



Screening for lung cancer

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Outline

- Lung cancer mortality
- Why Screen?
- Risk/Benefits
- What to do

Lung cancer mortality

- 5 Kiwis die a day from Lung Cx
- Top cancer death
- More than breast, prostate, melanoma combined
- Up to 1 in 5 lung are never smokers

Why Screen?

- $\frac{3}{4}$ patients present with symptoms too late to cure
- Earlier pick up much better survival
- Less radical surgery needed
- Low dose CT (LDCT)

	Events/N	MST	24 months	60 months
IA1	68/781	NR	97%	92%
IA2	505/3105	NR	94%	83%
IA3	546/2417	NR	90%	77%
IB	560/1928	NR	87%	68%
IIA	215/585	NR	79%	60%
IIB	605/1453	66.0	72%	53%
IIIA	2052/3200	29.3	55%	36%
IIIB	1551/2140	19.0	44%	26%
IIIC	831/986	12.6	24%	13%
IVA	336/484	11.5	23%	10%
IVB	328/398	6.0	10%	0%

NLST trial 2011

- RCT: annual screening with LDCT vs chest x-ray for 3 years in 53,454 high-risk persons in US
- ♂ and ♀, 55 to 74 yo,
 - ≥30 pack-years of smoking
 - current smokers and those ceased within 15 years
- LDCT reduced mortality by 20%
- Number needed to prevent one lung cancer death **333**
- 1060 vs 941 cases after 6.5 years

Risk

- 24.2% abnormal findings
 - 96% false +ve
 - 11% invasive tests
 - Incidental findings, thyroid/adrenal nodules, coronary and others
- Radiation risk, for 108 discovered 1 induced by radiation
- Short term distress presumably
- Overdiagnosis, high risk of other things already

e-Table 11: Potential Categorization of Incidental Findings

Category	Incidence ^a	Likely next step	Examples
Not clinically relevant	50%	no directed investigation necessary	Mild-moderate coronary artery calcification, ^b emphysema, bronchial wall thickening, skeletal degenerative changes, liver cyst(s), renal cyst(s), hiatal hernia, focal atelectasis, mild mod aortic dilatation, pleural plaques, pulmonary fibrosis, adrenal lesions <10 HU, other diaphragmatic hernia, bronchiectasis, low risk thyroid nodule ^c , renal stone, gallstone, pancreatic cyst, splenic cyst
Possibly clinically relevant	10%	Further investigation may be indicated	adrenal lesions >10 HU, mediastinal adenopathy (>1 cm), compression fracture, breast nodule, suspicious thyroid nodule ^c , pancreatic cyst, moderate-severe coronary artery calcification, ^b aortic aneurysm 4-5.5 cm
Clinically concerning	<1%	Therapeutic intervention may be indicated	pneumonia, aortic aneurysm ≥5.5 cm, mass or lesion suspicious for malignancy (e.g. bone destruction), segmental/lobar atelectasis, large pleural effusion, large pericardial effusion

Examples are ordered according to reported frequency^{20,50,51,118,119,146}

^a estimated ^b although significant Coronary artery calcification is associated with increased risk of cardiovascular events, there is insufficient evidence that investigation or intervention is of benefit in asymptomatic patients. ^clow risk thyroid nodule (by CT) is defined as <1.5 cm without evidence of tissue invasion or node enlargement

Benefits

- No point with chest x-ray
- Maybe screening encourages smoking cessation
- Picks up more early stage cancers
- Baseline scan is not enough

NSU criteria

- the condition is suitable for screening ✓
- there is a suitable test ✓
- there is an effective and accessible treatment or intervention for the condition ✓
- there is high-quality evidence that a screening programme is effective in reducing death and illness
- the potential benefit of the test should outweigh potential harm
- the health sector should be capable of supporting diagnosis, follow-up and programme evaluation ✗
- there is consideration of social and ethical issues; there is consideration of cost-benefit issues.

What to do

- No routine CXRs and sputum cytology
- Not publically funded in Australia and NZ
 - Cost too high in terms of infrastructure
- With insurance don't use the word screening in request

- If 30 pack year smoking aged between 55-77 can consider low dose CT for yearly basis
- Only in who can have treatment and reasonable life expectancy

e-Table 12: Overview of Guidelines Related to Management of Incidental Findings

Site (reference)	Source	Level of Evidence	Population ^a	No Further Investigation Recommended for:	Consider Further Investigation Recommended for:
Coronary Artery calcification ⁸	none				
Aortic enlargement ¹³	ACCF, AHA	Guideline	general referral population (no high familial risk)	diameter <3.5 cm	Consider annual surveillance imaging if 3.5-4.5 cm, biannual if 4.5-5.4 cm consider therapeutic intervention if ≥5.5 cm
Liver ¹⁴	ACR	Consensus, indirect	general population >40 ^b	< 1.5 cm, or any size with benign features (sharply marginated, homogeneous, < 20 HU)	MR or CT with IV contrast if ≥1.5 cm and suspicious features (ill-defined margin)
Renal ¹⁵	ACR	Consensus, indirect	general population	Small (TSTC), homogeneous and either - 10 to 20HU or >70 HU; <-10 HU but solitary, no calcification, <4 cm	MR if 21-69 HU or heterogeneous (thickening, nodularity, calcification, septations) or if <-10 HU with calcifications, multiplicity or >4 cm
Thyroid ¹⁸	ACR	Consensus, indirect	general population of adults >35	< 1.5 cm and no lack suspicious features	US±FNA if >1.5 cm or suspicious (invasion of local tissues or abnormal lymph nodes – i.e. calcifications, cystic components, and/or increased enhancement)
Adrenal ¹⁹	ACR	Consensus, indirect	general population	<1 cm, or 1-4 cm but <10 HU, known to be stable for ≥ 1 year,	CT in 1 year if 1-2 cm, >10 HU, dedicated cm CT, MR if 2-4 cm and >10 HU if >4 cm, consider biopsy, resection, PET
Pancreas cyst ²¹	ACR	Consensus, indirect	general population	none	serial imaging if benign features: every 4-24 mo depending on size (<1.5, 1.5-2.5, >2.5 cm) and age (< or ≥65) EUS/FNA if mural nodule, thickening, duct dilation (for any size cyst) more active workup (image every 4 mo or EUS/FNA) if no communication with main pancreatic duct
Biliary system ²⁰	ACR	Consensus, indirect	asymptomatic general population	Gallstones, GB wall calcification, GB sludge, GB wall thickening, polyps ≤6 mm, GB distention	consider LFT if there is biliary duct dilation, yearly US surveillance of polyps 7-9 mm; consider cholecystectomy for polyps ≥10 mm
Spleen ²²	ACR	Consensus, indirect	asymptomatic general population	Homogeneous, thin wall, <20HU	f/u imaging in 6-12 mo if indeterminate (heterogeneous, >20HU, smooth margins, enhancement) PET or FNA if suspicious (heterogeneous, irregular margins, enhancement, necrosis, parenchymal invasion)

ACCF, American College of Cardiology Foundation; ACR, American College of Radiology; AHA, American Heart Association; CT, computed tomography; EUS, endoscopic ultrasound; FNA, fine needle aspiration; GB, gallbladder; HU, Hounsfield units; IV, intravenous; LFT, liver function tests; MR, Magnetic resonance imaging; mo, months; PET, positron emission tomography; TSTC, too small to characterize; US, ultrasound

^a By definition these are incidental findings unless otherwise noted, implying that the patients are asymptomatic relative to the lesions addressed in the table. Entries in this table also exclude recommendations for patients that would not be eligible for lung cancer screening.

^b excludes patients at high risk of developing liver cancer or a history of cancers likely to metastasize to the liver

Other comments

- If they have symptoms it is no longer screening
- Red Flags = get a chest x-ray
 - Haemoptysis
 - New/persistent/changed cough >6 weeks
 - Thoracic pain
 - Weight loss

PREVENTION IS BEST

After 10 years smoking cessation, risk of lung cancer nearly the same as a never smoker