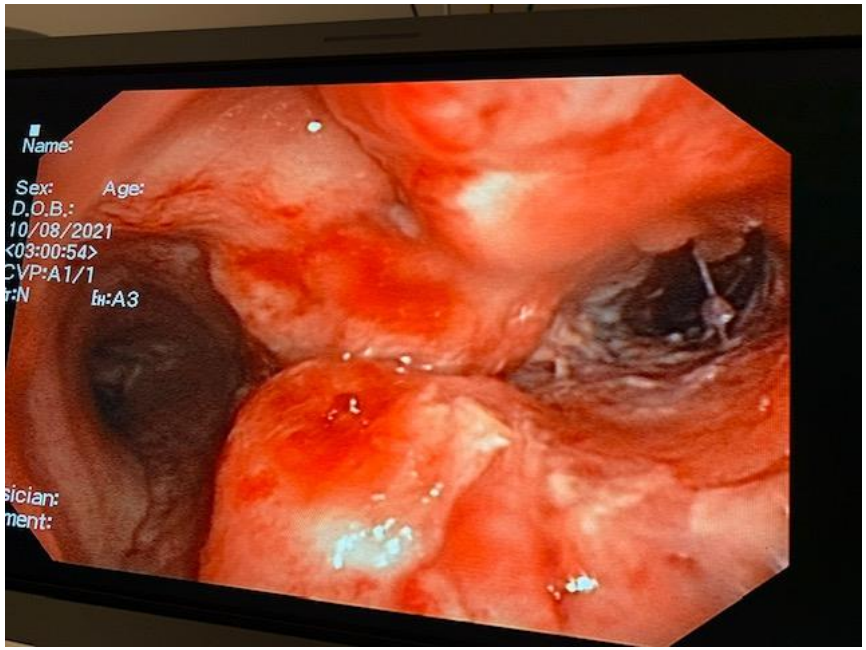
Photodynamic Therapy (PDT)

Photodynamic therapy (PDT)

Cryotherapy

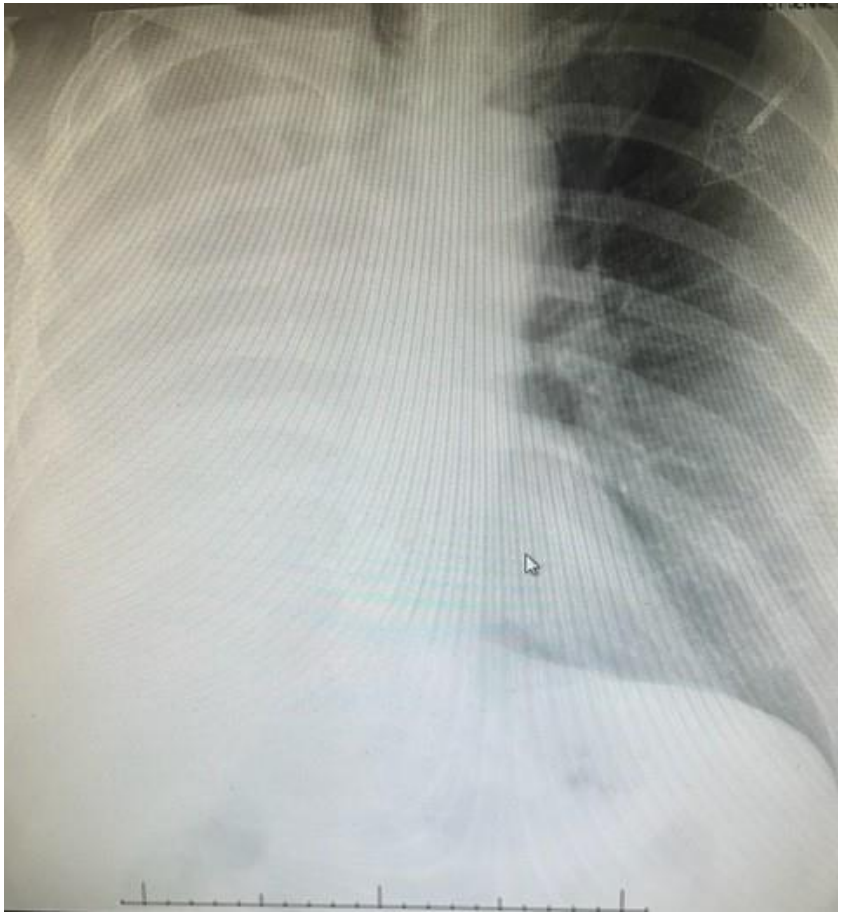


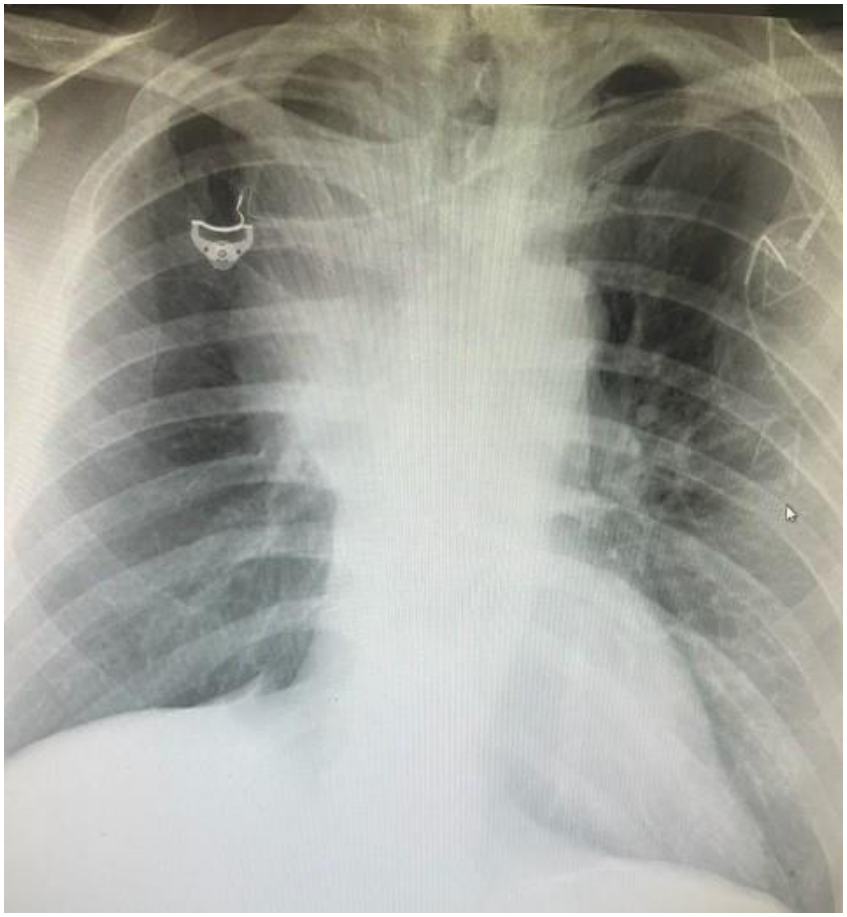
POST-TREATMENT



PRE-TREATMENT

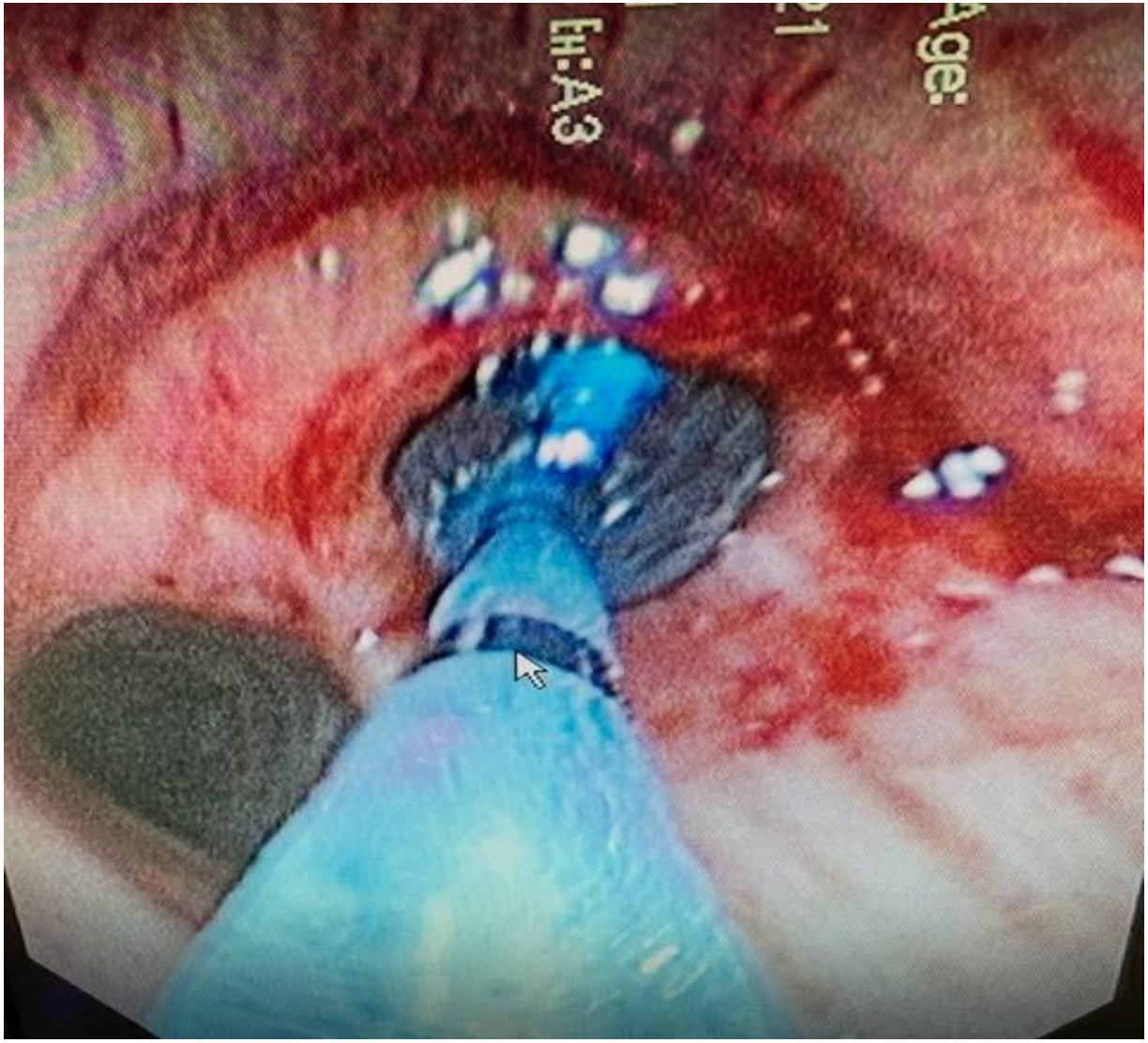
POST-TREATMENT



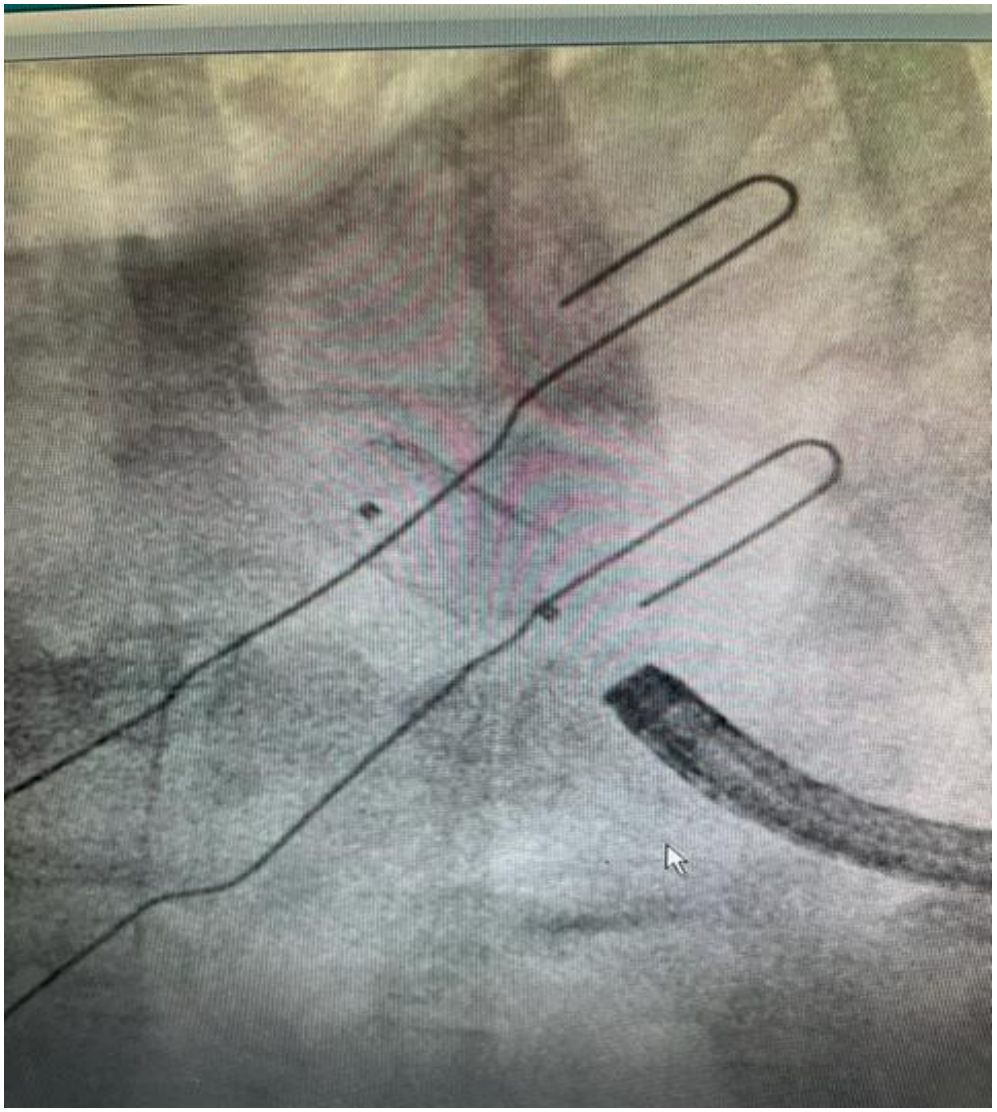


PRE-TREATMENT

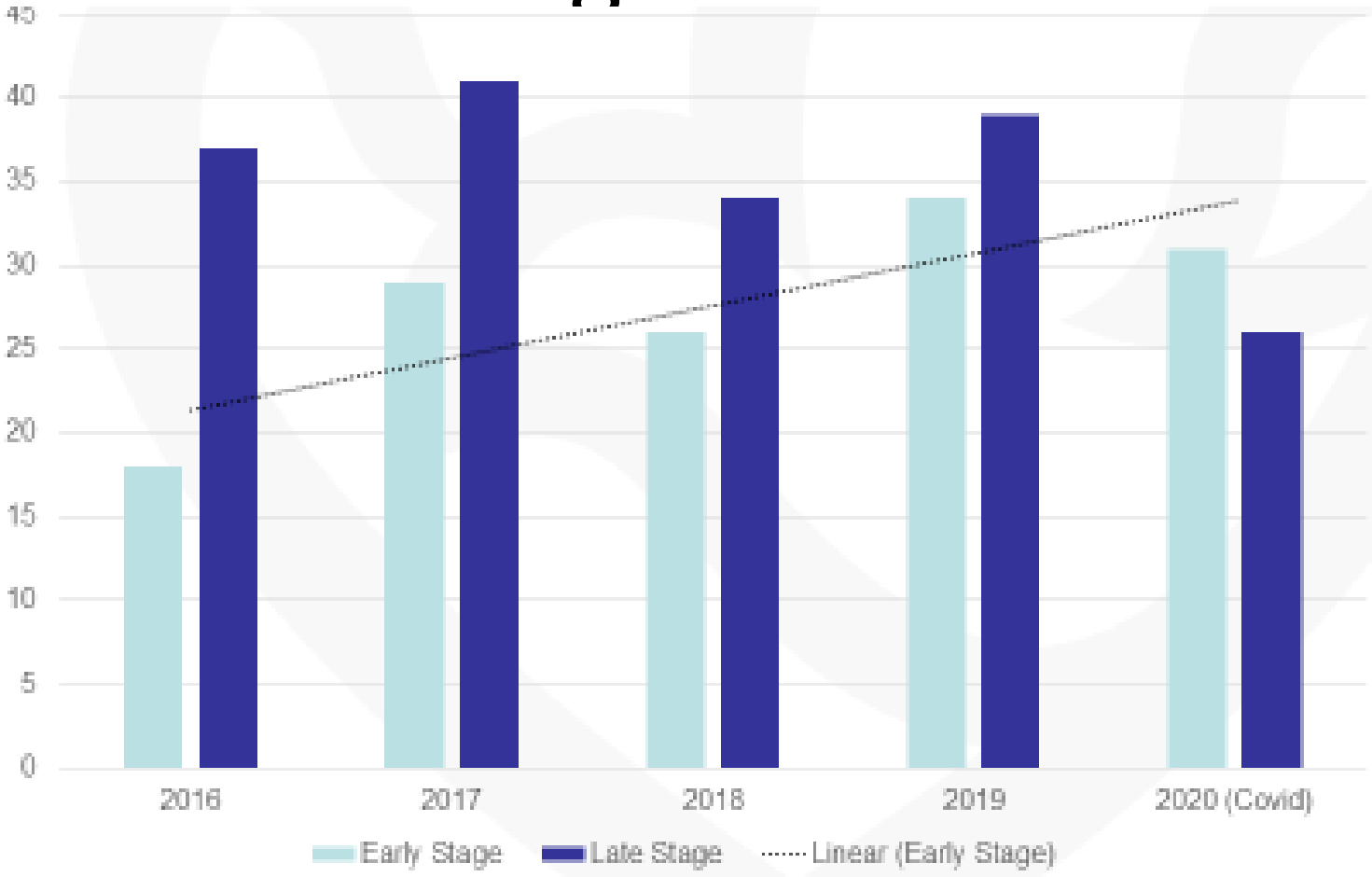
Balloon Dilation



Endobronchial Stenting



Stage Shift


45
40
35
30
25
20
15
10
5
0
2016
2017
2018
2019
2020 (Covid)
Early Stage
Late Stage
Linear (Early Stage)

THANK YOU!!