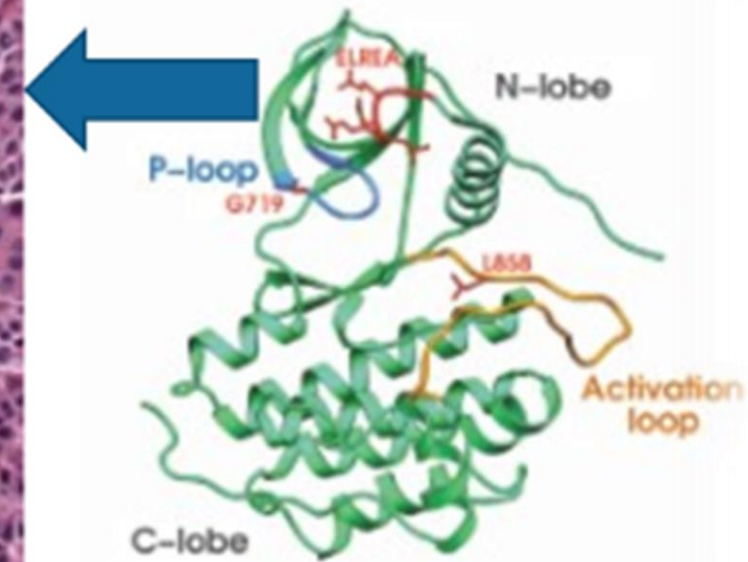
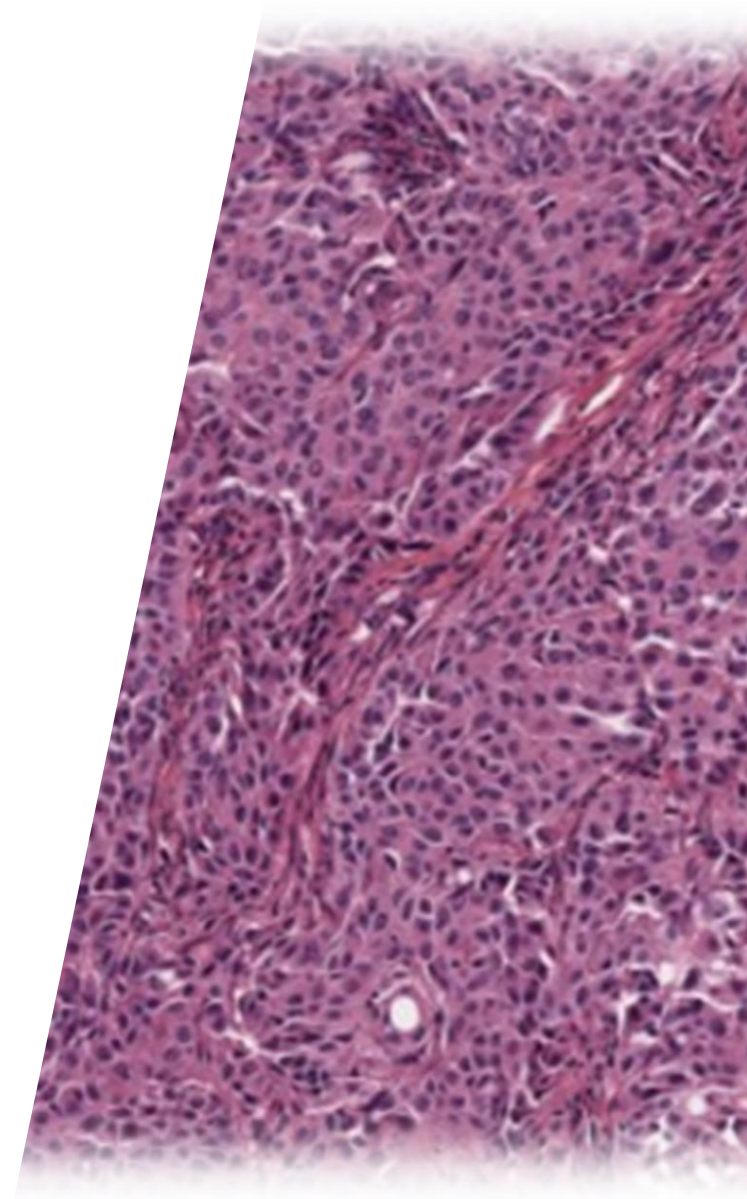


Welcome!

Before we begin...

Today's session will
be recorded

Please add your name
and organization in
the chat



EGFR
Mutation



Friday, February 9, 2024 • 4:00 – 5:00 PM EST

Lung Cancer Biomarker Testing ECHO Year 3

Session 2: Adequate Tissue for Sampling

Welcome to Session 2 of the Lung Cancer Biomarker Testing ECHO Year 3



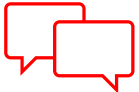
Each ECHO session will be recorded and will be posted to a publicly-facing website



You will be muted with your video turned off when you join the call. Use the buttons in the *black* menu bar to unmute your line and to turn on your video. **If you do not wish to have your image recorded, please turn OFF the video option.**



Today's materials will be made available on our ACS ECHO website, <https://echo.cancer.org>.



Please type your full name, the full name of your organization, and e-mail in the chat box



This ECHO session takes place on the Zoom platform. To review Zoom's privacy policy, please visit zoom.us/privacy



Questions about Zoom? Type in the chat box [@Mindi Odom](#)

The Biomarker ECHO series is made possible with funding provided by:



ONCOLOGY



Additional thanks to Foundation Medicine and founding sponsor, Amgen



Have a question? Don't wait to ask! Feel free to enter in the **Chat** at any time.

Today's Agenda



1 Housekeeping, Agenda Preview, and Introductions
15 minutes

2 Didactic Lecture: Adequate Tissue for Sampling
Nichole Tanner, MD, MSCR
10 minutes

3 Didactic Q/A
5 minutes

4 Case Presentation: Infirmity Health, Mobile, Alabama
Jose Galeas, MD, Oncologist
5 minutes

5 Case Presentation Recommendations and Discussion
15 minutes

6 Post Session Poll & Wrap Up
5 minutes

Your ECHO Support Team



Korey Hofmann, MPH
ECHO Lead
Program Manager, National Lung
Cancer Roundtable



Mindi Odom
Director, Project ECHO
Your ECHO Co-Lead



Beth Graham, MPH, CHES
Program Manager, Project ECHO



Jennifer McBride, PhD
Senior Data & Evaluation Manager



Donoria Evans, PhD, MPH
Director, Data and Evaluation,
National Roundtables and Coalitions

Introductions

Meet Our Lung Cancer Biomarker Testing ECHO HUB Subject Matter Experts (SMEs)



Millie Das, MD
Chief, Oncology
VA Palo Alto Health Care System
Clinical Associate Professor
Stanford University



Aakash Desai, MBBS, MPH
Assistant Professor of Medicine
O'Neal Cancer Center
University of Alabama, Birmingham



Grace Dy, MD
Professor of Oncology
**Roswell Park Comprehensive
Cancer Center**



**DuyKhanh Pham "Mimi"
Ceppa, MD, FACS**
Associate Professor of Thoracic
Surgery
**Indiana University School of
Medicine**



Matthew Factor, MD
System Chief, Thoracic Surgery
Geisinger Health



Adam Fox, MD
Assistant Professor
**Medical University of South
Carolina**



Jason Merker, MD, PhD
Associate Professor, Department of
Pathology and Laboratory Medicine &
Genetics
**University of North Carolina
Lineberger Comprehensive Cancer
Center**

Introductions

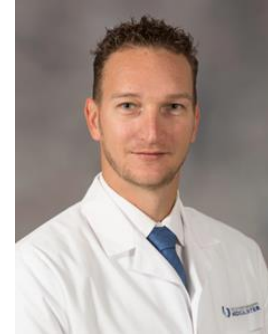
Meet Our Lung Cancer Biomarker Testing ECHO HUB Subject Matter Experts (SMEs)



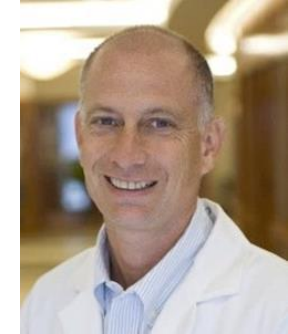
Koosha Paydary, MD, MPH, MSc
Assistant Professor, Department of
Internal Medicine
Rush University



Catherine R. Sears, MD
Associate Professor of Medicine,
Division of Pulmonary, Critical Care,
Sleep and Occupational Medicine
**Indiana University School of
Medicine**
**Simon Comprehensive Cancer
Center**



Michal Senitko, MD
Assistant Professor
**The University of Mississippi
Medical Center**



Gerard Silvestri, MD, MS
Hillenbrand Professor of Thoracic
Oncology
**Medical University of South
Carolina**



**Heather Wakelee, MD
(Ad Hoc)**
Professor of Medicine and Chief
of the Division of Oncology,
**Stanford University School of
Medicine**
Deputy Director, **Stanford
Cancer Institute**



Ignacio Wistuba, MD
Professor and Chair, Department of
Translational Pathology
**The University of Texas MD
Anderson Cancer Center**

Welcome to our Participant Learning Sites



ALABAMA

Mobile Infirmary

O'Neal
Comprehensive
Cancer Center at the
University of Alabama
at Birmingham

University of South
Alabama Health,
Mitchell Cancer
Institute

CALIFORNIA

Comprehensive
Cancer Center at
Desert Regional
Medical Center

Fresno VA Medical
Center

Harbor UCLA

Providence St. Joseph
Health

Sharp Healthcare

INDIANA

Ascension St. Vincent
Indianapolis

Deaconess Hospital,
Inc.

Franciscan Alliance
Burrell Cancer Center
Crown Point

Methodist Hospitals

NORTH CAROLINA

Cone Health Medical
Group/Cone Health
Cancer Center

Novant New Hanover
Regional Medical
Center

UNC Caldwell McCreary



Lung Cancer Biomarker Testing ECHO FACILITATOR

Bruce E. Johnson, MD, FASCO

Dana-Farber/Harvard Cancer Center
Lung Cancer Program
Senior Advisor to the President,
Dana-Farber Cancer Institute



Nichole T. Tanner, MD, MSCR
Professor of Medicine
Medical University of South
Carolina

Adequate Tissue for Sampling

Tissue Acquisition and Biomarker Testing

Nichole T. Tanner MD, MSCR
Professor of Medicine
Pulmonary and Critical Care Medicine
Co-Director, Hollings Lung Cancer Screening Program
Medical University of South Carolina
Charleston, SC

Disclosures



Industry Sponsored Biomarker Trials:

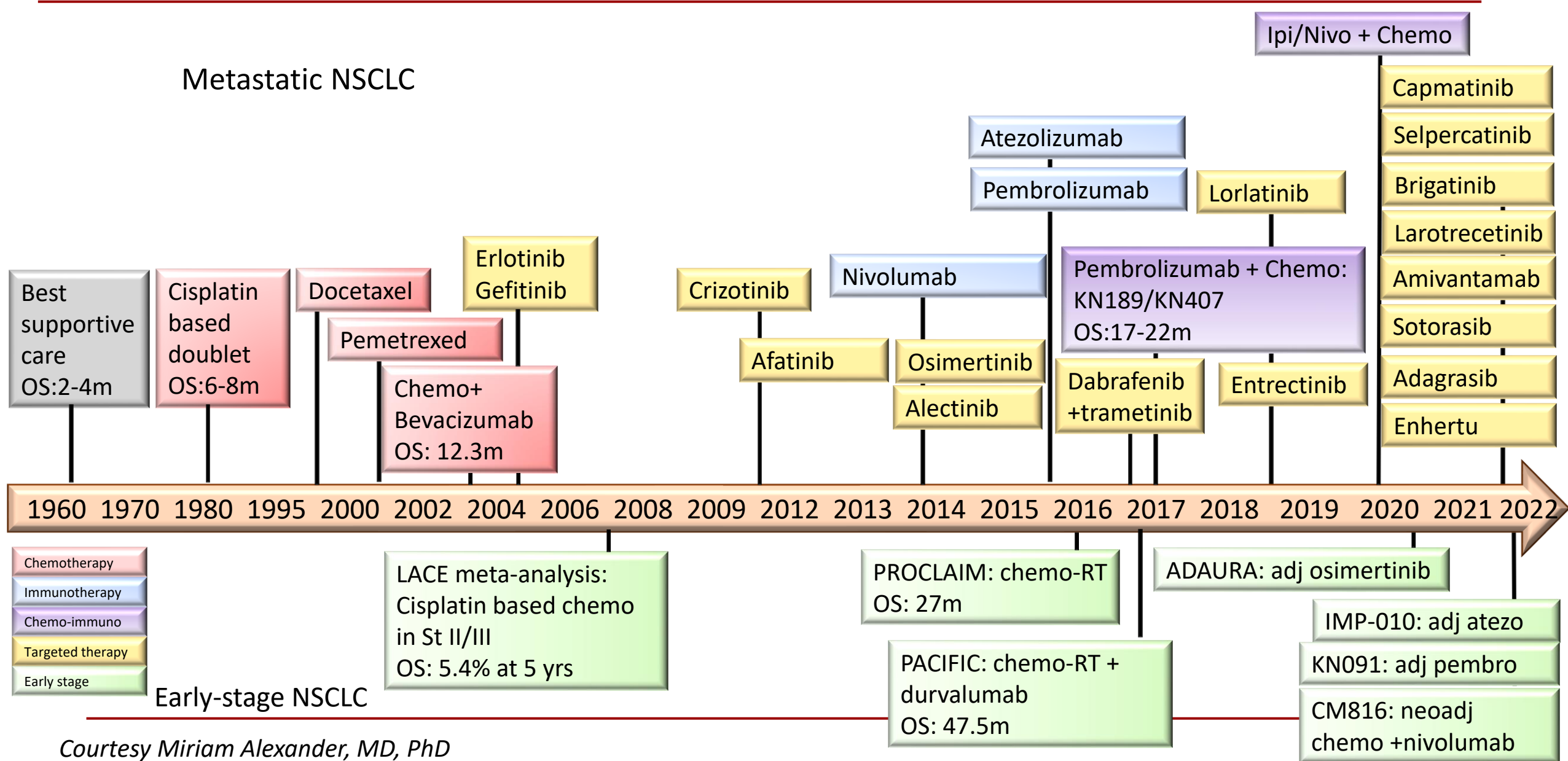
- Biodesix
- Delphi
- Exact Sciences
- Nucleix
- Pronogmic
- Veracyte

Outline

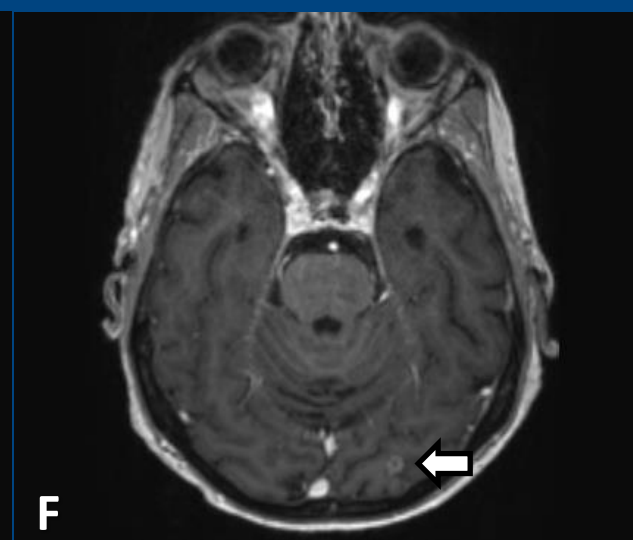
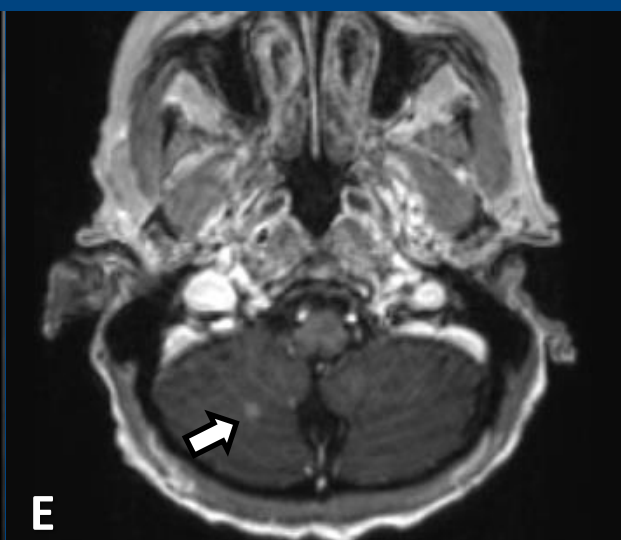
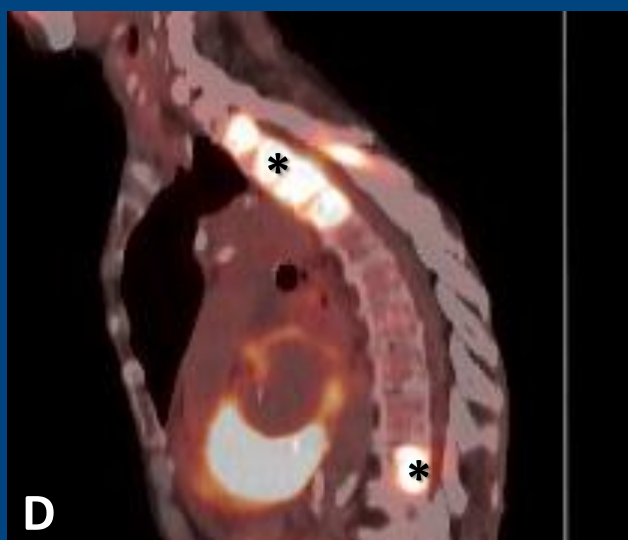
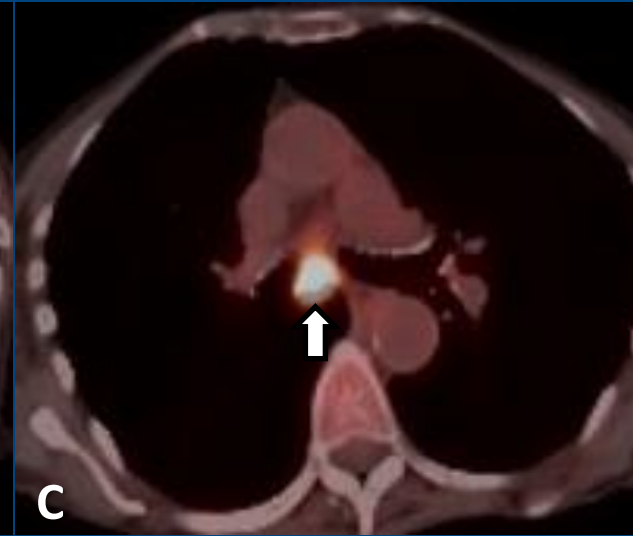
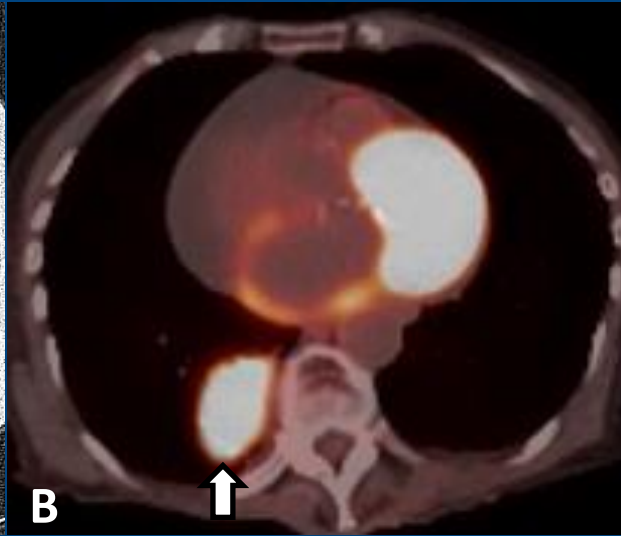
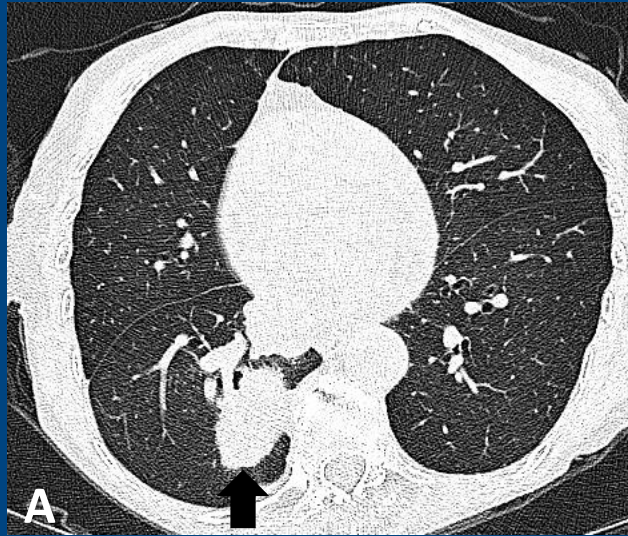


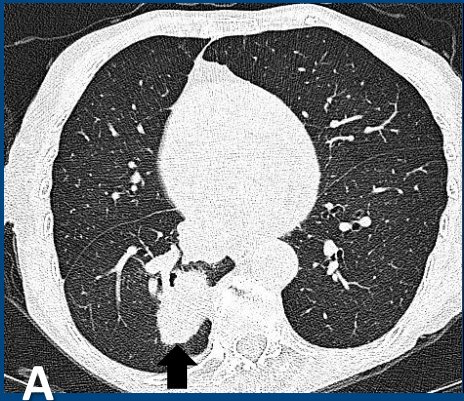
- Procedure selection
- Bronchoscopy
 - EBUS
 - Guided bronchoscopy
- Challenges

The why: Role in treatment selection and response



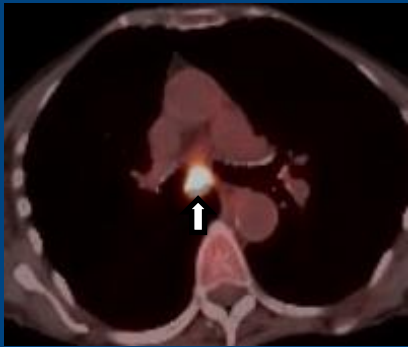
Select the Best Procedure





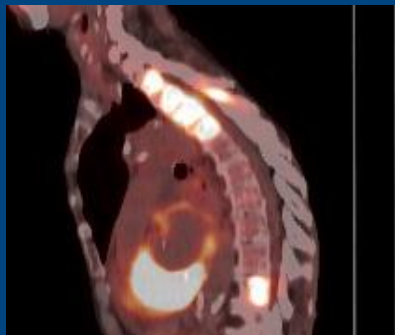
CT-guided lung biopsies:
- Pros: Highly accurate, cores
- Cons: 15% pneumothorax, primary mass lacks stage information

Robotic Bronchoscopy:
- Pros: decent safety profile
- Cons: questionable adequacy for diagnosis, little data for NGS testing
*Patient selection is key



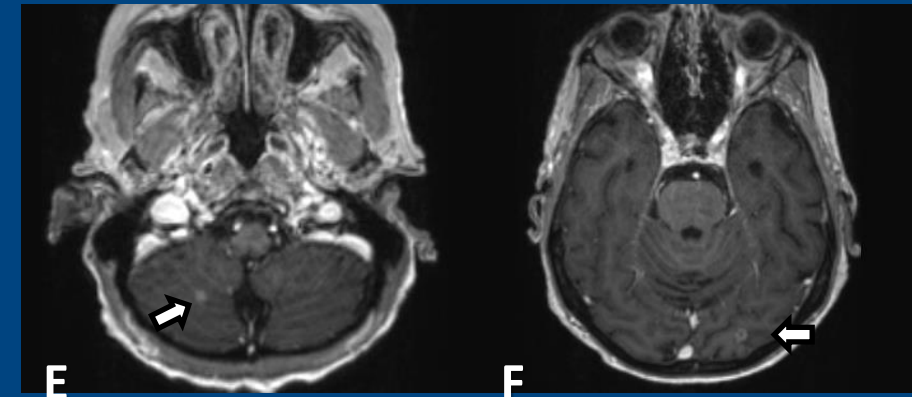
EBUS-TBNA:

- Pros: Highly accurate, <1% major complications
- Cons: Often produces FNA material



Bone biopsies:

- Pros: Good diagnostic yield
-Cons: decalcification degrade DNA



Brain biopsies:

- pros: Highly accurate
- cons: high morbidity/risk

Accuracy of Staging Tests in Lung Cancer Patients

Procedure	Number of Studies	N	Sens	Spec
Mediastinoscopy	35	10,648	81	100
EUS	26	2,443	89	100
EBUS	26	2,756	89	100
EBUS/EUS	7	811	91	100

EBUS for NGS

- A study in 54 patients (85 samples) successful testing in 98% for a 50 gene panel and 91% for a 1,213 gene panel
- Another study 115 patients: EBUS-TBNA specimen adequacy for large NGS panels in 86% of cases (success rate improved with 76% for first 3rd and 92% for the last 3rd)

EBUS and NGS

- Meta-analysis, with some limitations found that 6 passes are often adequate for NGS
- Lacks analysis for PD-L1
- Does not account for how/where testing was performed

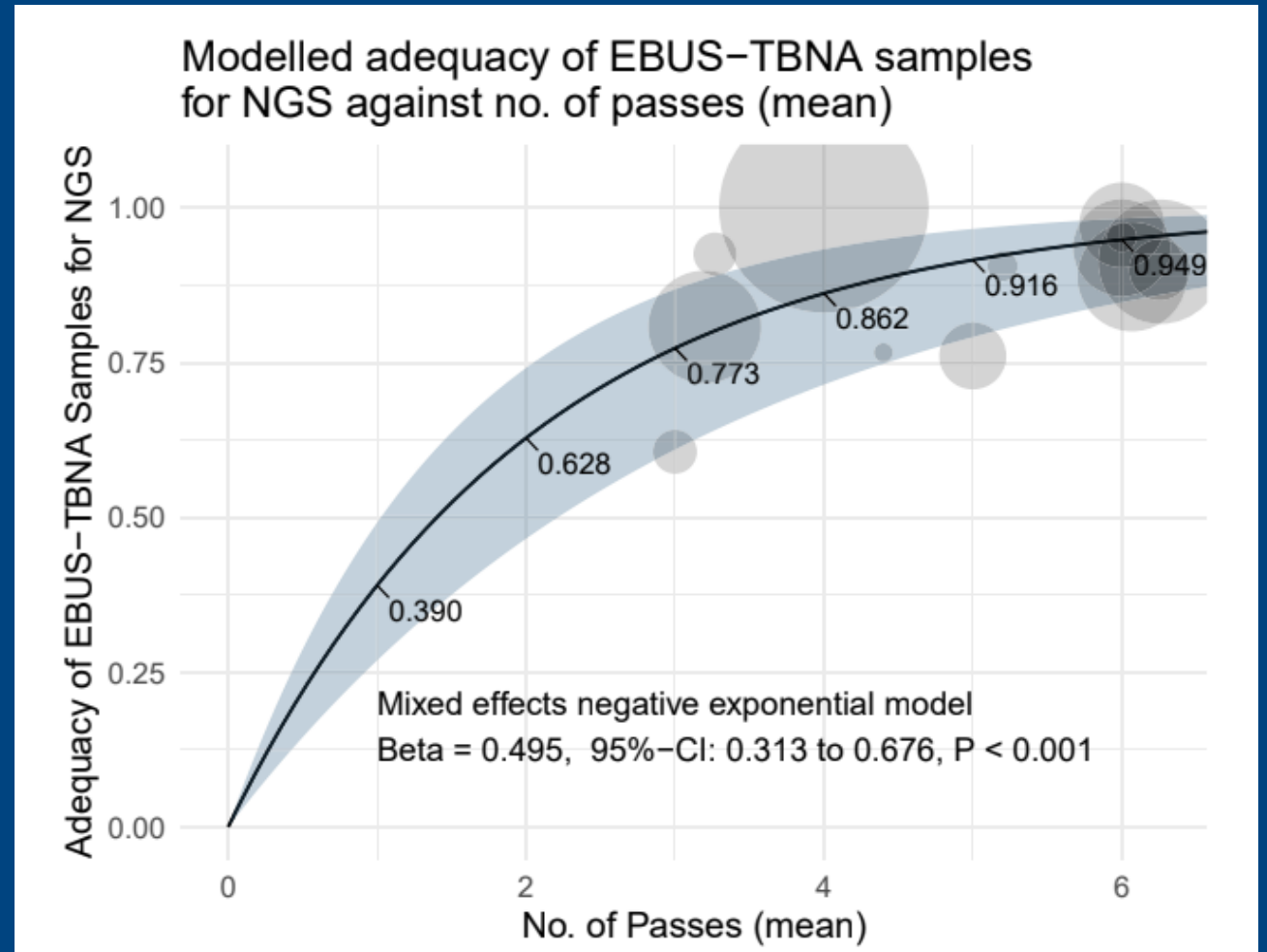


TABLE 3] Study Characteristics and Diagnostic Yield, Summarized Across Relevant Subgroups

Publication /Patient Population	No. of Study Arms	Total No. of Nodules Included	No. of Nodules Per Study, Median (range)	Diagnostic Yield, Mean (95% CI)
All publications	149	16,389	65 (11-1,329)	69.4% (67.5%-71.4%)

Guided Bronchoscopies

- Included navigation bronchoscopies, robotic bronchoscopy, radial ultrasound, and combinations
- There are many reports suggesting a very high accuracy for guide bronchoscopies but these are often at single specialized, high-volume centers
- Discuss availability of local resources and for appropriate case selection

DNA Requirements

Depends on the NGS platform



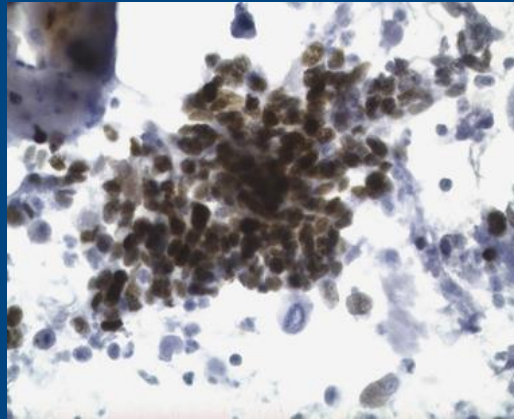
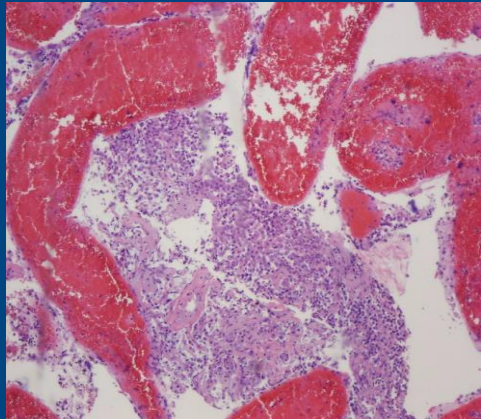
Large panel (> 200 genes) requires up to 50ng of DNA



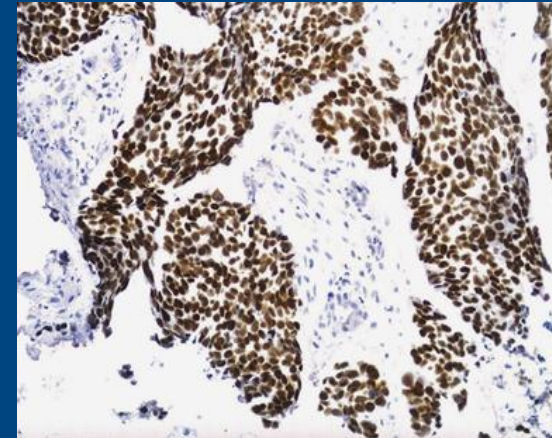
A 50 gene panel may require 1-10ng of DNA (>1000 cells) while 1200 gene panels may require 25-100ng of DNA (>200,000 cells)

Cell Block

- Morphology
- Immunohistochemistry (diagnostic and PD-L1)



TTF1



TTF1

- Mainstay for mutational analysis for FNA specimens, rarely slides can be used

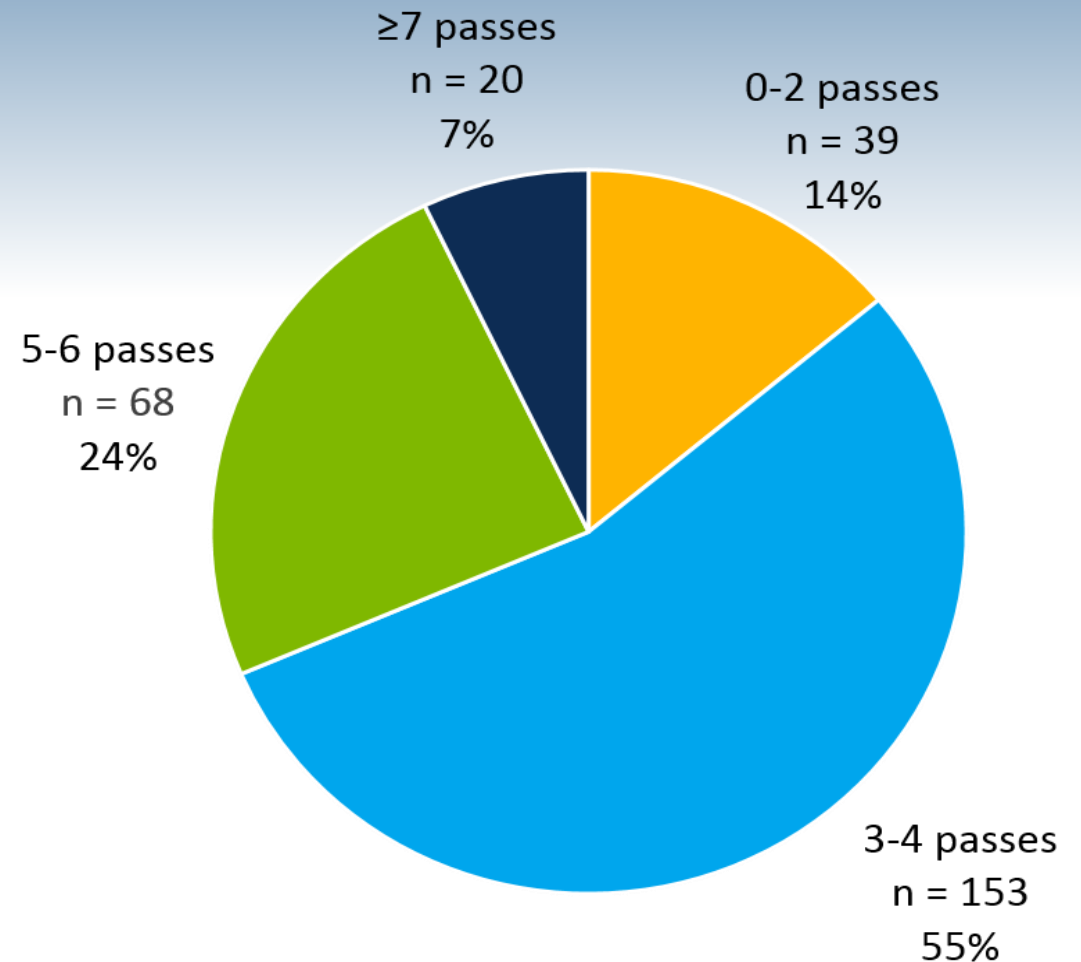
The challenge

- How much is enough to address competing needs?
 - IHC for cell type
 - IHC for PDL-1
 - Other tests (eg FISH), if smaller NGS panel
- Variable cellularity among lung cancers

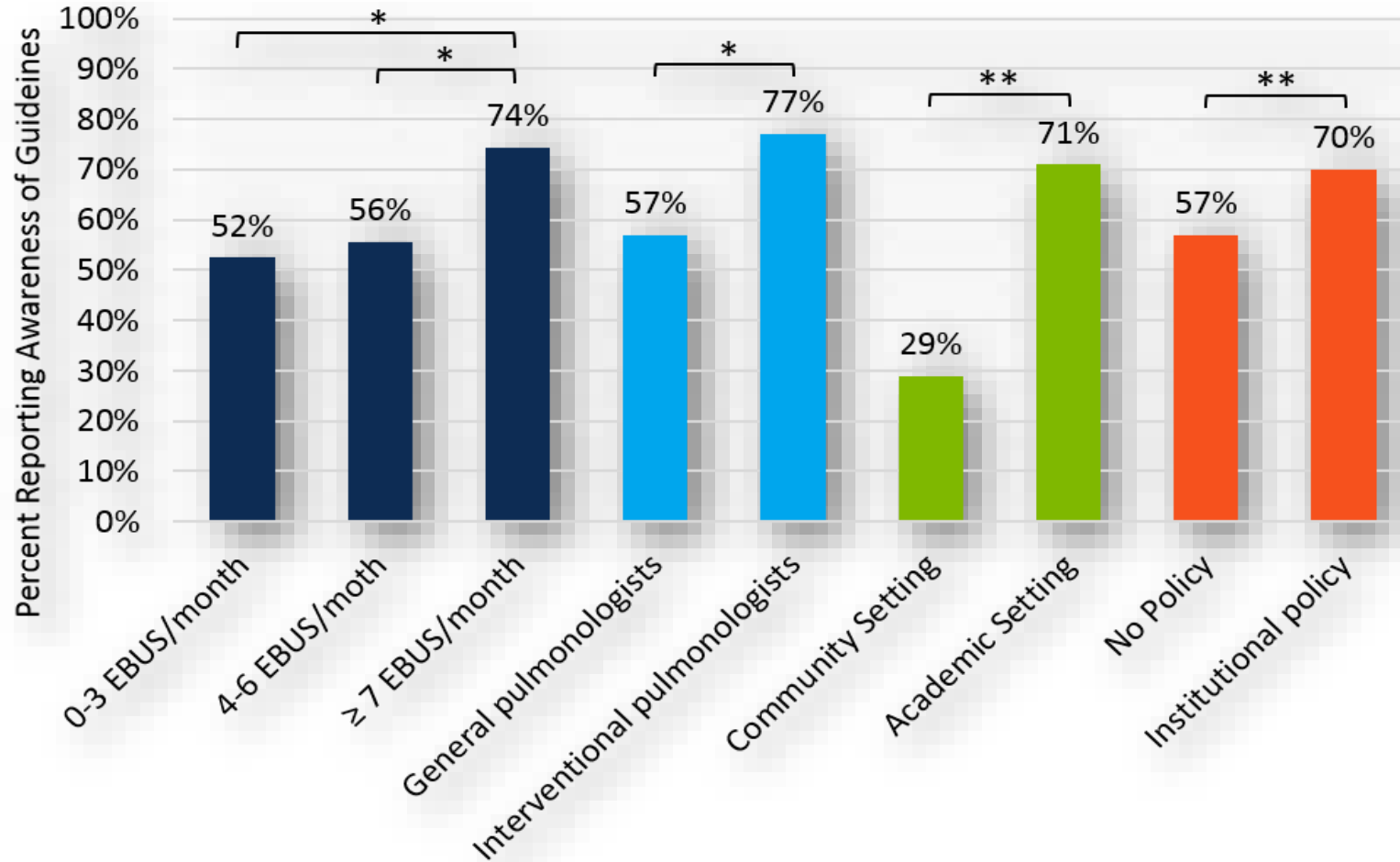
The Challenge for Pulmonologists

- 453 pulmonologists surveyed
- 67% community and 33% academic
- 51% 1-4 lung cancers/month

Number of Passes from EBUS for Biomarker Testing



Reported awareness of guidelines



Conclusions

EBUS-TBNA remains the cornerstone of staging the mediastinum in lung cancer and is effective in molecular analysis

TISSUE is the ISSUE, no matter what method is used.

Challenges of clinical integration include education, obtaining adequate amounts of DNA, and cost/insurance coverage.

Communication between Pulmonary, Oncology and Pathology is critical for the success of biomarker testing and treatment of patients with lung cancer.



Thank You



Open Discussion: Questions & Answers



Session 2 Case Presentation Infirmary Health

Jose Galeas, MD
Oncologist, Infirmity Cancer Care
Mobile, Alabama

Session Case Study

Provided by: Infirmiry Health

Focus: Patient



Patient Hx

78 year-old female ex 20 ppy smoking history, COPD

2016 Initial Diagnosis

- Stage I lung cancer – apical aspect of upper lobe of left lung
- s/p wedge resection - 11/3/2016 – grade 2 adenocarcinoma – 2.6 cm, 14/14 LN not involved, negative margins
- Final stage- T1bN0

2020 Recurrence

- 7/20/20 – T9 lesion biopsy – metastatic adenocarcinoma consistent with lung primary
- Tissue NGS – failed
- Blood NGS- PIK3CA mutation, EZH2 mutations
- Started carboplatin pemetrexed pembrolizumab

HD MIP No cut

DFDV 100.1 cm

Ex: Jun 23 2020

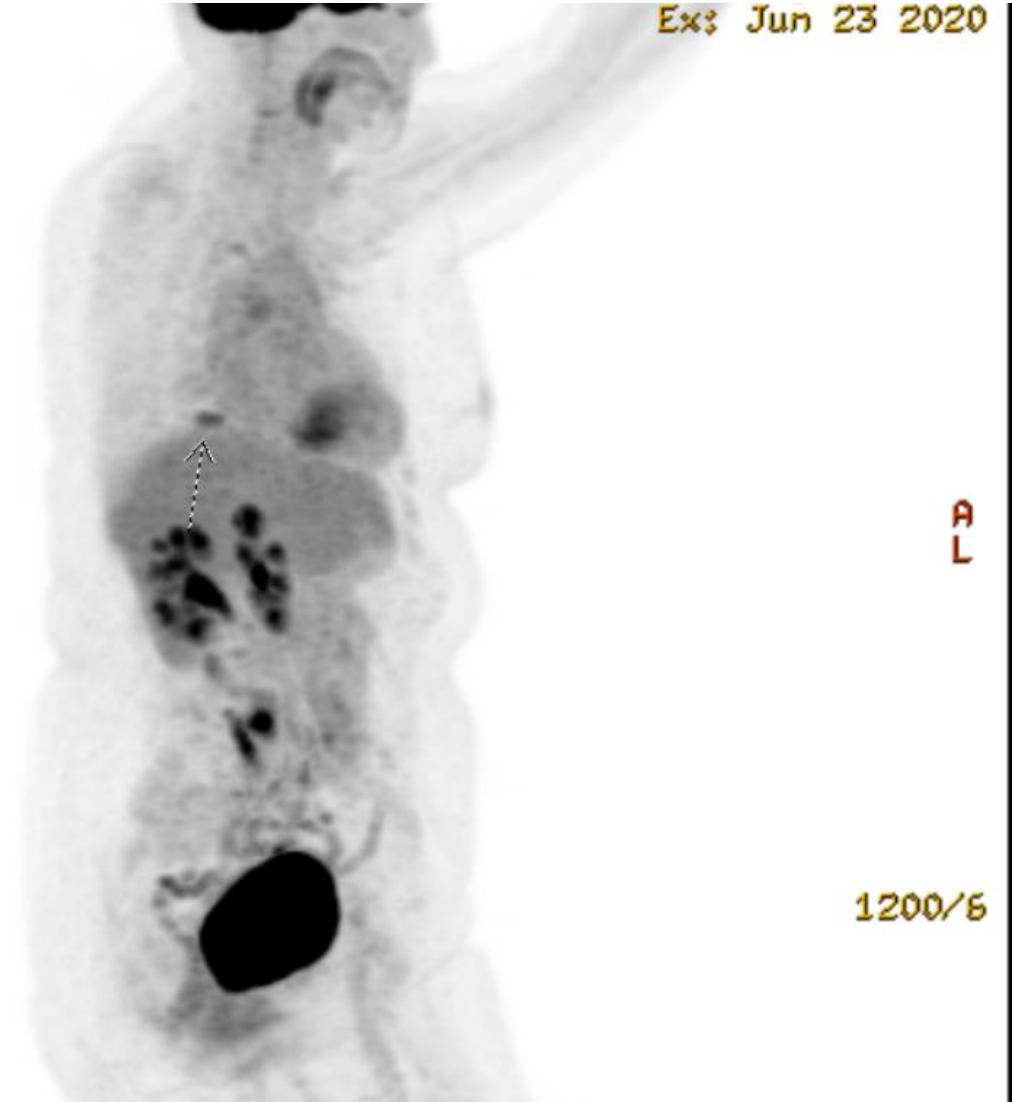
P
R

A
L

No VOI

1200/6

3.3mm /3.3sp



Session 2 Case Study

Provided by: Infirmiry Health



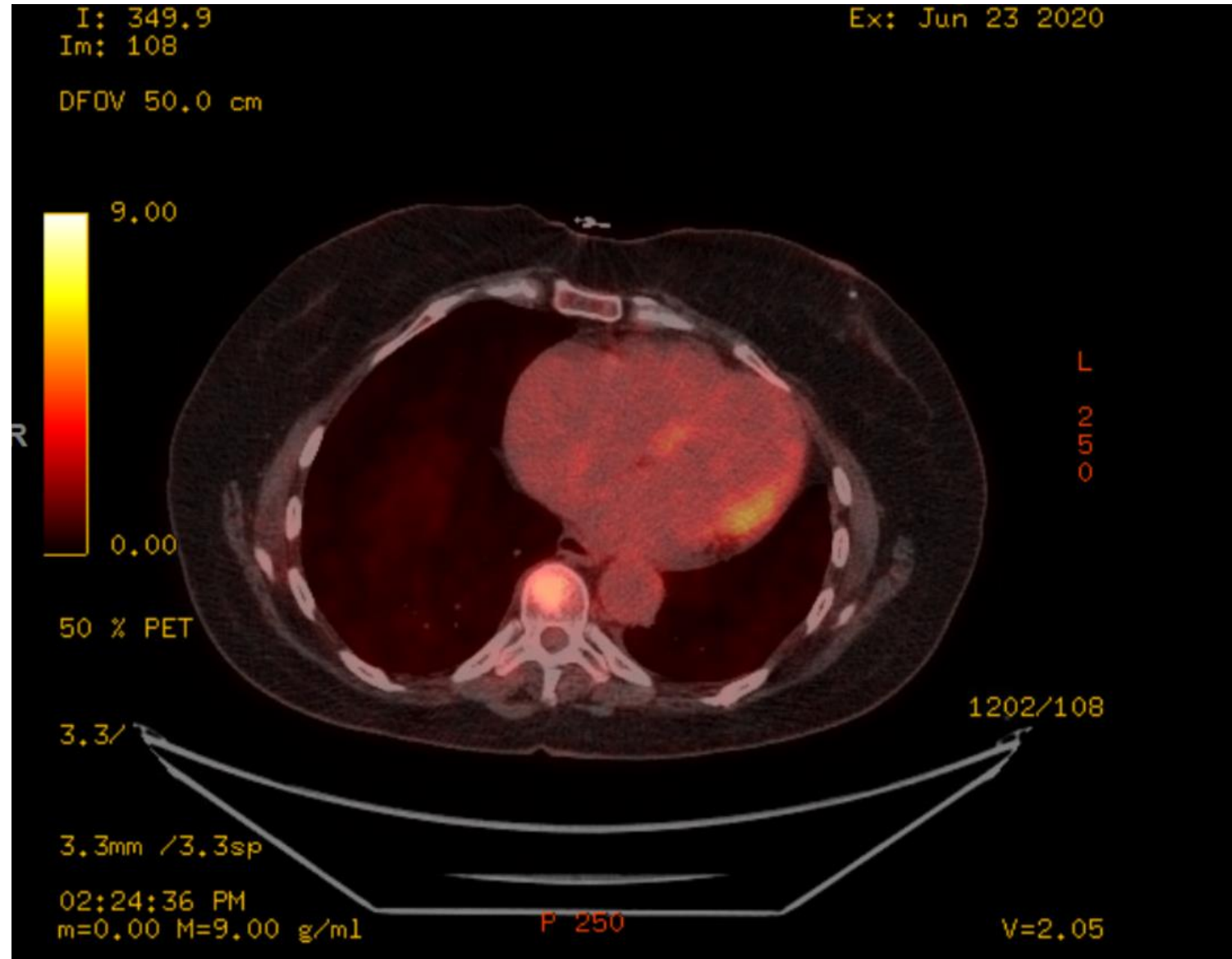
Patient Hx

2020 Recurrence

- 7/20/20 – T9 lesion biopsy – metastatic adenocarcinoma consistent with lung primary
- Tissue NGS - Failed
- Liquid NGS- PIK3CA mutation, EZH2 mutations
- Started carboplatin pemetrexed pembrolizumab

April 2022

- 4/7/22 - increase in size of pulmonary nodules
- Worsening symptoms and evidence of progression of disease in imaging
- 4/20/22 - Stopped pembrolizumab and started weekly nab - paclitaxel for better tolerance of therapy
- Liquid NGS from 4/13/22 showed positive IDH 1 , PIK3CA and EZH2 mutations -**no actionable targets**



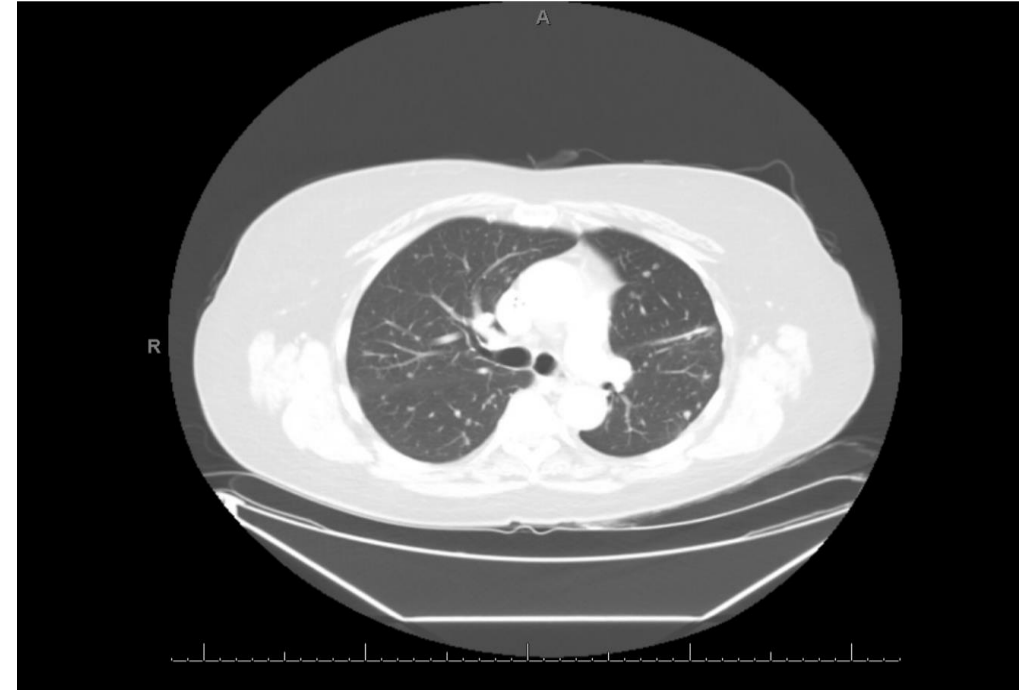
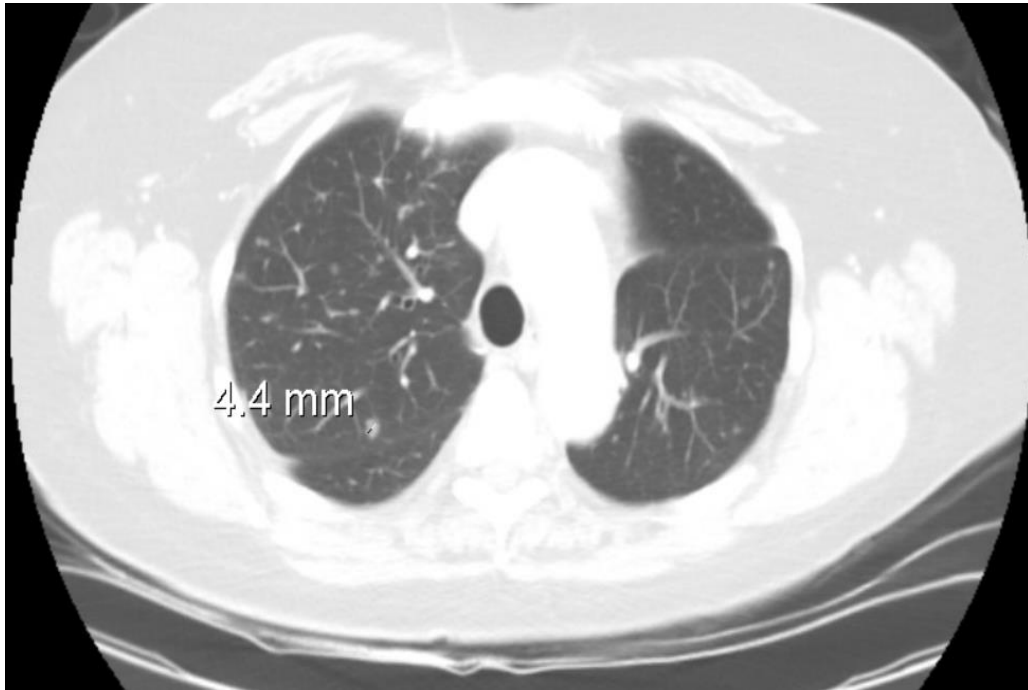
Session 2 Case Study

Provided by: Infirmiry Health



April 2022

- Patient symptomatic, stopped pembrolizumab
- started nab-paclitaxel – 4/20/22



November 2022

- CT scans 11/29/22 - reviewed - concern for worsening lung nodule densities
- Clinically no improvement
- Discussed with pulmonary robotic assisted bronchoscopy

Session 2 Case Study

Provided by: Infirmiry Health



January 2023

- Biopsy - 1/5/23 – Lung adenocarcinoma
- EGFR positive result

February 2023

- Started Osimertinib 2/2023

May 2023

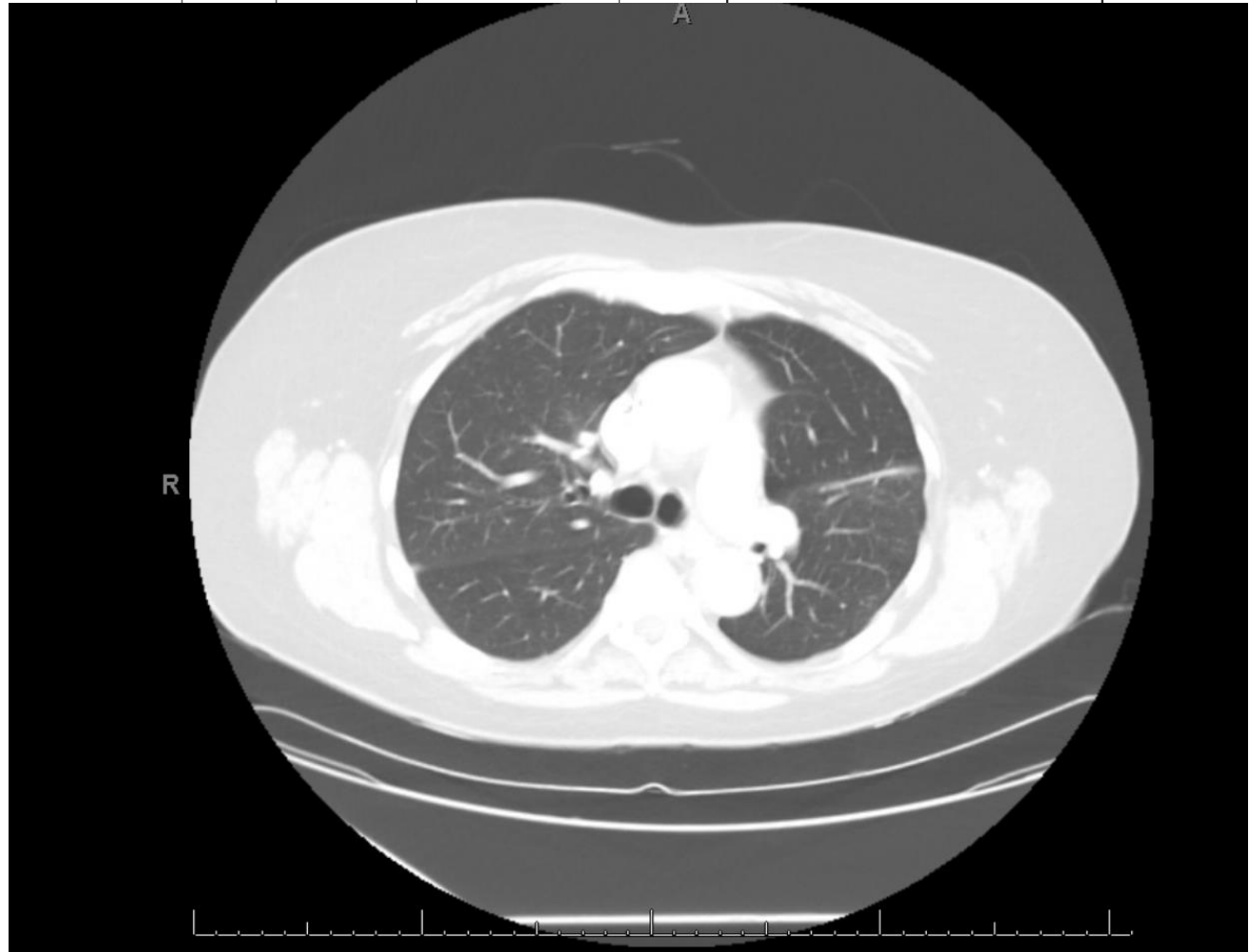
- CT imaging on 5/2023 significant improvement in pulmonary nodules

December 2023

- Most recent imaging 12/23 continues to show response
- Patient asymptomatic

Results with Therapy Associations

BIOMARKER	METHOD	ANALYTE	RESULT	THERAPY ASSOCIATION		BIOMARKER LEVEL*
EGFR L858R [†]	IHC	Protein	Positive 1+, 50%	BENEFIT	† afatinib, dacomitinib, erlotinib [†] , gefitinib, osimertinib	Level 2



Session 2 Case Study

Provided by: Infirmarary Health



Discussion & Questions

- Is tissue for NGS still king?
- What is the value of bone tissue for NGS?

Key points

- Implementation of new technology advances for biopsy
- Minimal requirements for pathology evaluation

Case Summary

78 y/o female patient; 20 ppy smoking history, COPD
2016 Initial diagnosis Stage 1 adenocarcinoma; T1bN0
2020 recurrence metastatic adenocarcinoma
2023 test result EGFR; Osmertinib in February 2023
2023 patient asymptomatic



Open Discussion: Questions & Answers

Session Reminders

Session 2 Slides, Recordings, & Resources will be made available within one week. All resources will be available on the [ACS ECHO Website](#).



Register Today for **Session 3**

March 6, 2024

4:00 – 5:00 PM EST



Topic: Choice of Panel, Interpretation of Results and Next Steps

Didactic Presenter: Ignacio Wistuba, MD, Professor and Chair,
Department of Translational Pathology

The University of Texas MD Anderson Cancer Center

Case Presenter: Deaconess Hospital, Inc. Newburg, Indiana

Session #	Month	Date	Time (ET)	Didactic Topic	Didactic Presenter	Facilitator
0	December	Weds. 12/13	4:00 – 5:00pm	Series Kick-Off: Introduction to ECHO and Biomarker Testing Guideline Overview:	Mimi Ceppa, MD, Aakash Desai, MBBS, MPH, Hilary Goeckner	Bruce E. Johnson, MD, FASCO
1	January	Weds. 1/17	4:00 – 5:00pm	Understanding the Barriers and Pathways to Lung Cancer Biomarker Testing	Millie Das, MD	Timothy Mullett, MD, MBA, FACS
2	February	Fri. 2/9	4:00 -5:00pm	Adequate Tissue for Sampling	Nichole Tanner, MD, MSCR	Bruce E. Johnson, MD, FASCO
3	March	Weds. 3/6	4:00 -5:00pm	Choice of Panel, Interpretation of Results and Next Steps	Ignacio Wistuba, MD	Timothy Mullett, MD, MBA, FACS
4	March	Weds. 3/27	4:00 -5:00pm	Improving Turnaround Time	Jason Merker, MD, PhD	Bruce E. Johnson, MD, FASCO
5	April	Weds. 4/24	2:00 - 3:00pm	Navigating Insurance Complexities	Hilary Goeckner & Cori Chandler	Bruce E. Johnson, MD, FASCO
6	May	Fri. 5/24	12:00 - 1:00pm	Series Wrap Up and Next Steps	Patient speaker	Timothy Mullett, MD, MBA, FACS

A Few Reminders



Next ECHO Session: March 6, 2024, 4:00–5:00 PM ET Topic: Choice of Panel, Interpretation of Results and Next Steps



Please *register now* for [Session 3](#) by using the QR code or the link in the chat.



Slides, Recordings, & Resources will be made available within one week. All resources will be available on the [ACS ECHO Website](#).



Case Presentations: Ready to schedule your presentation?
Contact Korey.Hofmann@cancer.org



Please send us a high-definition logo for your system.



Contact Korey if you haven't received calendar invitations for **Sessions 3 – 6**.



Questions? Korey Hofmann | korey.hofmann@cancer.org or Mindi Odom | mindi.odom@cancer.org



Questions?





Thank You