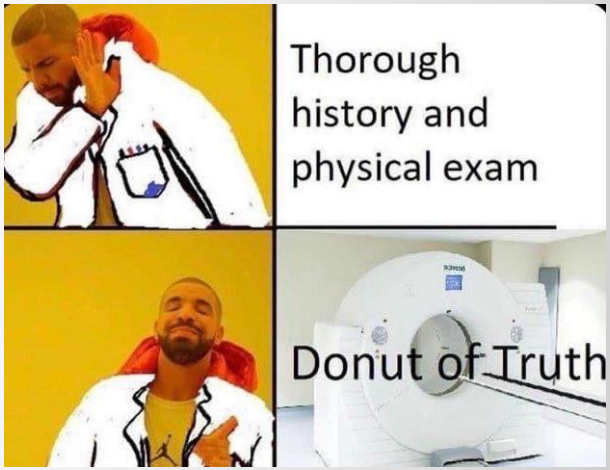
CANCER EDUCATION DAY

The Donut of Truth – CT Lung Cancer Screening. Managing Expectation of Patients and Providers

Dr. Youssef Almalki



Presenter Disclosure – None (so sad)

- Relationships with financial sponsors:
  - Grants/Research Support: N/A
  - Speakers Bureau/Honoraria: N/A
  - Consulting Fees: N/A
  - Patents: N/A
  - Advisory Boards: N/A

WINDSOR REGIONAL HOSPITAL
OUTSTANDING CARE – NO EXCEPTIONS!

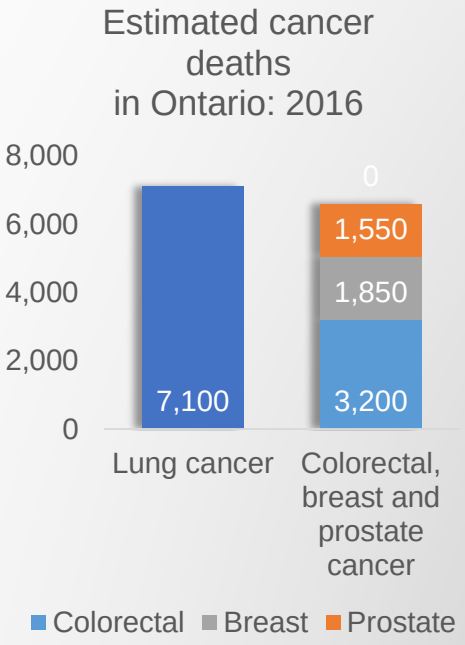
Objectives

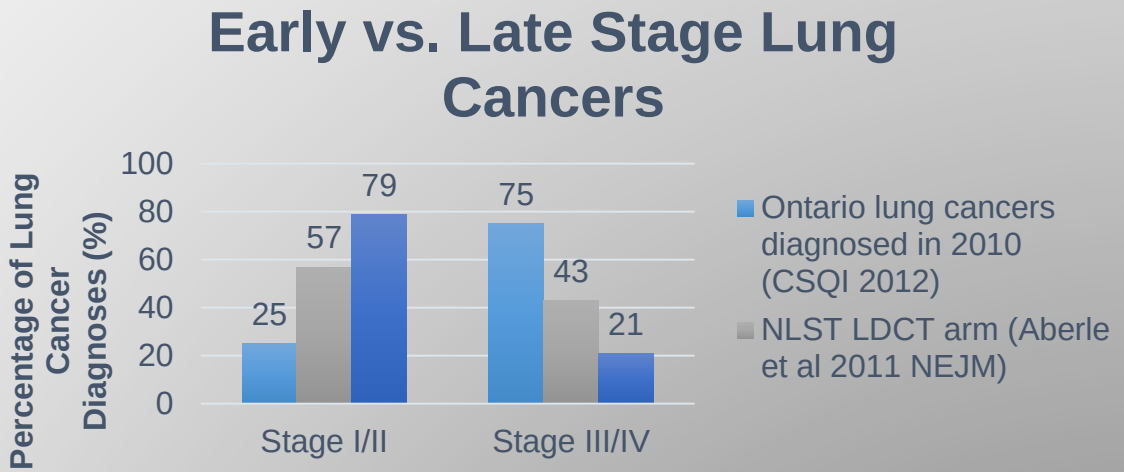
- Lung Cancer Statistics & Who Qualifies for Screening
- What to expect – patient experience.
- The CT exam / Report – the donut of truth.
  - CT report – Lung CT Screening Reporting and Data System(Lung RADS)

Lung Cancer - #1

- Number one cancer diagnosed world wide until 2020 (Breast Cancer became #1).
  - 2022 back at #1 (Lung CA 2,480,675 vs. 2,296,840 Breast CA– World Cancer Research fund).
- Leading cause of cancer death in Canada.
- Canada - Average age of lung cancer dx is 71.2 y.o
- **Three-year** net survival for lung cancer diagnosis at Stage 4 is 5%, but 71% for Stage 1. (Canadian Cancer Society Statistics 2020).

Lung Cancer in Ontario





One of the most commonly diagnosed cancers[1,2]

2016: An estimated 7,100 people died of lung cancer—more than colorectal, breast and prostate cancer combined

Most common cause of cancer death[1,2]

Responsible for ¼ of all cancer deaths

Approximately the same number of cancer deaths as the next 3 leading causes combined

In 2009, 71% of lung cancers in Ontario were attributable to active cigarette smoking[3]

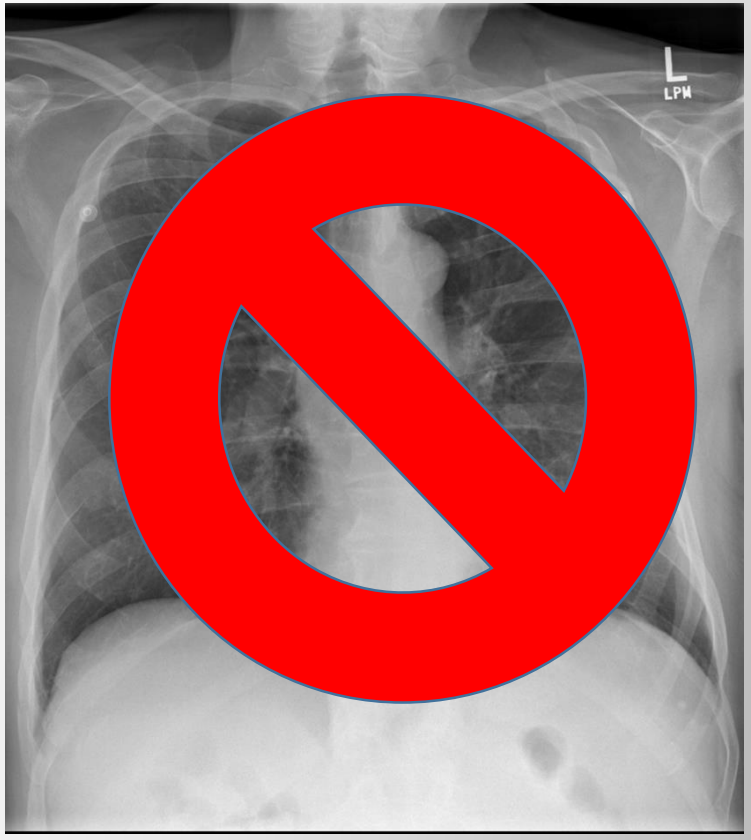
Only 15% of individuals diagnosed with lung cancer are alive after 5 years[2]

1 – Cancer Care Ontario, Incidence & Mortality in Ontario
2 – Canadian Cancer Statistics 2015
3 – Cancer Risk Factors in Ontario: Tobacco

Lung Cancer and Smoking

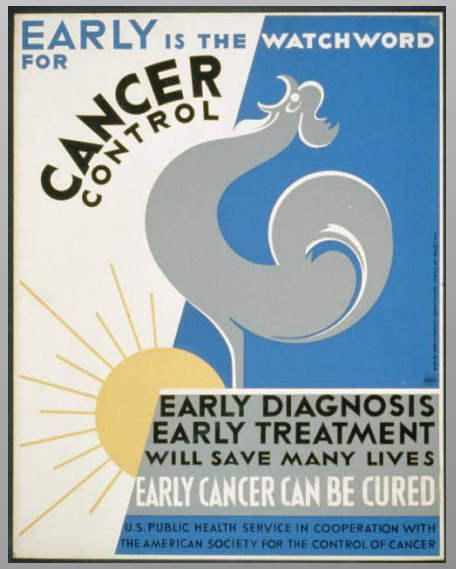
- Tobacco smoking
  - 90% of male Lung CA - 79% of female Lung CA (worldwide)
    - (what about the others – Residential Radon, Air pollution, physical inactivity, or ‘unlucky’).
- Landmark study
  - The National Lung Screening Trial (NLST) (CT vs CXR)
  - In three rounds of screening 24.2% of LDCT were positive vs only 6.9% via CXR.
  - 20% reduction in lung cancer mortality in low-dose CT group after 6 years of follow-up, and 7% reduction in all-cause mortality

Chest X-ray vs. LDCT



“An ounce of prevention is worth a pound of cure”

Benjamin Franklin



1938 Cancer Control

Qualifying for Lung Cancer Screening ONTARIO

55 to 74 years old

AND

Smoked cigarettes every day for at least 20 years

(Does not have to be 20 years in a row)

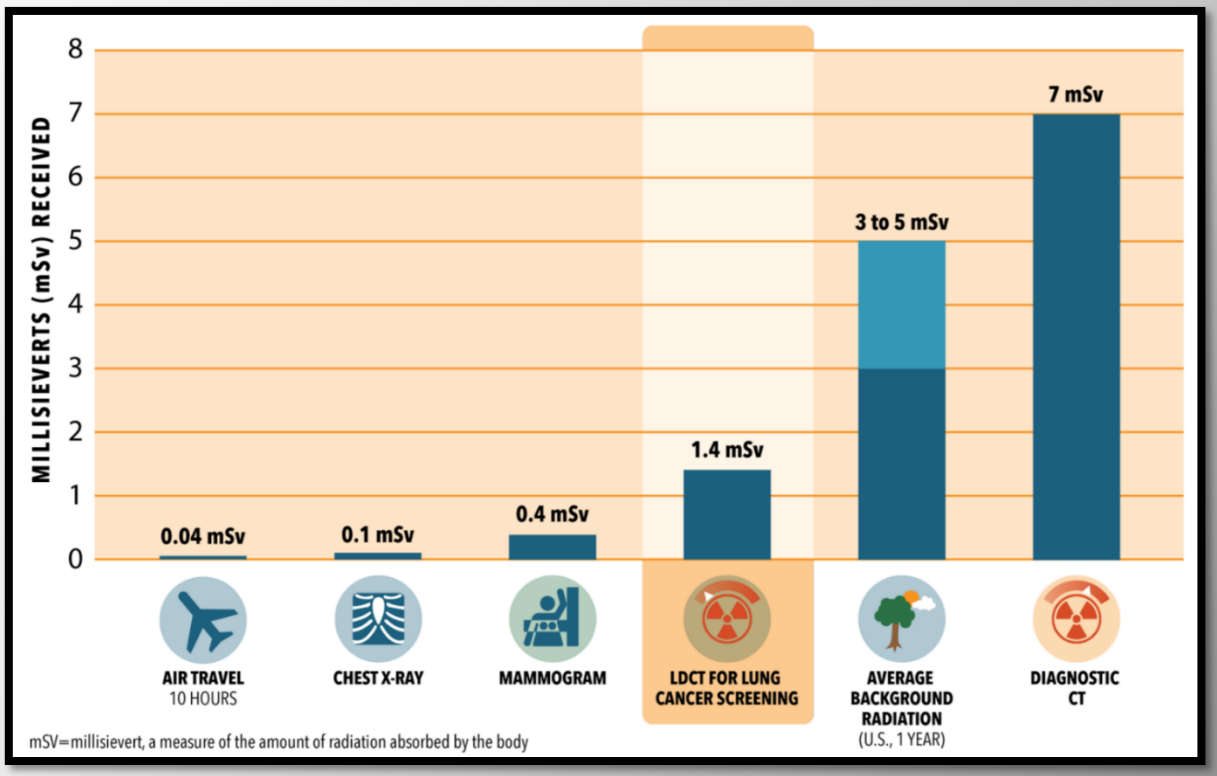
SCREENING IS FOR **ASYMPTOMATIC** PEOPLE

Patient Expectations

- Non-contrast scan. i.e. NO NEEDLES
- Total exam time ~10 minutes. Total scan time <1 min (around 5 seconds) or less.

Patient Expectations

- Low (Radiation) Dose CT -> “LDCT”



effectivehealthcare.ahrq.gov

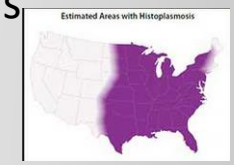
Banana Equivalent Dose (BED) 1.4 mSv is equal to 14,000 bananas.
[BED is only for education/comprehension and not a formal dose measurement.]

Provider Expectations
The LDCT Report – Maintaining Perspective.

- Let's remember what we are looking for –
  - LUNG NODULES (most of which are benign)
    - discrete, rounded opacity within the lung parenchyma that is <3 cm in diameter and completely surrounded by lung parenchyma without associated lymphadenopathy, atelectasis, or pneumonia.
  - DDx of Single Pulmonary Nodule (SPN) [StatPearls Publishing; 2024 Jan-]

- TB
- Organizing pne
  /grandulation t
- Sacroidosis /Sil
- Aspergilosis
- Histoplasomsis

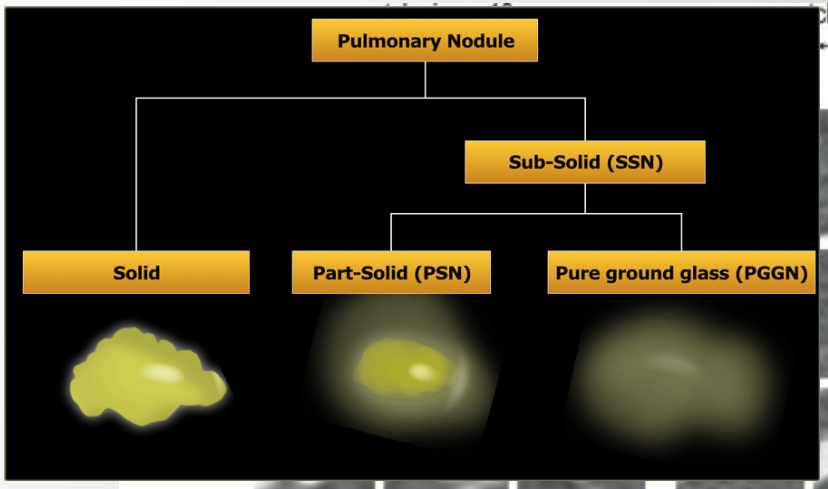
Type of Cause	Condition
Neoplastic (malignant)	Primary lung malignancies (non–small cell, small cell, carcinoid, lymphoma), solitary metastasis
Benign	Hamartoma, arteriovenous malformation
Infectious	Granuloma, round pneumonia, abscess, septic embolus
Noninfectious	Amyloidoma, subpleural lymph nodule, rheumatoid nodule, Wegener granulomatosis, focal scarring, infarct
Congenital	Sequestration, bronchogenic cyst, bronchial atresia with mucoid impaction

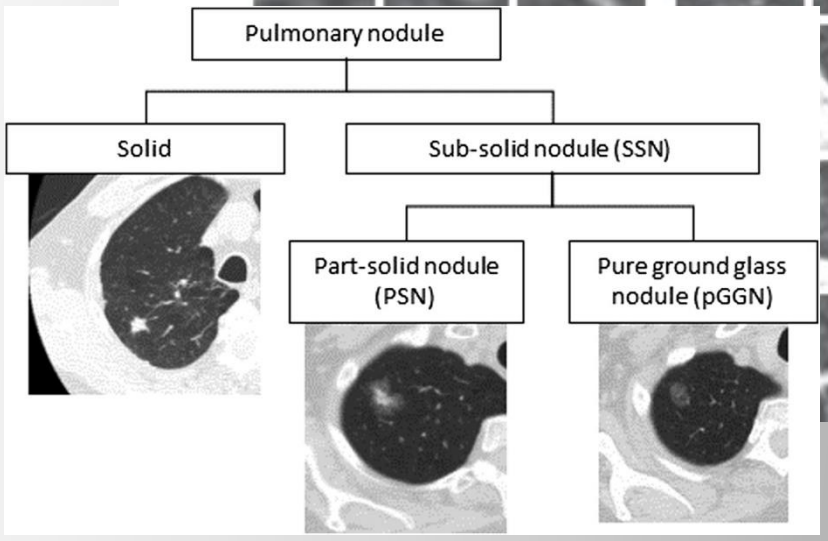


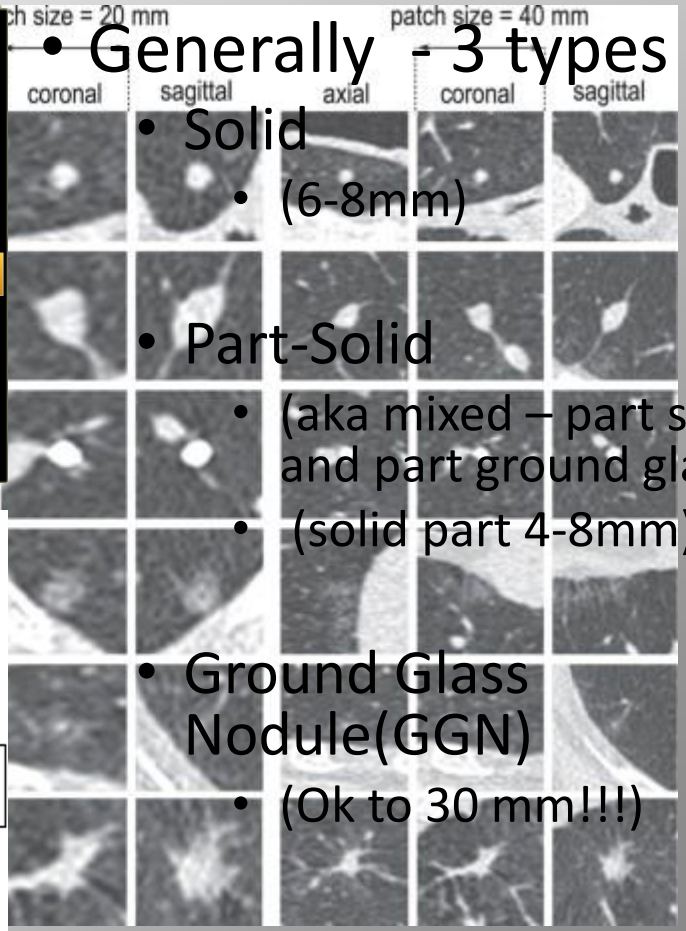
- Pleomorphic adenoma
- Pulmonary amyloidosis
- Pulmonary hamartoma
- Lymphoma

- Granulomatosis with
  giitis.
  infection – e.g.
  nyosis.
  alcified granuloma
- Normal confluent pulmonary veins
- Primary lung CA / Mets

Provider Expectations – Nodule types (& sizes of concern)







- Generally - 3 types
- Solid
  - (6-8mm)
- Part-Solid
  - (aka mixed – part solid and part ground glass)
  - (solid part 4-8mm)
- Ground Glass Nodule(GGN)
  - (Ok to 30 mm!!!)

CT Report & Lung RADS

Lung-RADS® Version 1.1

Assessment Categories Release date: 2019

Category Descriptor	Lung-RADS Score	Findings	Management	Risk of Malignancy	Est. Population Prevalence
Incomplete	0	Prior chest CT examination(s) being located for comparison Part or all of lungs cannot be evaluated	Additional lung cancer screening CT images and/or comparison to prior chest CT examinations is needed	n/a	
Negative No nodules and definitely benign nodules	1	No lung nodules Nodule(s) with specific calcifications: complete, central, popcorn, concentric rings and fat containing nodules			
Benign Appearance or Behavior Nodules with a very low likelihood of becoming a clinically active cancer due to size or lack of growth	2	**Perifissural nodule(s)** (see Footnote 11) < 10 mm (524 mm³) **Solid nodule(s):** < 6 mm (< 113 mm³) new < 4 mm (< 34 mm³) **Part solid nodule(s):** < 6 mm total diameter (< 113 mm³) on baseline screening **Non solid nodule(s) (GGN):** <30 mm (<14137 mm³) **OR** ≥ 30 mm (≥ 14137 mm³) and unchanged or slowly growing **Category 3 or 4 nodules unchanged for ≥ 3 months**	Continu… screening … 12…		
Probably Benign Probably benign finding(s) - short term follow up suggested; includes nodules with a low likelihood of becoming a clinically active cancer	3	**Solid nodule(s):** ≥ 6 to < 8 mm (≥ 113 to < 268 mm³) at baseline **OR** new 4 mm to < 6 mm (34 to < 113 mm³) **Part solid nodule(s)** ≥ 6 mm total diameter (≥ 113 mm³) with solid component < 6 mm (< 113 mm³) **OR** new < 6 mm total diameter (< 113 mm³) **Non solid nodule(s)** (GGN) ≥ 30 mm (≥ 14137 mm³) on baseline CT or new			
Suspicious Findings for which additional diagnostic testing is recommended	4A	**Solid nodule(s):** ≥ 8 to < 15 mm (≥ 268 to < 1767 mm³) … baseline **OR** growing < 8 mm (< 268 mm³) **OR** new 6 to < 8 mm (113 to < 268 mm³) **Part solid nodule(s):** ≥ 6 mm (≥ 113 mm³) with solid component ≥ 6 mm to < 8 mm (≥ 113 to < 268 mm³) **OR** with a new or growing < 4 mm (< 34 mm³) solid component Endobronchial nodule			
Very Suspicious Findings for which additional diagnostic testing and/or tissue sampling is recommended	4B	**Solid nodule(s)** ≥ 15 mm (≥ 1767 mm³) … new or growing, and ≥ 8 … (≥ 268 mm³) **Part solid nodule(s) with:** a solid component ≥ 8 mm (≥ 268 mm³) **OR** a new or growing ≥ 4 mm (≥ 34 mm³) solid component	Chest CT with … without contrast, PET/CT and/or tissue sampling depending on the *probability of malignancy and comorbidities. PET/CT may be used when there is a ≥ 8 mm (≥ 268 mm³) solid component. *For new large nodules that develop on an annual repeat screening CT, a 1 month LDCT may be recommended to address potentially infectious or inflammatory conditions*	> 15%	2%
	4X	Category 3 or 4 nodules with additional features or imaging findings that increases the suspicion of malignancy			
Other Clinically Significant or Potentially Clinically Significant Findings (non lung cancer)	S	**Modifier - may add on to category 0-4 coding**	As appropriate to the specific finding	n/a	10%

American College of Radiology™ — Lung-RADS® v2022

Release Date: November 2022

Lung-RADS	Category Descriptor	Findings	Management
0	**Incomplete** Estimated Population Prevalence: ~ 1%	Prior chest CT examination being located for comparison (see note 9)	Comparison to prior chest CT;
		Part or all of lungs cannot be evaluated	Additional lung cancer screening CT imaging needed;
		Findings suggestive of an inflammatory or infectious process (see note 10)	1-3 month LDCT

ACR American College of Radiology — Lung-RADS® 2022

Release Date: November 202…

Lung-RADS	Category Descriptor	Findings	Management
0	**Incomplete** Estimated Population Prevalence: ~ 1%	Prior chest CT examination being located for comparison (see note 9)	Comparison to prior chest CT;
		Part or all of lungs cannot be evaluated	Additional lung cancer screening CT imaging needed;
		Findings suggestive of an inflammatory or infectious process (see note 10)	1-3 month LDCT
1	**Negative** Estimated Population Prevalence: 3…	**No lung nodules OR** **Nodule with benign features:** …mplete, central, popcorn, or concentric ring calcifications **OR**	
		…r at baseline or new **AND** …ntiform, or triangular shape	
		…OR	12-month screening LDCT
		…(< 113 mm³) at baseline	
		…³) at baseline, new, or growing **OR** …mm³) stable or slow-growing (see note 7)	
		…egmental at baseline, new, or stable (see note 11)	
		…t is stable or decreased in size at 6-month follow-up CT, **OR** …es that resolve on follow-up, **OR**	
		…oven to be benign in etiology following appropriate	
		…268 mm³) at baseline **OR** …to < 113 mm³)	
		…(≥ 113 mm³) with solid component < 6 mm (< 113 mm³)	
		…ameter (< 113 mm³)	6-month LDCT
		…baseline or new	
		…e note 12)	
		…(mean diameter) of a thick-walled cyst	
		…stable or decreased in size at 3-month follow-up CT	
		…< 1,767 mm³) at baseline **OR**	
		…mm³) **OR**	
		…to < 268 mm³)	
		…diameter (≥ 113 mm³) with solid component ≥ 6 mm to < 8 mm	3-month LDCT;
		…³) at baseline **OR**	PET/CT may be considered if there is a ≥ 8 mm (≥ 268 mm³) solid nodule or solid component
		…4 mm (< 34 mm³) solid component	
		…or more proximal at baseline or new (see note 11)	
		…e note 12)	
		…OR	
		…that becomes multilocular	
		…or more proximal, and stable or growing (see note 11)	Referral for further clinical evaluation
4B	**Very Suspicious** Estimated Population Prevalence: 2%	…³) at baseline **OR** …≥ 8 mm (≥ 268 mm³)	Diagnostic chest CT with or without contrast;
		…mponent ≥ 8 mm (≥ 268 mm³) at baseline **OR**	PET/CT may be considered if there is a ≥ 8 mm (≥ 268 mm³) solid nodule or solid component;
		…or growing ≥ 4 mm (≥ 34 mm³) solid component	
		…pical pulmonary cyst (see note 12) - thick-walled cyst with growing wall thickness/nodularity **OR** - Growing multilocular cyst (mean diameter) **OR** - Multilocular cyst with increased loculation or new/increased opacity (nodular, ground glass, or consolidation)	tissue sampling; and/or referral for further clinical evaluation
		Slow-growing solid or part-solid nodule that demonstrates growth over multiple screening exams (see note 8)	Management depends on clinical evaluation, patient preference, and the probability of malignancy (see note 13)
4X	Estimated Population Prevalence: < 1%	Category 3 or 4 nodules with additional features or imaging findings that increase suspicion for lung cancer (see note 14)	
S	**Significant or Potentially Significant** Estimated Population Prevalence: 10%	**Modifier:** May add to category 0-4 for clinically significant or potentially clinically significant findings unrelated to lung cancer (see note 15)	As appropriate to the specific finding

The LDCT Report – Lung RADS

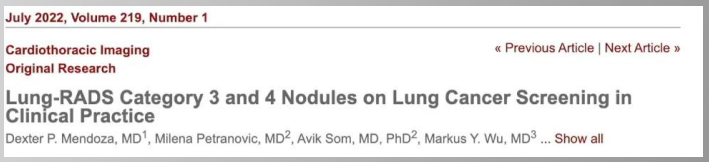
- Lung CT Screening Reporting and Data System
  - Decrease f/up and false positives.
  - 5 Categories

	Category Descriptor	Category Descriptor	Primary Category	Expected Distribution	Probability of Malignancy
NEG	Incomplete	-	0		
NEG	Negative	No nodules & definitely benign nodules	1	90%	< 1%
NEG	Benign Appearance or Behavior	Nodules with a very low likelihood of becoming a clinically active cancer due to size or lack of growth	2		
POS	Probably Benign	Probably benign finding(s) - short term follow up suggested; includes nodules with a low likelihood of becoming a clinically active cancer	3	6%	1-2%
POS	Suspicious	Findings for which additional diagnostic testing is recommended	4A	2%	5-15%
POS	Very Suspicious	Findings for which additional diagnostic testing and/or tissue sampling is recommended	4B	2%	> 15%

Let's do Lung-RADS Category '4'

Category	Probability of CA[1]	Management
3	1-2%	LDCT in 6 months
4A	5-15%	LDCT in 3 months (or PET/CT)
4B	>15%	Contrast CT, PET/CT +/-Tissue sampling.
4X	76.8%[1] (frequency)	Same as 4B.

- "X" Category 3 or 4 nodules with additional features or imaging findings that increase the suspicion for lung cancer.
  - E.g. spiculation, LN, mets, or GGN that doubles in size in 12 months.
- "S" modifier – (10% of cases will have this) Significant or potentially significant finding.
  - This can be added to any category. E.g. 1S, or 3S. E.g. Aortic aneurysm, breast nodule, axillary LN, or renal mass.


July 2022, Volume 219, Number 1

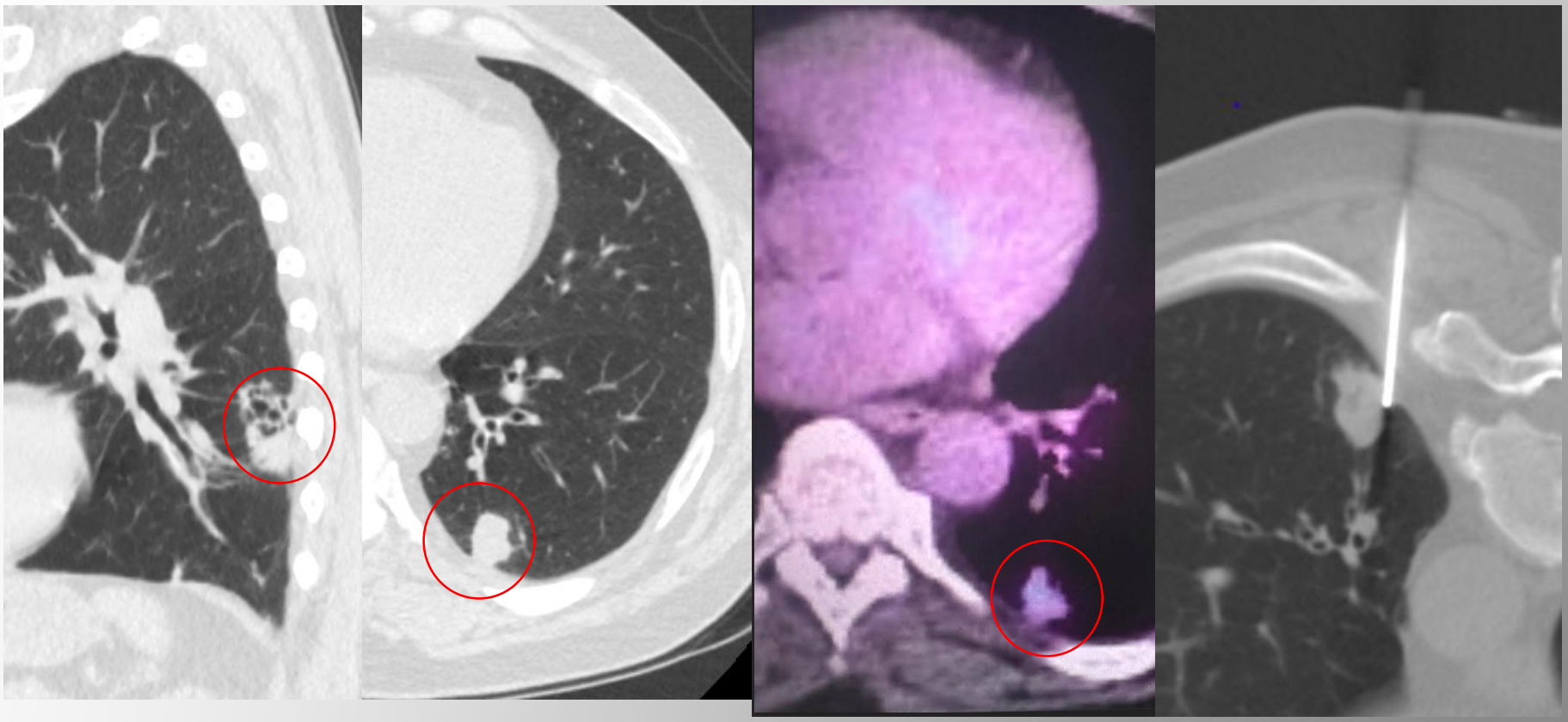
Cardiothoracic Imaging
Original Research

« Previous Article | Next Article »

Lung-RADS Category 3 and 4 Nodules on Lung Cancer Screening in Clinical Practice

Dexter P. Mendoza, MD[1], Milena Petranovic, MD[2], Avik Som, MD, PhD[2], Markus Y. Wu, MD[3] ... Show all

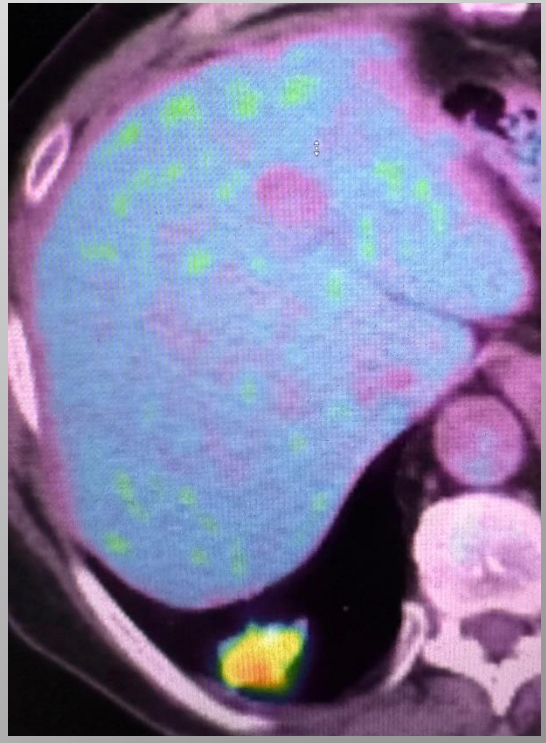
Case 1: 67 y.o. male, 17 mm nodule (with adjacent cystic change)

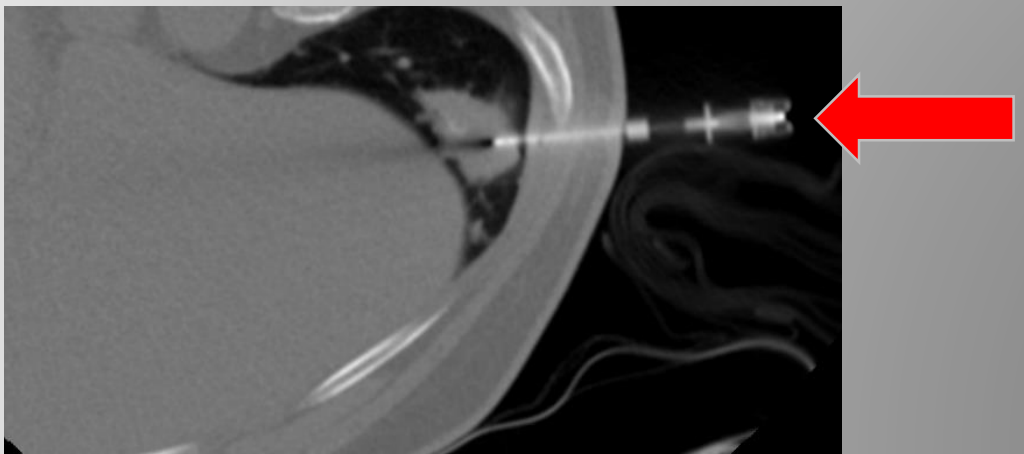


- PET Negative

Bx: adenocarcinoma with lipiedic pattern.
Resected and doing well at 1yr.

Case 1: 71 yo male, 3.2 cm mass, PET Positive.





Summary

- Lung CA = #1 cause of CA death in Canada.
  - Most common CA in the world and in the indigenous pop of Ontario.
- CT Lung cancer screening saves lives.
- The LDCT exam is safe, fast, non-contrast / non-invasive.
- LDCT report will have Lung RADS to guide follow-up / management. Lung RADS '4' esp. **4B and 4X** will need the most attention with PET/CT -/+ Bx.

Question & Answer