


Lung Cancer, Anything but Basic
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1 BELIEVE IN WHAT YOU SEE 

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Disclosures

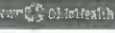
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Educational Objectives

Prepare	Prepare the outpatient clinician for the work-up of the pulmonary nodule/lung cancer diagnosis
Analyze	Analyze the current staging system and standard of care
Identify	Identify the treatment options of lung cancer and long term considerations of lung cancer patients

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Patient Presentation #1

- 35 year old male
- Presented to ED for abdominal pain
- Small nodule found on CT abdomen during work up



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Pulmonary Nodule

- Rounded opacity that is well or poorly defined
 - Well defined are often solid and clearly visible
 - Can be poorly defined or sub solid and ground glass in appearance.
- Can be up to 3 cm in diameter
- Greater than > 3cm is a lung mass

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Pulmonary Nodule

- Nodules are found in 8-51% of all CT chest
 - Regardless of smoking status
 - Regional differences
- 2 Most important factors to consider is growth rate and calcifications (Old Scans)
- Average doubling time of lung cancer is 110 days (20-400 days)

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Pulmonary Nodule Causes & Assessment

- Benign Nodules
 - Dense, Central, Uniform calcifications
 - Smooth rounded borders
 - Density measures >184 Hounsfield Units
- Cancers
 - Spiculated edges, Irregular shapes or Lobulated
 - >8mm
- Tiny nodules in fissures usually represent benign intrapulmonary lymph nodes

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Pulmonary Nodule Causes & Assessment

- Benign Causes: Infectious or inflammatory lesions, postinfectious scars, intrapulmonary lymph nodes
 - Granuloma (current or past infection)
 - Histoplasmosis
 - Inflammatory (sarcoidosis, RA)
 - Hamartoma/teratoma
- Lung cancers, Lymphomas, Carcinoid tumors, or Metastatic deposits

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Lung Cancer 2021

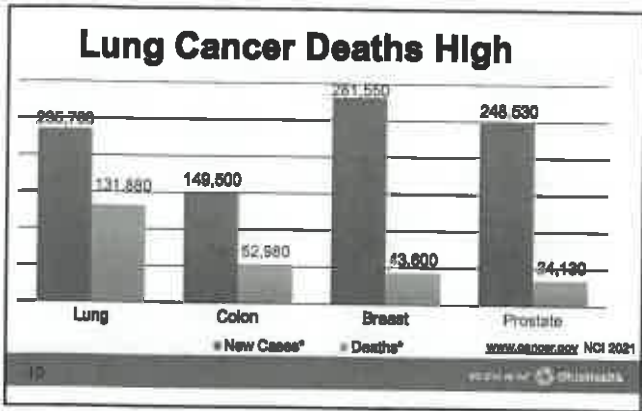
- 235,760 new cases
- 131,880 deaths in U.S.
- That is about 361 deaths a day in the U.S.
- 384,000 alive with history of lung cancer



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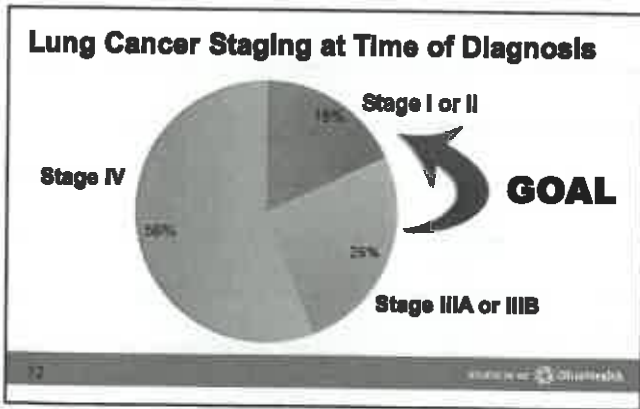
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Lung Cancer

- 13% all new cancers *not including skin
- Second most common new cases in men and woman behind prostate and breast
- Most common cause of death by malignancy in both men and women
- More fatal than breast, prostate and colon cancer combined

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Lung Cancer Screening

US Preventative Services Task Force
CXR, CT, Cytology from Sputum

JAMA 2011 Screening Trial
CXR Showed No Benefit

The National Lung Screening Trial

- N Engl J Med 2011; 365:396-409
- CT shows 20% reduction in mortality
- 7% reduction in number of deaths from any cause



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Lung Cancer Screening Continued

- Prevalence of Cancer 1.1 to 12%
- Harms: False -, False +, Over Diagnosis, Radiation Exposure, Psychosocial Stress
- 98% of all + findings do not lead to Cancer Dx
- 10-12% of + are over diagnosis because would not have been found in that patient's lifetime

	IA	IIIB	IV	Sensitivity	Specificity
CT (lead)	40%	12%	22%	85.8%	73.4%
CXR	21%	15%	20%	78.6%	81.0%

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Screening Take Away

- 2/2022 CMS announced it will expand the eligibility of high-tech lung cancer screening tests
- Age 50-77
- Asymptomatic
- Smoking history at least 20 pack years
- Current smoker or quit within last 15 years
- Received an order for LDCT

NCA - Screening for Lung Cancer with Low Dose Computed Tomography (LDCT) (CAG-004388) - Decision Memo (cms.gov)

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Risk Factors

- Smoking
 - 85-90%
- Radon
- Family history
- Age
- COPD
- Asbestos exposure
- Radiation to lungs
- Diesel exhaust

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Strides to Minimize Death Rate Increase

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Lung Cancer

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graph TD; NSCLC[Non-Small Cell Lung Cancer] --- Adeno[Adenocarcinoma 40-50%]; NSCLC --- Squamous[Squamous 35-40%]; NSCLC --- LargeCell[Large Cell 10%]; NSCLC --- Carcinoid[Carcinoid 6%]; SCLC[Small Cell Lung Cancer];
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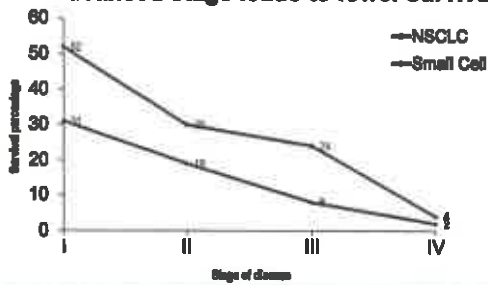
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Small Cell Lung Cancer

- 14% new cases (decreasing)
- 95% of time are smokers and M>F
- Mostly non-surgical
- Staged limited vs. extensive (1950s)
- 5 year survival less than 5%
- 70% presents with distant metastasis
- Limited Stage median survival 18 months
- Extensive median survival 6-12 months with Tx

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Advanced stage leads to lower survival



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5 Year Survival/Stage at Dx

- IA - 49-59.8%
- IB - 45%
- IIA - 31%
- IIB - 30%
- IIIA - 14%
- IIIB - 6%
- IV - 1%



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Patient Presentation #2

- 62 year old female presented to PCP with productive cough and fevers for a week
- Antibiotics
- RTC 2 weeks later complaining of continued cough



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CXR vs CT Chest

- CXR can discover nodules as small as 6mm but usually must be at least 1cm*
- CT can discover nodules as small as 2mm
 - * Radiologist Dependent
- Once nodule found enters surveillance
 - Fleischner Society

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CXR vs CT Chest



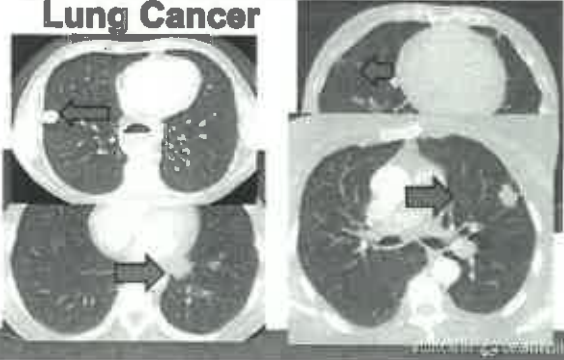
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Lung Cancer Risk Models

- MAYO Model (risk of cancer vs. clinical expert)
 - Proven not useful for surgeons
- PICO Model
- Bach Model
- Spitz Model
- SPN Calculator
 - <http://www.chestx-ray.com/index.php/calculators/spn-calculator>
- Lung nodule is 25% higher risk of CA if smoker


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Lung Cancer



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Squamous Cell NSCLC



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Outpatient Work-up of Lung Cancer

- CXR, CT chest
 - PET scan, MRI brain
- Pulmonary function studies
 - V/Q scan
- Stress or echo

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PET Scan

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Pulmonary Function Studies

- FEV1, RV and DLCO all reduced
 - Think **RESTRICTIVE** disease
- FEV1 and DLCO reduced but RV high
 - Think **OBSTRUCTIVE** disease
- Beware restrictive disease
- VQ if:
 - FEV1 1.2 or less
 - DLCO <40%
- Pre op RA ABG

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Lung Cancer Diagnosis & Staging

- CT biopsy
- Bronchoscopy
- Navigational/Robotic bronchoscopy

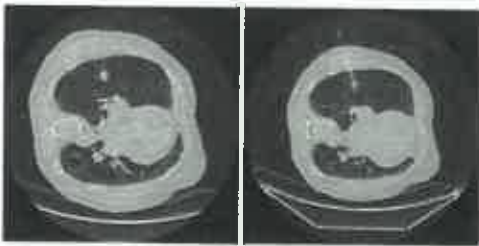
- Mediastinoscopy
- Endobronchial ultrasound biopsy

- Biomarker testing

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CT Biopsy



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Bronchoscopy



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Mediastinoscopy



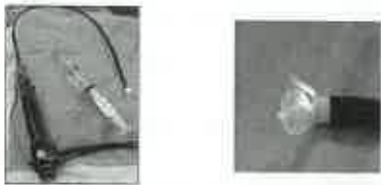
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QUESTIONS

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Endobronchial Ultrasound (EBUS)



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QUESTIONS

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Current Lung Cancer Staging System

- International Association for the Study of Lung Cancer 8th Edition

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QUESTIONS

04

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Staging 7th Edition

- IA – tumor <3cm ,N0
- IB – tumor 3-4 cm, N0
- IIA – tumor 4-5cm and N0, visceral pleural involvement
- IIB – tumor 5cm with N1 or tumor 5-7cm with N0, or same lobe nodules with N0
- IIIA – N2 nodes, tumor >7cm with N1, same lobe nodules, Chest wall/diaphragm/<cm carina
- IIIB – T4 extension, ipsilateral lung, N3
- IV – great vessels, mediastinum, carina, vital organs, contralateral lung, distant metastasis, or pleural effusion

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N0 = no nodes

N1 = ipsilateral hilar or peribronchial nodes

N2 = Subcarinal, ipsilateral mediastinal nodes

N3 = Contralateral nodes

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Lung Cancer Standard of Care

- **Non-Small Cell Lung Cancer**
 - Surgery
 - Immunotherapy/Chemo/radiation induction
 - Immunotherapy/Chemo/radiation definitive
- **Small Cell Lung Cancer**
 - Always chemo/radiation unless palliative surgical procedures

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Lung Cancer Surgical Treatment

- Thoracotomy, VATS, Robotic
 - Wedge
 - Segmentectomy
 - Lobectomy
 - Pneumonectomy
- Palliative Treatments
 - PDT, RFA, Stenting
- Other
 - Cyberknife, Brachytherapy

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Lobectomy = (Current) Standard of Care

- North American Lung Cancer Study Group
 - Prospective Randomized 1982-88
 - 247 patients (Low)
 - 75% recurrence with limited resection
 - 50% increase in cancer related death
 - Lobe increases lymphatic resection
- CALGB 140503
 - Phase III Randomized National Trial
 - Small peripheral nodule <2cm
 - Lobe vs sublobar resection
 - Preserve pulmonary function

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Post Operative Complications

- Cardiac Dysrhythmia (30%)
- Pneumonia
- Hemorrhage
- Prolonged Air Leak / Tension Pneumothorax
- Air emboli
- Respiratory Failure
- Diaphragm Perforation

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VATS/RATS Lobectomy

- Decrease pain medication
- Shortened length of stay
- Greater shoulder strength
- Increased PFTs
- Contraindications:
 - Extensive pulmonary adhesions (RATS improves)
 - Inability to tolerate single lung ventilation
 - Bulky hilar LAD or Calcified LAD

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5 Year Survival with Treatment

- IA - 49-52%
 - Surgical resection 75-92%
- IB - 45%
 - Surgery -> adjuvant chemo 60-85%
- IIA/IIB - 30-31%
 - Surgery -> adjuvant chemo/radiation 50-55%
- IIIA - 14%
 - Induction chemo/radiation -> surgery 25-30%
- IIIB - 6%
- IV - 4%

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Stereotactic Radiation/Cyberknife



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Molecular Target Therapies

- PD-L1
- EGFR 10%
- KRAS 15-25%
- ALK 3-5%
- MET 2-4%
- Braf 1%
- ROS1



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ESSENTIALS OF CHEST HEALTH

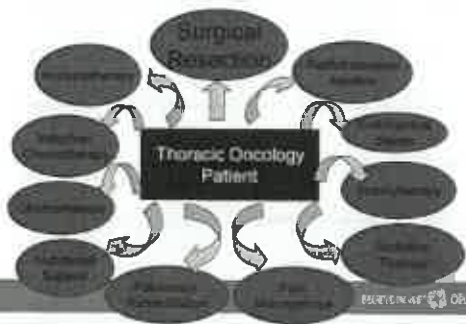
Survivorship

- Adjusting to physical and emotional changes after treatment
- Mental adjustment to fear of recurrence
- Follow up medical care
- Late effects of cancer treatment
- Family issues

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ESSENTIALS OF CHEST HEALTH

Comprehensive Lung Cancer Therapy



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ESSENTIALS OF CHEST HEALTH

Take Home Points

- Work up can be started prior to surgical referral
 - CT chest, PET scan, PFTs, stress test
- Current standard of care depends on the cancer staging
 - Surgical staging preferred over radiological
- Treatment options of thoracic oncology patients have both curative and palliative intent
- Cancer care extends well beyond primary therapy

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What questions do you have



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