Lung Cancer Screening

'Pro and Contra'

Dr Haval Balata

Clinical Research Fellow (PhD) & Respiratory ST7
Manchester Thoracic Oncology Centre
Manchester University NHS Foundation Trust

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07/03/2018

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Nil disclosures to declare

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Agenda – 40 minutes

- Lung Cancer Screening
  - The story so far (Pro)
  - The unanswered questions (Contra)

- The Manchester Lung Cancer Screening Pilot

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Lung Cancer – Globally

- Leading cause of cancer related death worldwide – 1.6million
- 19% of all cancer deaths
- Commonest cancer death in men; second in women
- Incidence rising in some countries

- Ferlay J, Soerjomataram I, Dikshit R, et al. Int J Cancer 2015;136:E359-86.
- Torre LA, Siegel RL, Jemal A. Lung Cancer Statistics. Adv Exp Med Biol 2016;893:1-19.

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Lung Cancer – UK

- 3rd commonest occurring cancer
  - 45,000 new cases annually
- Commonest cause of cancer related death
  - 35,000 deaths annually
  - 22% of all cancer deaths

- 70% present at late stage – non-curable
  - 30% of these die within 3 months
- 35% diagnosed as an emergency presentation
- 5 year survival 10%

- CRUK. Lung cancer statistics. 2016
- O'Dowd EL, McKeever TM, Baldwin DR, et al. Thorax 2015;70:161-8

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The need for screening

- 5 year survival 70% in stage I-II with surgical resections
- 10-year survival in patients having resection within 1 month of diagnosis has been quoted as high as 92%

- Early diagnosis is essential!

- Goldstraw P, Crowley J, Chansky K, et al. J Thorac Oncol 2007;2:706-14.
- International Early Lung Cancer Action Program I, Henschke CI, Yankelevitz DF, et al. N Engl J Med 2006;355:1763-71

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Lung Cancer Screening…

…..the story so far

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Sputum Cytology and CXR – 1960s/1970s

- 'The National Cancer Institute's Cooperative Early Lung Cancer Detection Program'
  - The Memorial Sloan-Kettering Cancer Centre in New York
  - The John Hopkins Lung Project
  - The Mayo Lung Project
- >30,000 male smokers
- Annual CXR vs Sputum Cytology/Annual CXR

- Increased incidence, resections and survivorship
- But…..NO mortality benefit

- Berlin NI. Cancer 2000;89:2349-51.
- Berlin NI, Buncher CR, Fontana RS, Frost JK, Melamed MR. Am Rev Respir Dis 1984;130:545-9

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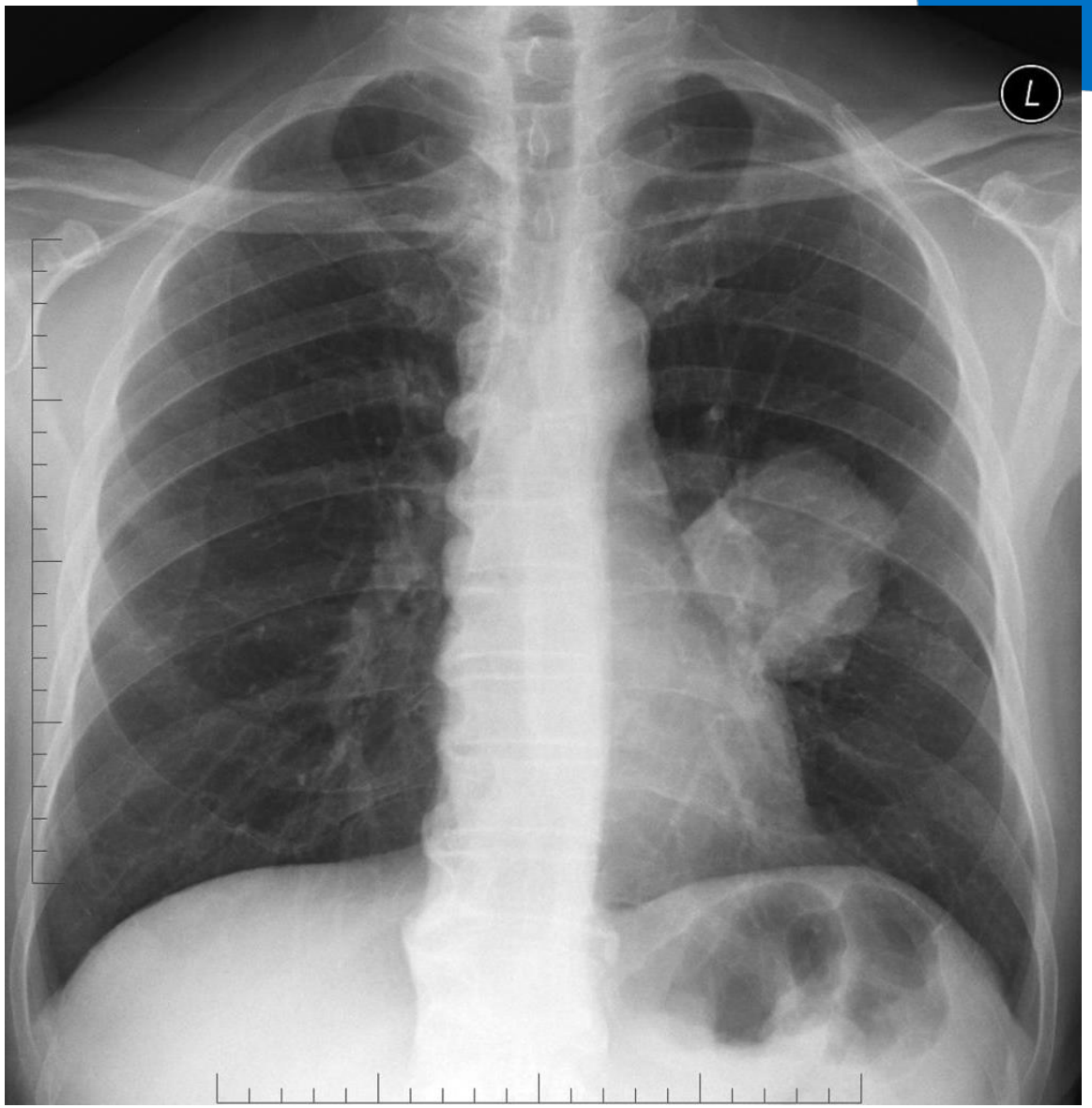
So what about the Chest X-Ray?



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Prostate Lung Colorectal and Ovarian (PLCO)

- 1993 to 2001
- > 154,000 subjects enrolled
- Aged 55-74. Men, women and never smokers.

- Annual CXR vs 'usual care' – 4 years
- Median follow up of 12 years

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Hocking WG, Hu P, Oken MM, et al. J Natl Cancer Inst 2010;102:722-31

Prostate Lung Colorectal and Ovarian (PLCO)

- 1,213 lung cancer deaths in screening arm
- 1,230 lung cancer deaths in control arm

- NO mortality benefit with annual CXR

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Oken MM, Hocking WG, Kvale PA, et al. JAMA 2011;306:1865-73

But….

- 1990s – The role of Low Dose CT described in detection of lung cancer

- No Contrast
- Less radiation (1.5-mSv vs 7-8-mSv)

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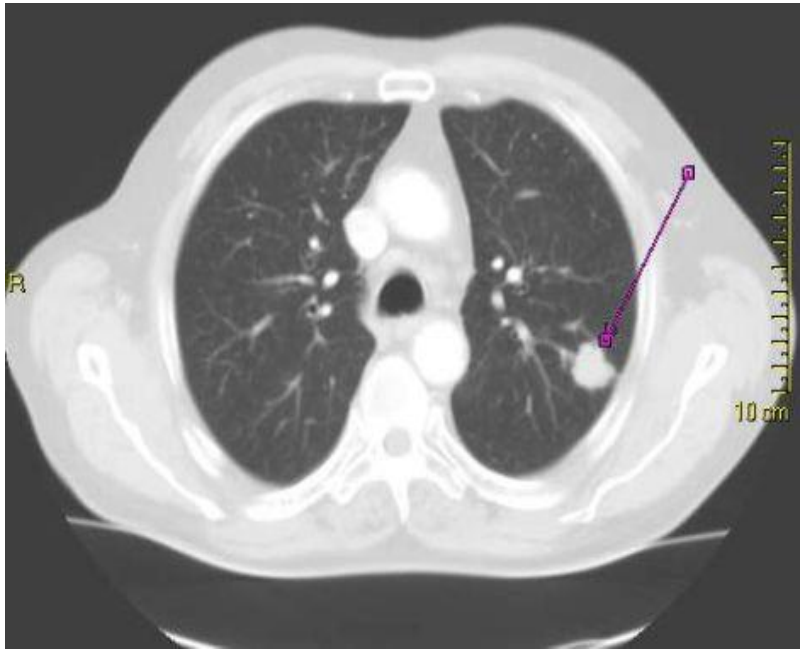
What about LDCT for lung cancer screening?



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Low Dose CT

- Kaneko et al, 1996
  - CXR & LDCT in 1,369 subjects – LDCT superior
- Sone et al, 1998
  - Mobile LDCT in 5,483 subjects previously screened – LDCT superior
- ELCAP, 1999
  - CXR & LDCT in 1,000 subjects (60 years, >10 Pack years)
  - 2.7% vs 0.7% detection
  - 2.3% vs 0.4% early stage

- Kaneko M, Eguchi K, Ohmatsu H, et al. Radiology 1996;201:798-802.
- Sone S, Takashima S, Li F, et al. Lancet 1998;351:1242-5.
- Henschke CI, McCauley DI, Yankelevitz DF, et al. Lancet 1999;354:99-105

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Turn of the millennium…

Renewed interest in lung cancer screening!

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Randomized control trials

Trial (Recruitment)	Method	Number Enrolled	Age Criteria	Scan Positivity Rate	Baseline Cancer Detection	Early stage cancer

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The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 AUGUST 4, 2011 VOL. 365 NO. 5

Reduced Lung-Cancer Mortality with Low-Dose Computed Tomographic Screening

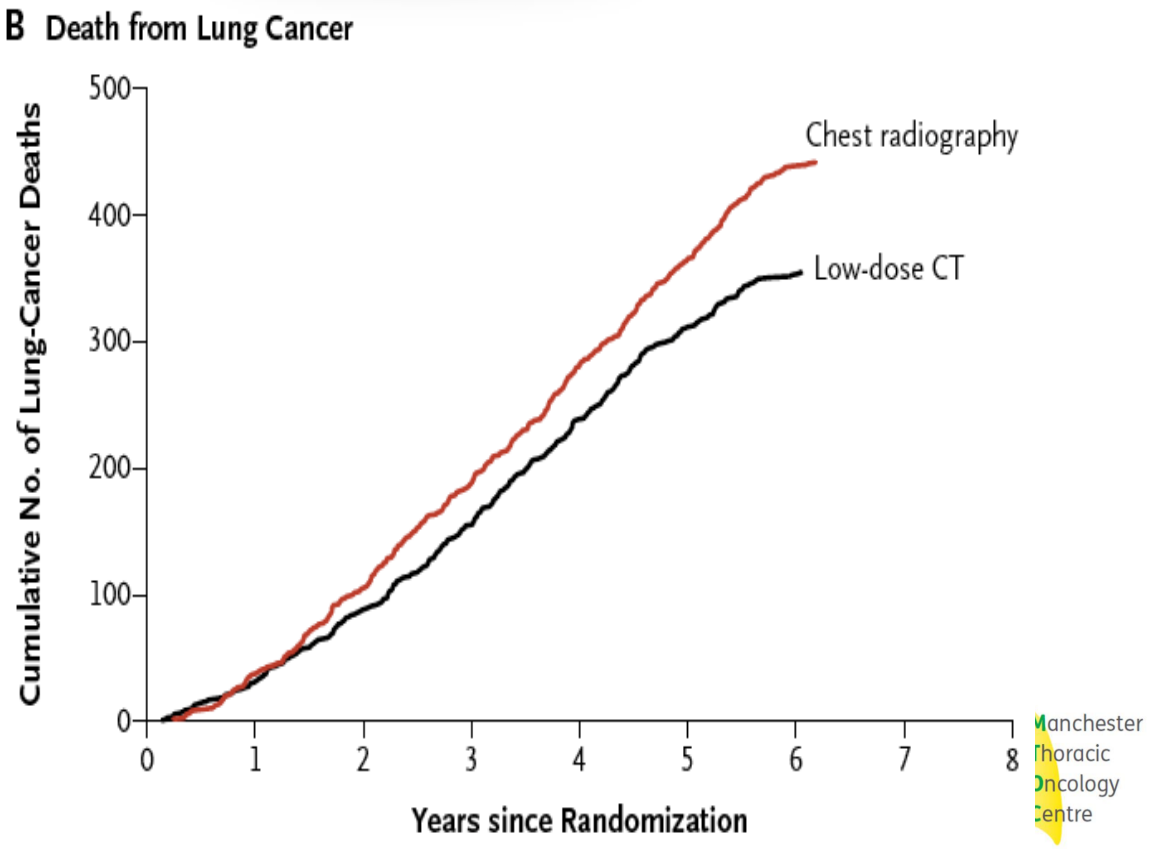
The National Lung Screening Trial Research Team*

National Lung Screening Trial (NLST)

- 53,454 participants
  - Age 55-74
  - 30 pack years
  - Smoked within past 15 years
- Randomised to 3 yearly screening rounds:
  - Low dose CT scans vs. chest X-ray.

Outcome

- 20% reduction in lung cancer deaths in the CT scan group and
- 6.7% reduction in overall deaths



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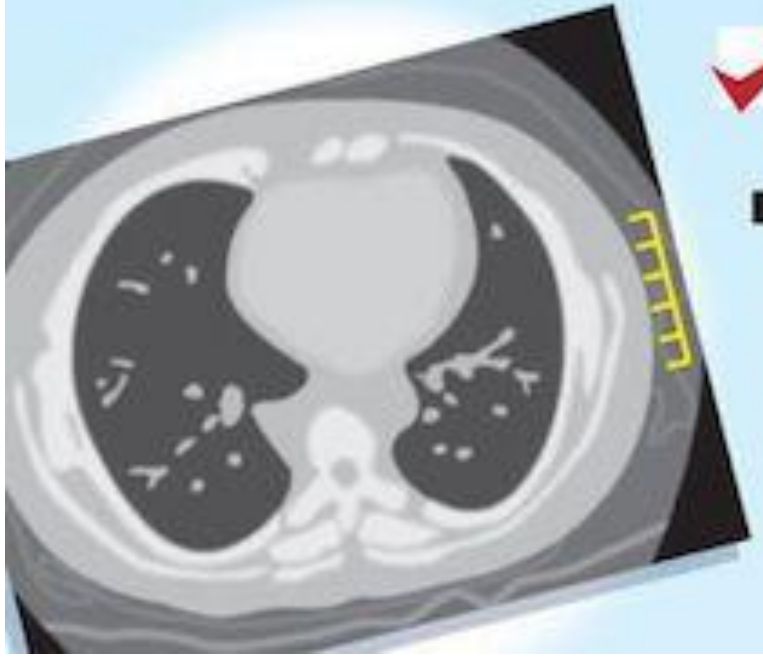
American College of Chest Physicians (ACCP)

SCREENING RECOMMENDATIONS



CT SCREENING SHOULD BE OFFERED TO:

- Smokers & former smokers, age 55-74, with more than 30 pack-years of smoking.

Annual low-dose CT scanning should be offered in a setting that delivers the comprehensive care provided to National Lung Screening Trial participants.

CT SCREENING NOT RECOMMENDED FOR INDIVIDUALS:

- With fewer than 30 pack-years of smoking
- Younger than 55 or older than 74
- With severe comorbidities that would preclude potentially curative treatment or limit life expectancy

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Lung Cancer: Screening

Release Date: December 2013

Recommendation Summary

Summary of Recommendation and Evidence

Population	Recommendation	Grade (What's This?)
Adults Aged 55-80, with a History of Smoking	The USPSTF recommends annual screening for lung cancer with low-dose computed tomography (LDCT) in adults aged 55 to 80 years who have a 30 pack-year smoking history and currently smoke or have quit within the past 15 years. Screening should be discontinued once a person has not smoked for 15 years or develops a health problem that substantially limits life expectancy or the ability or willingness to have curative lung surgery.	B

Read Full Recommendation Statement
PDF Version (PDF Help)

Read the Full Recommendation Statement

Supporting Documents

- **Final Evidence Review**
  PDF Version (PDF Help)
- **Evidence Summary**
  PDF Version (PDF Help)
- **Modeling Report**
  PDF Version (PDF Help)

Clinical Summary

Clinical summaries are one-page documents that provide guidance to

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European position statement on lung cancer screening

Matthijs Oudkerk, Anand Devaraj, Rozemarijn Vliegenthart, Thomas Henzler, Helmut Prosch, Claus P Heussel, Gorka Bastarrika, Nicola Sverzellati, Mario Mascalchi, Stefan Delorme, David R Baldwin, Matthew E Callister, Nikolaus Becker, Marjolein A Heuvelmans, Witold Rzyman, Maurizio V Infante, Ugo Pastorino, Jesper H Pedersen, Eugenio Paci, Stephen W Duffy, Harry de Koning, John K Field

Lung cancer screening with low-dose CT can save lives. This European Union (EU) position statement presents the available evidence and the major issues that need to be addressed to ensure the successful implementation of low-dose CT lung cancer screening in Europe. This statement identified specific actions required by the European lung cancer screening community to adopt before the implementation of low-dose CT lung cancer screening. This position statement recommends the following actions: a risk stratification approach should be used for future lung cancer low-dose CT programmes; that individuals who enter screening programmes should be provided with information on the benefits and harms of screening, and smoking cessation should be offered to all current smokers; that management of detected solid nodules should use semi-automatically measured volume and volume-doubling time; that national quality assurance boards should be set up to oversee technical standards; that a lung nodule management pathway should be established and incorporated into clinical practice with a tailored screening approach; that non-calcified baseline lung nodules greater than 300 mm³ and new lung nodules greater than 200 mm³ should be managed in

Lancet Oncol 2017

Published Online
November 27, 2017
http://dx.doi.org/10.1016/S1470-2045(17)30861-6

Center for Medical Imaging, University Medical Center Groningen, University of Groningen, Groningen, Netherlands
(Prof M Oudkerk MD, R Vliegenthart MD, M A Heuvelmans MD);

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Screening and smoking cessation

- Original concerns over ‘false reassurance’ of negative screening
  - No evidence of this

- Recent study from UKLS group demonstrate improved successful smoking cessation in screening programme

Brain K, Carter B , Lifford K, et al. Thorax 2017;72:912-918

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Lung Cancer Screening…

…..so what’s the problem??

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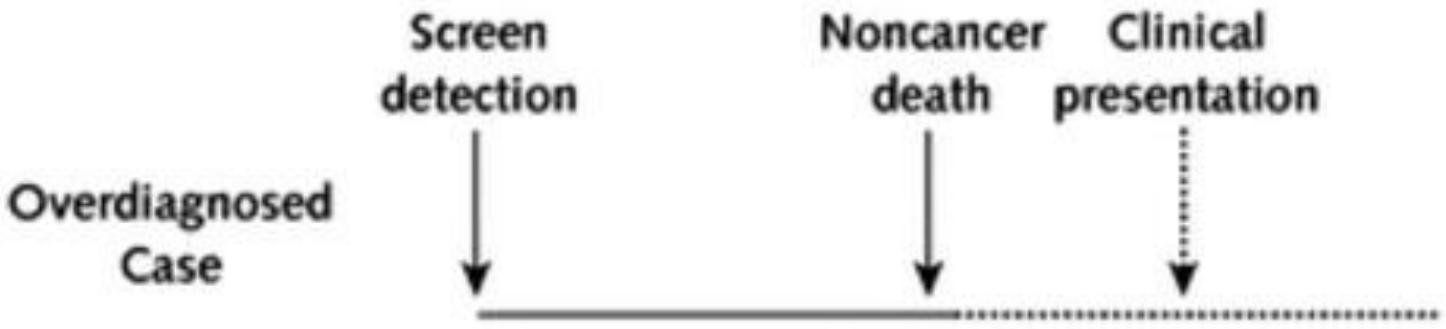
1. Overdiagnosis

- Overdiagnosis is the finding of an indolent lung cancer through screening that would have never had any clinical impact on the patient in their lifetime



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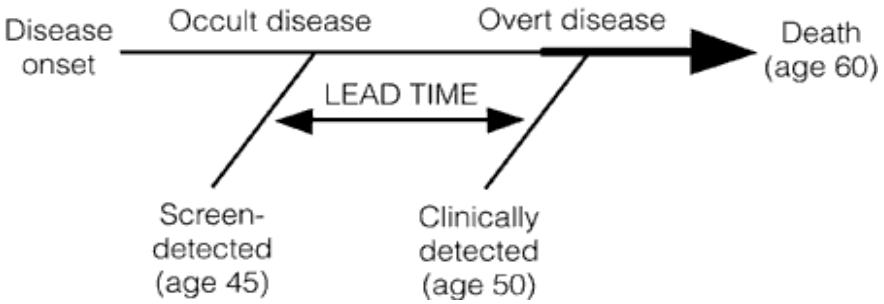
Overdiagnosis

- Concern of overdiagnosis has existed since initial LDCT studies
- Non-cancer mortality is 10% in lung cancer sufferers
- Rate of overdiagnosis in NLST was as much as 18%
  - Median FU only 6.5 years
  - Control arm received CXR
  - Treatment of non-solid lesions
- Need to account for lead-time bias
- Evidence in LDCT is limited – need longer follow-ups



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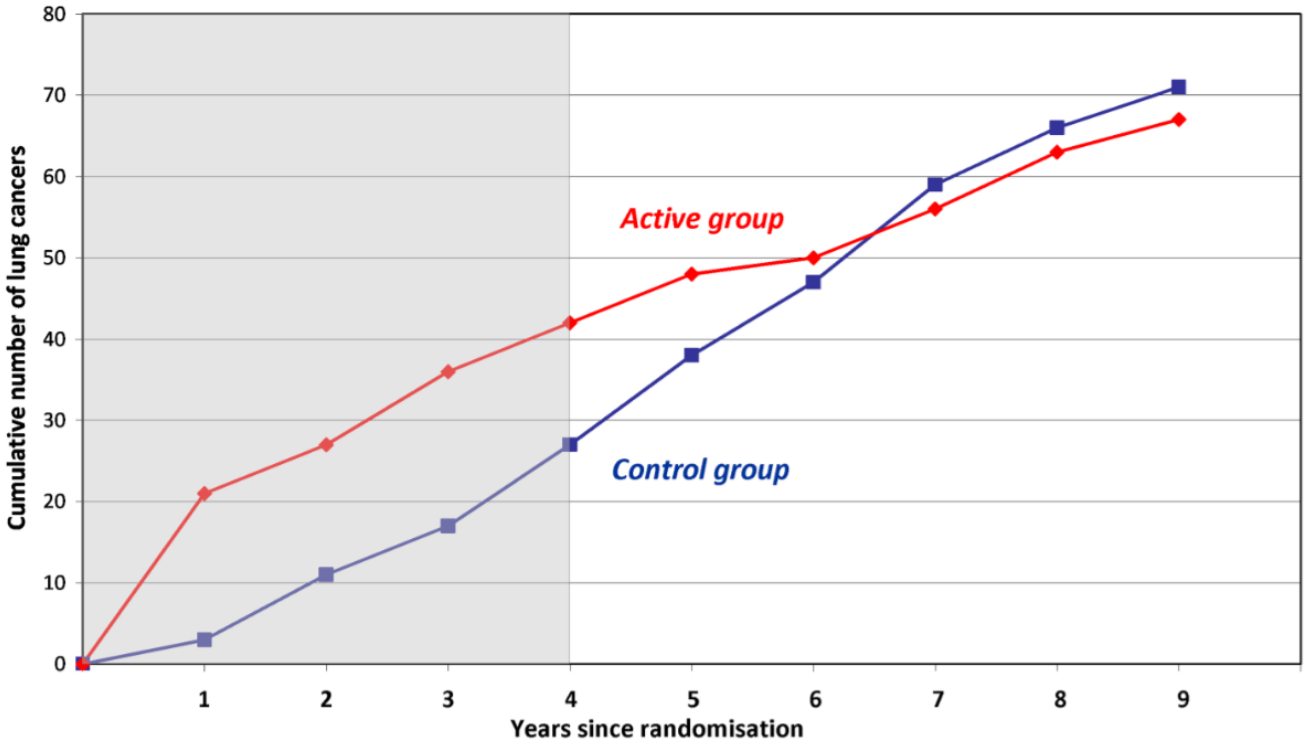
Overdiagnosis



Number of lung cancer:

Control	*3*	*8*	*6*	*10*	*11*	*9*	*12*	*7*	*5*
Active	*21*	*6*	*9*	*6*	*6*	*2*	*6*	*7*	*4*

ORIGINAL ARTICLE

Mortality, survival and incidence rates in the ITALUNG randomised lung cancer screening trial

Eugenio Paci,[1] Donella Puliti,[1] Andrea Lopes Pegna,[2] Laura Carrozzi,[3] Giulia Picozzi,[4] Fabio Falaschi,[5] Francesco Pistelli,[3] Ferruccio Aquilini,[3] Cristina Ocello,[1] Marco Zappa,[1] Francesca M Carozzi,[6] Mario Mascalchi,[7] and the ITALUNG Working Group

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2. False Positives – Nodule Management

- LDCT detects benign nodules
- Stress, anxiety and fear
- Potential complications from further investigations
  - Further imaging
  - Biopsy
  - Surgery!

- van den Bergh KA, Essink-Bot ML, Bunge EM, et al. Cancer 2008;113:396-404.
- van den Bergh KA, Essink-Bot ML, Borsboom GJ, et al. Br J Cancer 2010;102:27-34

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False Positives – Nodule Management

- Rate varied between 1-30%
- Definition is key!
  - >4mm non-calcified nodule in NLST = 96% false positive rate
  - Larger size and volumetric measurements in NELSON = 6% false positive rate
  - Define an 'Indeterminate Group' in UKLS = 3.6% false positive rate

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False Positives – Nodule Management

- Need to risk assess individual nodules
- Risks:
  - Age
  - Background emphysema
  - Gender
  - Family history
  - Size and location of nodule
  - Pattern (solid vs non-solid)

- Swensen SJ, Silverstein MD, Ilstrup DM, Schleck CD, Edell ES. Arch Intern Med 1997;157:849-55
- McWilliams A, Tammemagi MC, Mayo JR, et al. N Engl J Med 2013;369:910-9

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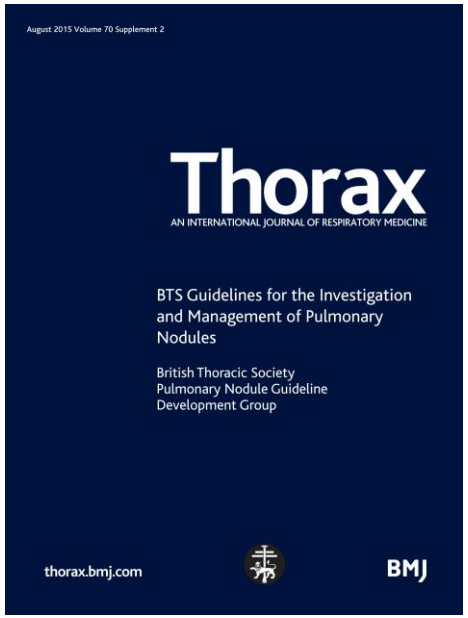
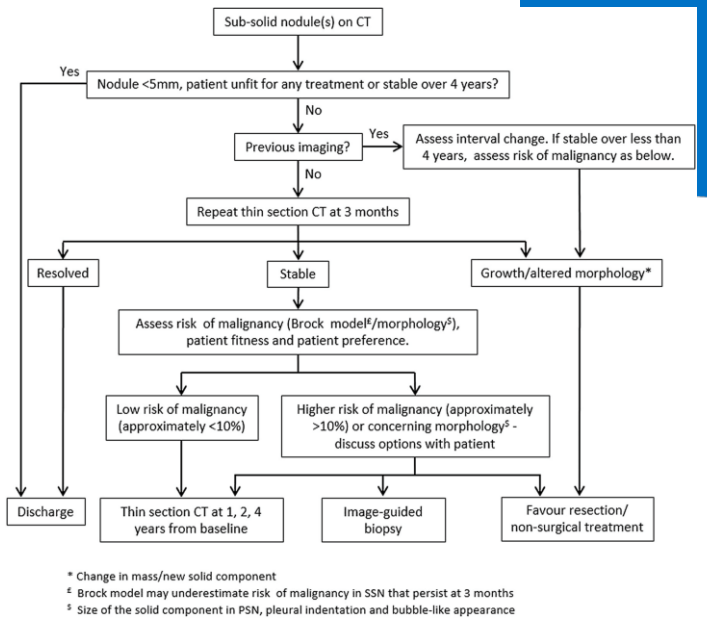
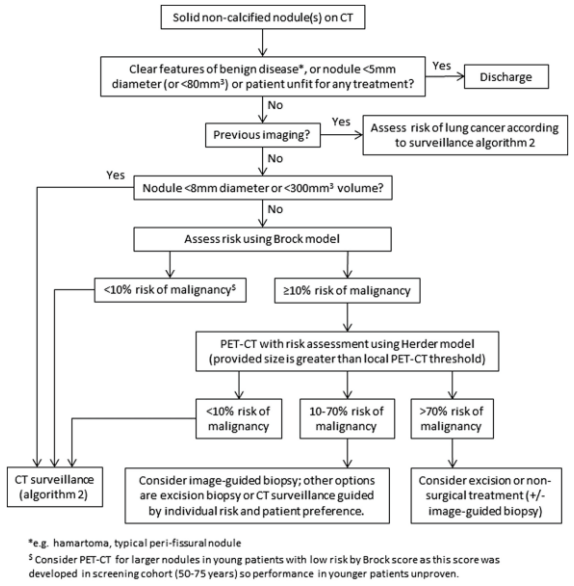




Lung-RADS™

Findings	Category	Description	Management
Composition: Solid, Part-solid, Non-solid; Nodule size; Baseline vs Follow-up	0	Incomplete	Additional images
	1	Negative	LDCT - 12m
	2	Benign	
	3	Probably Benign	LDCT - 6m
	4A	Suspicious	LDCT - 3m or PET-CT
	4B		PET-CT ± Bx
	4X		



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False Positives – Nodule Management

- LUNG-RADS applied to NLST:
  - ↓ false positives by 52%
  - ↑PPV
- NELSON Group
  - 2-step algorithm
  - Sensitivity 84.6%; Specificity 98.6%; NPP 99.8%
  - Size matters!!
    - <5mm: 0.6% risk of malignancy
    - 5-10mm + VDT 400-600 days: 4% risk of malignancy
    - 5-10mm + VDT <400 days: 9.9% risk of maligancy

- Horeweg N, van Rosmalen J, Heuvelmans MA, et al. Lancet Oncol 2014;15:1332-41
- Pinsky PF, Gierada DS, Black W, et al. Ann Intern Med 2015;162:485-91

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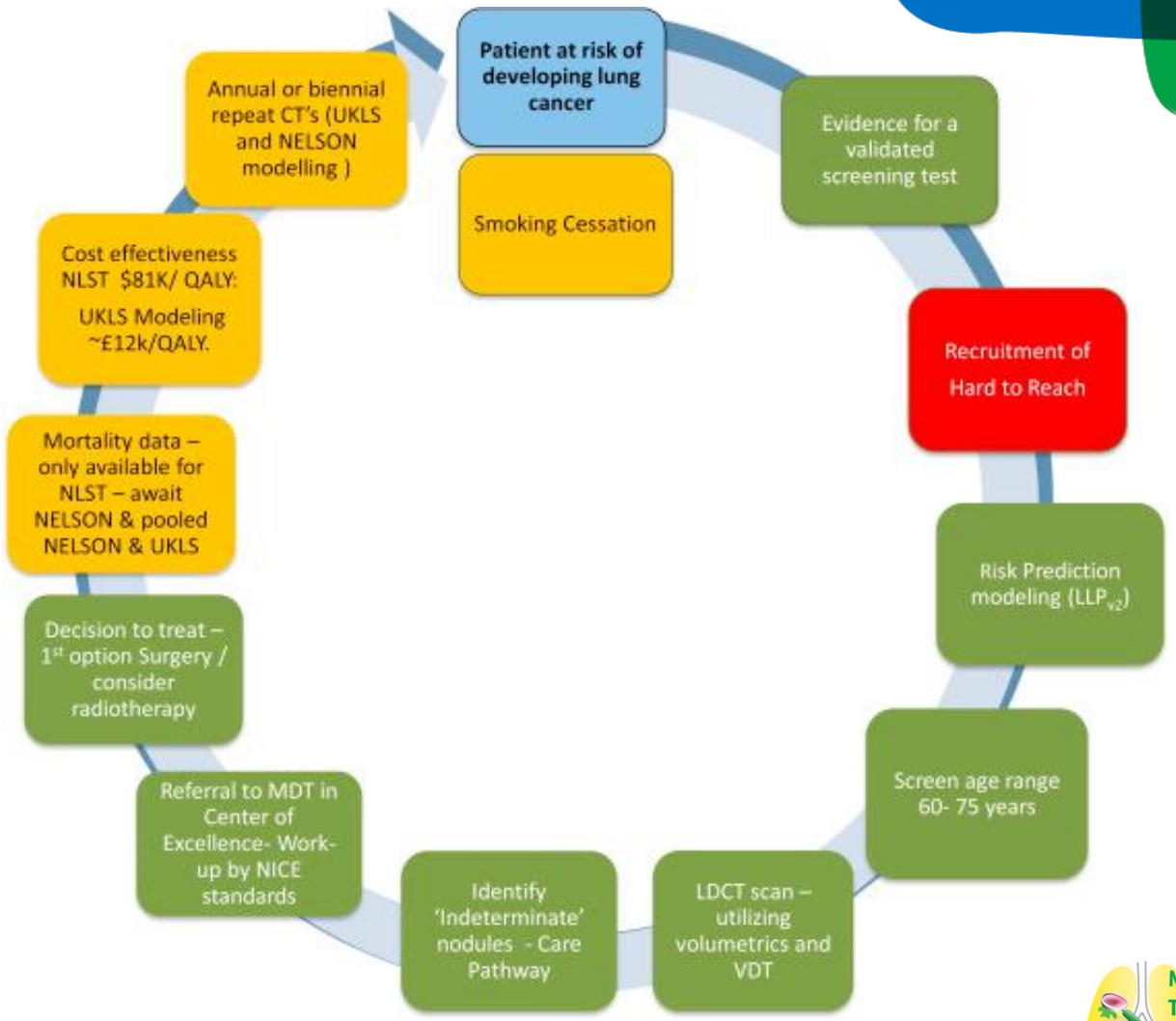
3. The ‘hard to reach’

- **Increased risk and less likely to participate in screening**
  - Age
  - Active smoking
  - Lower socio-economic background

- **Practical barriers**
  - Travel
  - Costs
  - Distance

- **Emotional barriers**
  - Fear of hospitals
  - Fear of doctors
  - Avoidance
  - Lack of understanding



- Ali N, et al. BMJ Open 2015;5:e008254
- Field JK, et al. Lung Cancer. 2016;91:29-35

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4. Who should we screen?

- Kovalchik model
  - NLST data: 20% lowest risk subjects accounted for 1% of prevented deaths
  - NNS to prevent 1 death: 161 vs 5276
- Liverpool Lung Project (LLP) model – V1 & V2
  - Smoking, Respiratory disease, Asbestos, Previous cancers, family history.
  - Used in UKLS
- $PLCO_{m2012}$ model
  - Using logistical regression from PLCO trial cohort
  - Age, socioeconomic status, BMI, ethnicity, sex, family history, personal history of cancer and respiratory disease, detailed smoking history

- Kovalchik SA, Tammemagi M, Berg CD, et al. N Engl J Med 2013;369:245-54.
- Tammemagi CM, Pinsky PF, Caporaso NE, et al. J Natl Cancer Inst 2011;103:1058-68.
- Cassidy A, Myles JP, van Tongeren M, et al. Br J Cancer 2008;98:270-6

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The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Selection Criteria for Lung-Cancer Screening

Martin C. Tammemägi, Ph.D., Hormuzd A. Katki, Ph.D., William G. Hocking, M.D., Timothy R. Church, Ph.D., Neil Caporaso, M.D., Paul A. Kvale, M.D., Anil K. Chaturvedi, Ph.D., Gerard A. Silvestri, M.D., Tom L. Riley, B.Sc., John Commins, B.Sc., and Christine D. Berg, M.D.

Risk prediction:
$PLCO_{m2012}$

Tammemagi Lung Cancer Risk Prediction Calculator ©
Calculator predicting 6-year risk of lung cancer by the Tammema
Instructions: For the characteristics described in Column A fill in t
Note: Values in columns C to F can be ignored and should not be c

Characteristics to be entered	Enter Values
Age in years	65
Education (enter the highest level obtained) 1 = less than high school grad; 2 = high school grad; 3 = Post high school training; 4 = Some college; 5 = College grad; 6 = Postgraduate/professional.	1
Body Mass Index (BMI, weight in kg/height in meters^2)	17
COPD, emphysema or chronic bronchitis (0=No; 1=Yes	1
Personal history of cancer (0=No; 1=Yes)	0
Family history of lung cancer (0=No; 1=Yes)	1
Race/ethnicity	
White (referent group) (0=No; 1=Yes)	1
Black (non-Hispanic) (0=No; 1=Yes)	0
Hispanic (0=No; 1=Yes)	0
Asian (0=No; 1=Yes)	0
American Indian/Alaskan Native (0=No; 1=Yes)	0
Native Hawaiian/Pacific Islander (0=No; 1=Yes)	0
Smoking status, 0 = Former-smoker 1 = Current-smoker	0
Average number of cigarettes smoked per day**	20
Duration smoked (years)	30
Years ago quit smoking. Enter zero for current smokers	15
Model constant	
Probability of lung cancer =	**0.044**

N ENGL J MED 368;8 NEJM.ORG FEBRUARY 21, 2013

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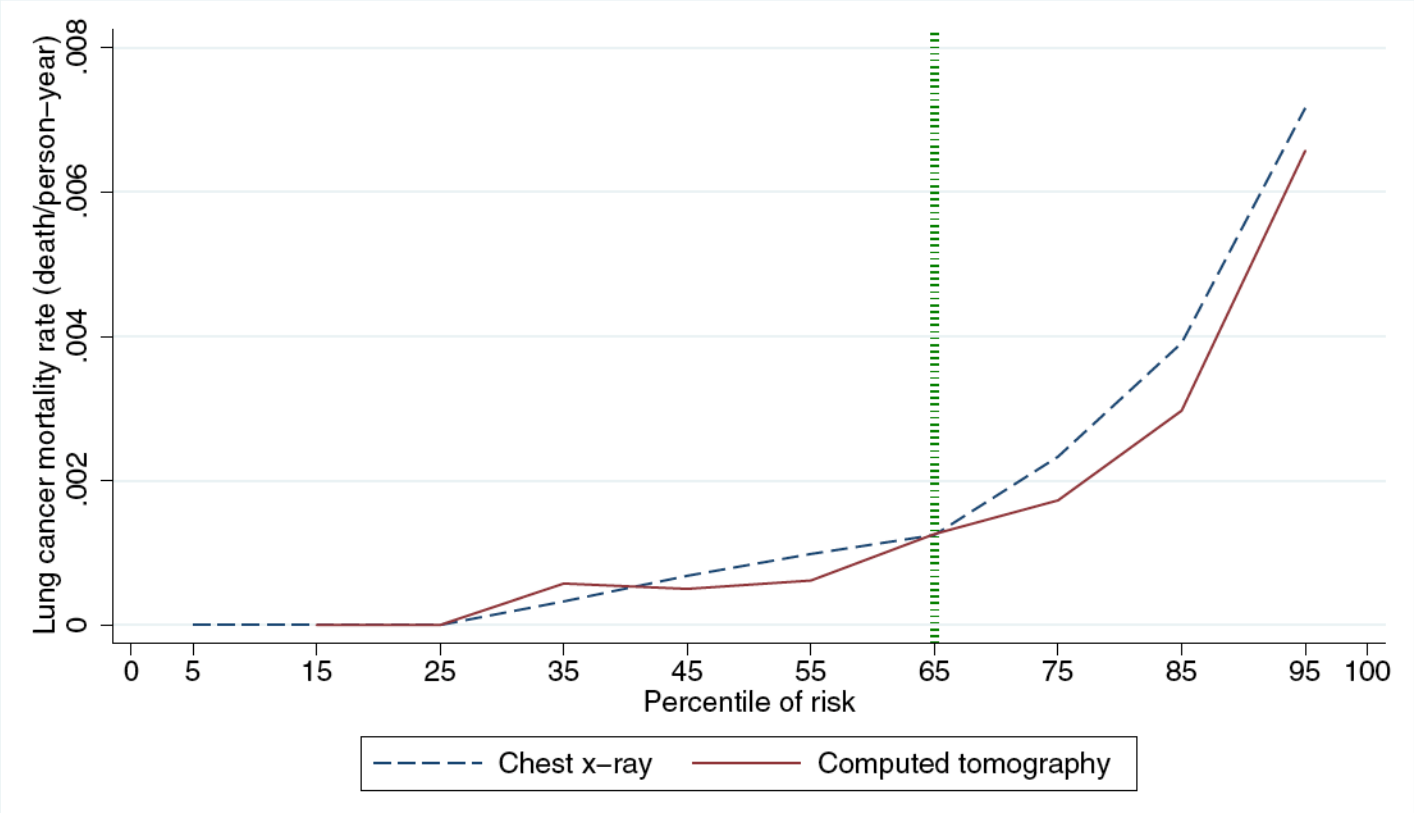
Threshold of risk: 1.51%



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Tammemagi MC, Church TR, Hocking WG, et al. PLoS Med 2014;11:e1001764

5. How often should we screen?

- MILD study
  - Annual vs biennial – no statistical difference
- NELSON Study
  - 2.5 year interval is too long
- Microsimulation models have shown mixed results

- ? Risk stratification is the key

- Pastorino U, Rossi M, Rosato V, et al. Eur J Cancer Prev 2012;21:308-15
- Sverzellati N, Silva M, Calareso G, et al. Eur Radiol 2016;26:3821-9.
- Yousaf-Khan U, van der Aalst C, de Jong PA, et al. Thorax 2017;72:48-56

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6. What age shall we screen?

- Risk of cancer increases with age
- Average age of lung cancer diagnosis is 70

- Age varied between 50-74 across the RCTs
- Combined median age of 13 large studies was 59
- Only 8.8% of NLST subjects were >70
- In UKLS, 95% of those deemed ‘high risk’ were >60

- Pastorino U. Br J Cancer 2010;102:1681-6
- Gohagan J, Marcus P, Fagerstrom R, et al. Chest 2004;126:114-21
- Field JK, Duffy SW, Baldwin DR, et al. Thorax 2016;71:161-70

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7. Cost-effectiveness

- Most work so far based on estimation models – variable
- UKLS have estimated a cost of £8,466 per QALY (CI £5,542-£12,569)
  - Within NICE limits for screening

- Targeting high risk subjects improves costs
  - Less eligible
  - Higher prevalence

- Field JK, Duffy SW, Baldwin DR, et al. Thorax 2016;71:161-70
- Whynes DK. Cost Eff Resour Alloc 2008;6:5

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8. Radiation Exposure

- LDCT uses less radiation: 1.5mSv vs 7-8-mSv
- Exposure from a single LDCT less than the average exposure from natural sources
- Repeated scanning and additional tests (eg PET) is a concern

- Estimated lifetime risk of radiation induced lung cancer in a 50 female smoker is 0.85%
- Risk models suggest risk > benefit in non-smokers and <50 years
- Recent study has shown radiation exposure after 10 years much lower than initially feared

- Smith-Bindman R, Lipson J, Marcus R, et al. Arch Intern Med 2009;169:2078-86
- Brenner DJ. Radiology 2004;231:440-5
- Berrington de Gonzalez A, Kim KP, Berg CD. J Med Screen 2008;15:153-8
- Rampinelli C, De Marco P, Orriggi D, et al. BMJ 2017;356:j347

Summery – where are we at?

The Wilson-Jungner criteria for appraising the validity of a screening program

- The condition being screened for should be an important health problem
- The natural history of the condition should be well understood
- There should be a detectable early stage
- Treatment at an early stage should be of more benefit than at a later stage
- A suitable test should be devised for the early stage
- The test should be acceptable
- The risks, both physical and psychological, should be less than the benefits
- Intervals for repeating the test should be determined
- The costs should be balanced against the benefits

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- The test should be acceptable ✓
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- Intervals for repeating the test should be determined **?**
- The costs should be balanced against the benefits **?**

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Summery

- Evidence for lung cancer screening is growing
- LDCT is the test of choice
- Risk stratification of participants is the key
- Nodule management important
- Need to reach those most in need – the ‘hard to reach’

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WE'VE CHANGED LIVES
WE ARE MACMILLAN. CANCER SUPPORT

Manchester Lung Screening Pilot

Commissioned by Macmillan Cancer Improvement Partnership & City Of Manchester Clinical Commissioning Groups

NHS
Manchester University
NHS Foundation Trust

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Why Manchester?

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Rates of premature death: Manchester

defined as deaths under age 75 per 100,000 (2012-14)

• Overall	150th out of 150 local authorities (LA)
• All Cancer	150th out of 150 LA
• Heart disease	150th out of 150 LA
• Stroke	150th out of 150 LA
• Lung disease	149th out of 149 LA
• Lung cancer	150th out of 150 LA

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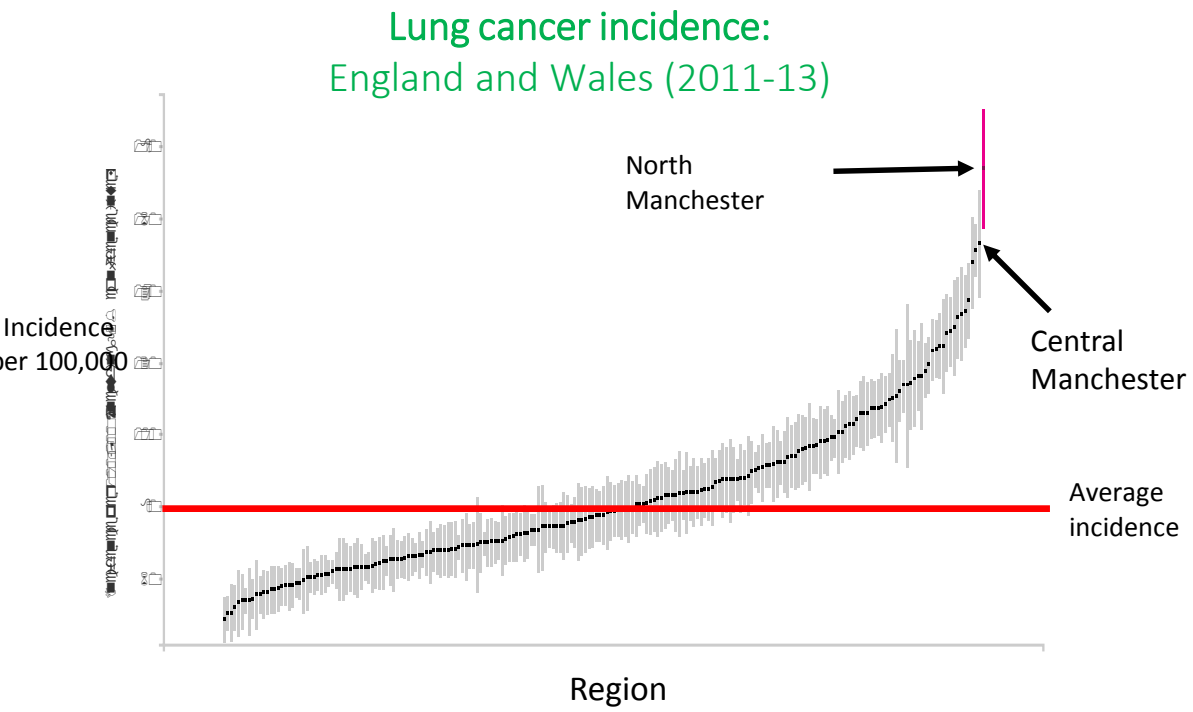
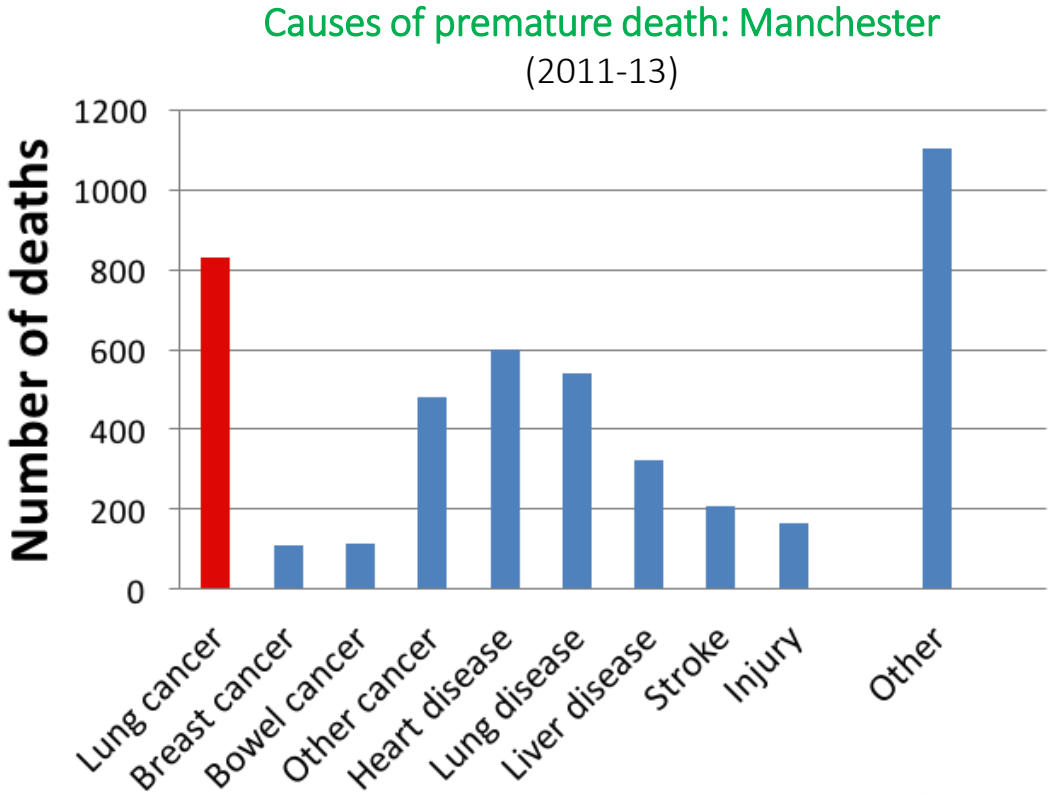
Lung Cancer in Manchester





Public Health England
http://healthierlives.phe.org.uk/topic/mortality

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The Manchester Lung Screening Pilot – Key Design Features

- Community based
  - Supermarket car parks
- 'Lung Health Check'
  - Not cancer screening
- Targeted at those most at risk
  - Deprived areas
  - Scan only those with $PLCO_{m2012}$ ≥1.51%
- Immediate access to mobile low dose CT scanner
- Use of 14 specialist thoracic radiologists
- Detailed 2-step nodule management algorithms
- 14 participating GP practices

- Inclusion criteria
  - Age 55-74
  - Ever smokers
  - Registered with participating GPs
- Exclusion Criteria
  - Diagnosis of lung cancer with 5 years
  - Palliative care register

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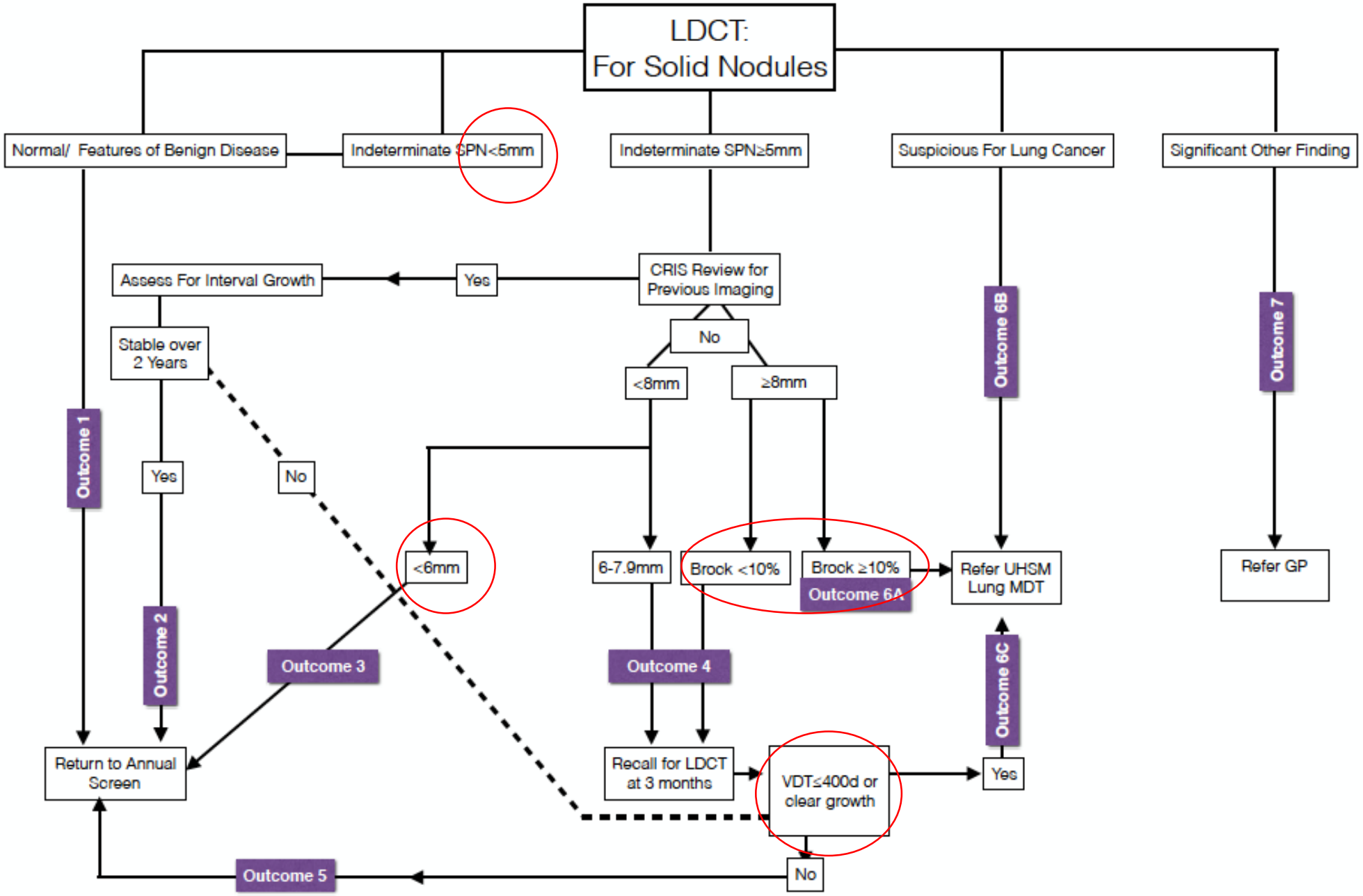

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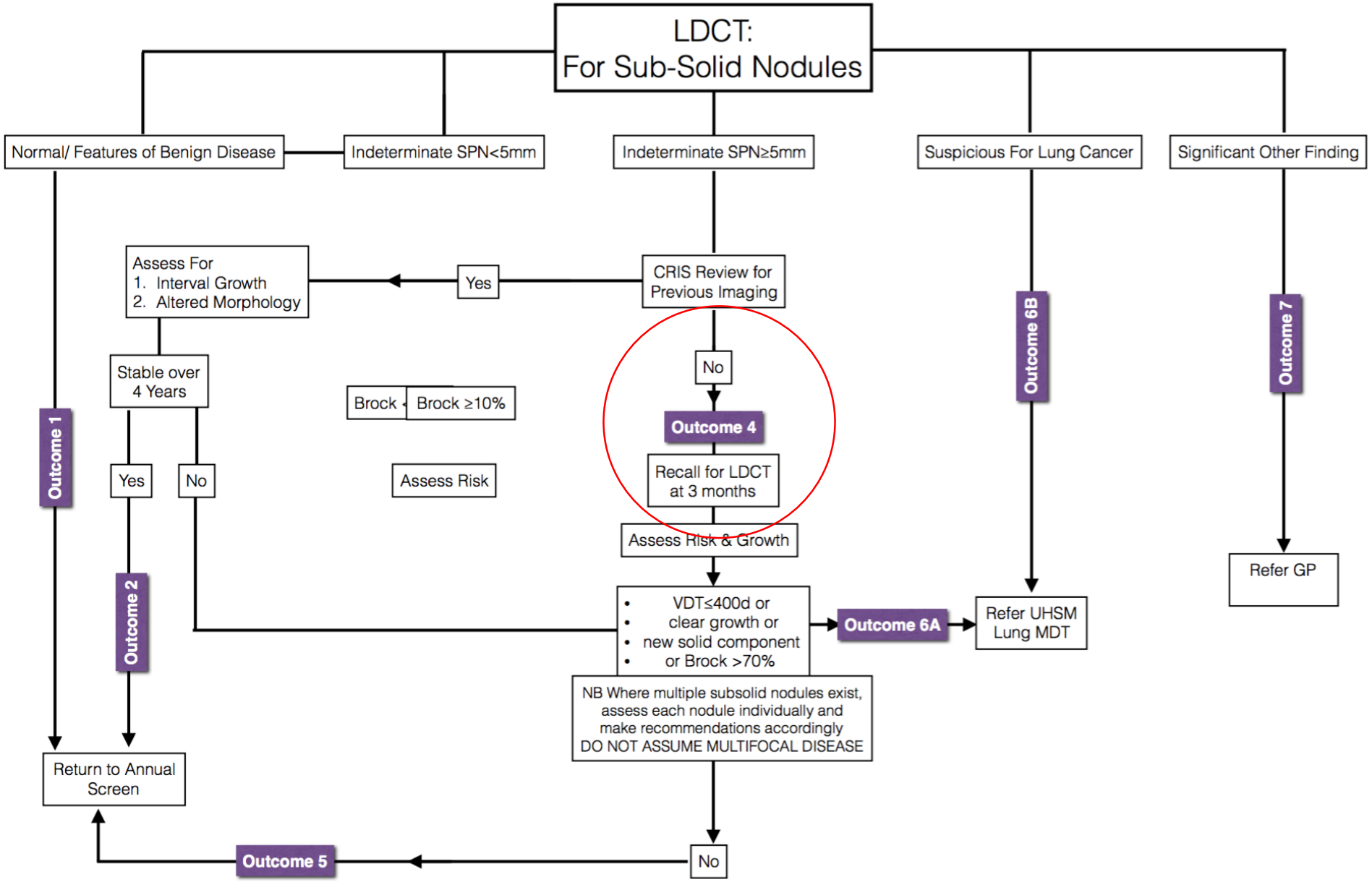

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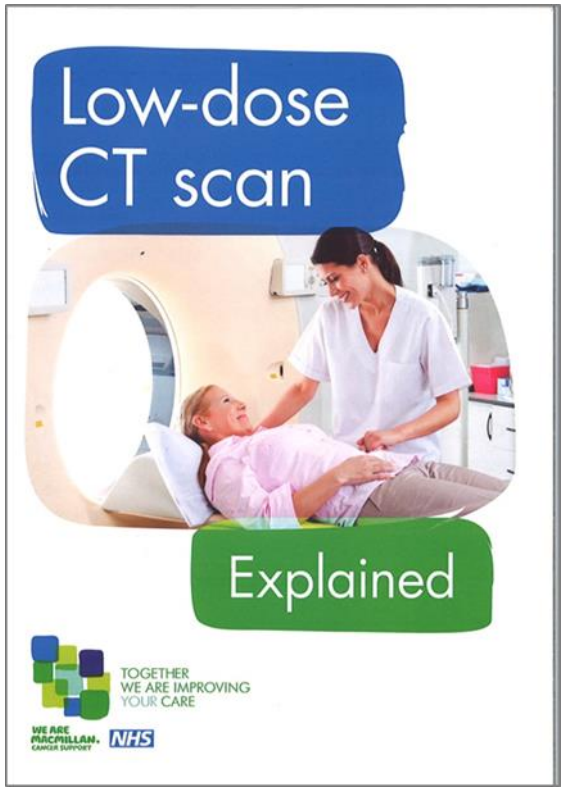
Engagement Approach

- **Co-designed well researched participant info:**
  - GP invite letter
  - Lung Health Check and LDCT scan leaflets
- **Grass roots community engagement**
  - Community networks and events
  - Leafleting and Macmillan bus
  - Awareness sessions e.g. Breathe Easy groups
  - Bookmakers, Vape/E-Cig shops
  - Posters in community venues
- **GP Engagement**
  - Briefing sessions/ staff encouragement
  - Waiting room posters
  - Messages on prescriptions
  - Practice staff answering queries



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Broader communication

Core Messages:

- "Sooner rather than later"
- Lung Health Check is "MOT for your lungs"
- Free
- Time and places limited
- Not normally available

- Local voices - Lord Mayor Film
- Press release, Local radio and TV
- Social media
- Patient stories

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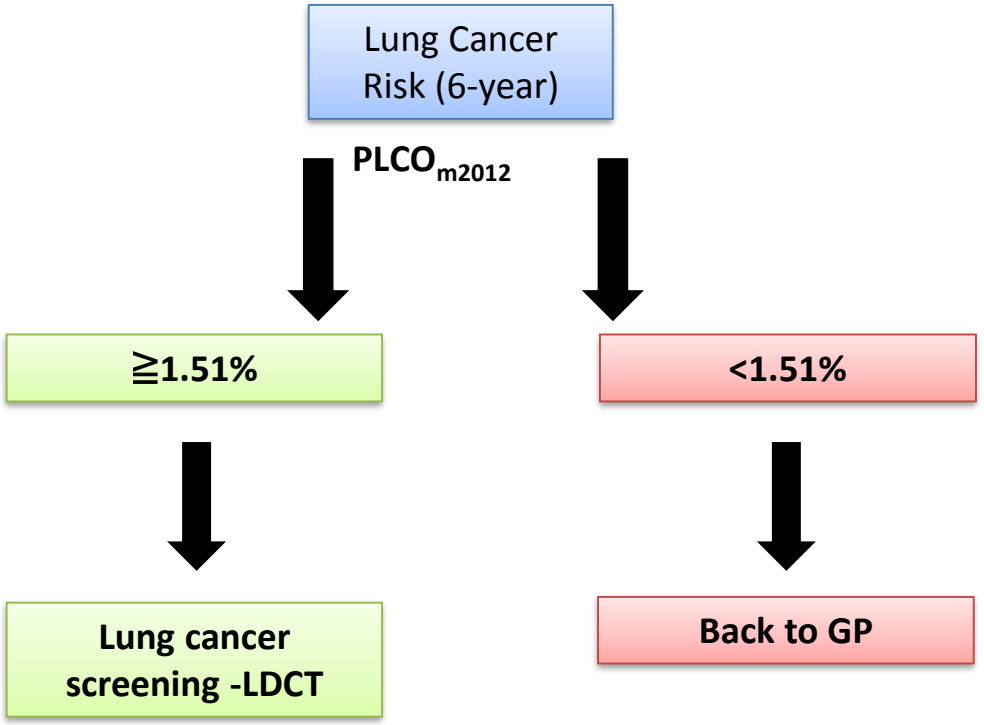
The Lung Health Check

- 20 minute appointment
- Experienced respiratory nurse
- History & symptoms
- Performance Status; MRC score
- Lung cancer risk score
  - $PLCO_{m2012}$
- Measurements
  - Spirometry
  - Height, Weight, BMI
- Non-judgemental stop smoking advice & signposting
- Consents
  - Research database (99.5%)
  - Data sharing



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Mobile Support Unit & Mobile LDCT Scanner

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Mobile Support Unit
Mobile LDCT Scanne

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Results – attendance

- All appointments booked within few days
  - Demand > service capacity (~2,800 appointments)
- Low DNA rate
- 2,541 lung health checks carried out
  - 25.6% of invited eligible participants
- 1,384 LDCT scans (56%)

- Mean age 64 (SD 5.5)
- Male 49%:51% Female

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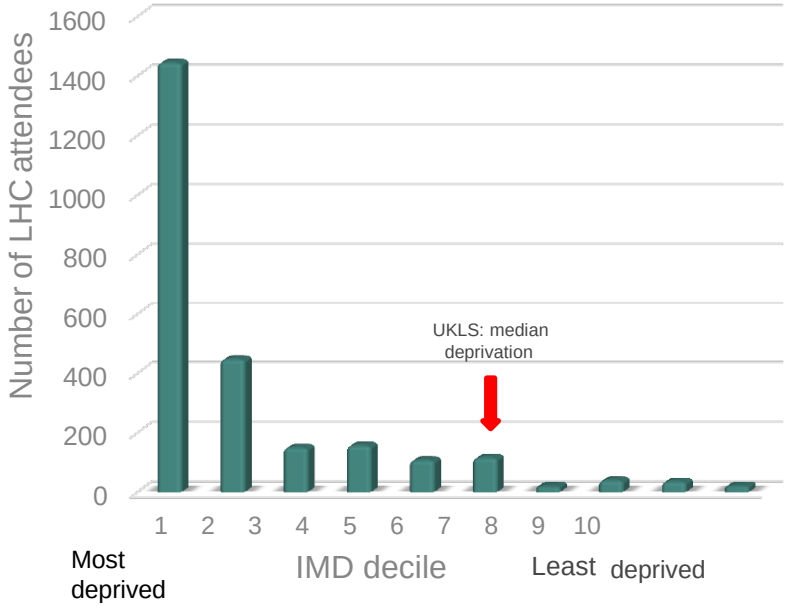
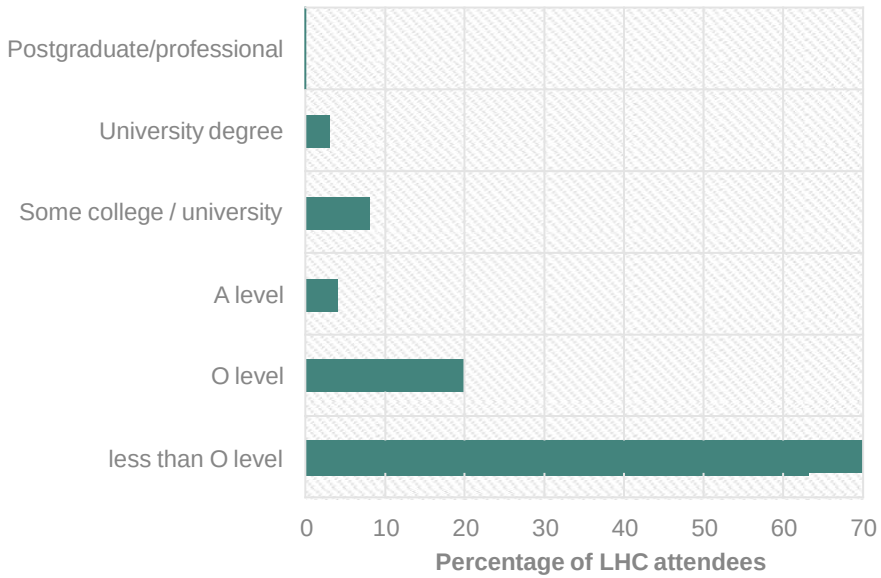
Results - reaching the 'hard-to-reach'

Deprivation (IMD):
Over half lowest decile (56%)
75% lowest quintile



IMD = index of multiple deprivation 2015

Education:
82% left school by 16
62% without any 'O' levels



Additional Risk
22% FH Lung Cancer
12% Personal Hx of cancer
24% Exposed to Asbestos
35% Current Smokers
(53% in screened group)
22% Hx of COPD

(90% PS 0-1)
(90% MRC 1-2)

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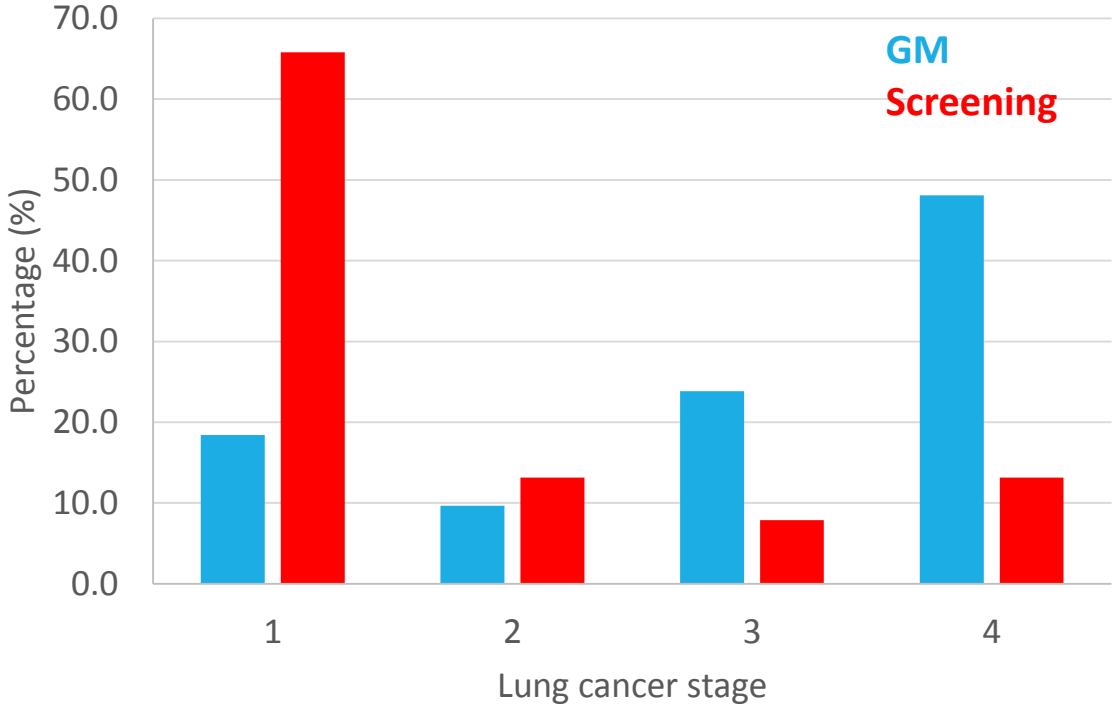
Results – Lung cancer screening

- 1,384 LDCT scans performed
- Lung cancer diagnosis: 3% (n=42)
- 80% early stage (I+II)
- 64% Surgical resection
- 89% received treatment with curative intent



- False positives: 2.8% of population screened; 48% of those seen in clinic
  - No surgery for benign disease
- Interval imaging rate: 12.7%

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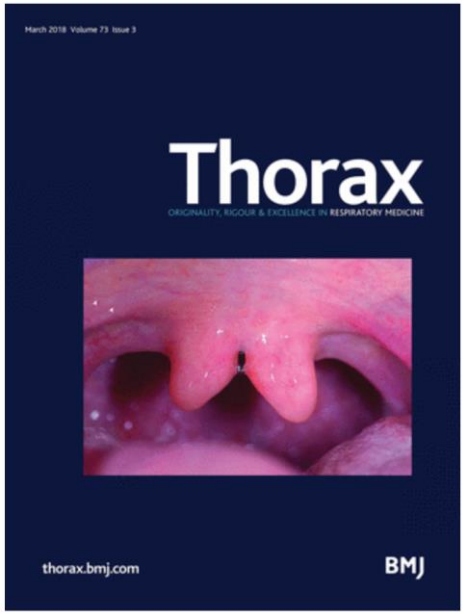
Take Home Messages

- Taking lung cancer screening into the community can identify and affect those at most risk
  - The so-called ‘hard-to-reach’
- Results in high rates of early stage lung cancer detection in deprived populations
- Nodule management can reduce false positives and unnecessary investigations
- Nodule risk stratification can reduce potential for overdiagnosis
- It can be cost-effective



Implementing lung cancer screening: baseline results from a community-based ‘Lung Health Check’ pilot in deprived areas of Manchester

Phil A Crosbie,[1,2] Haval Balata,[1] Matthew Evison,[1] Melanie Atack,[3] Val Bayliss-Brideaux,[3] Denis Colligan,[3,4] Rebecca Duerden,[1] Josephine Eaglesfield,[3] Timothy Edwards,[1] Peter Elton,[5] Julie Foster,[6] Melanie Greaves,[1] Graham Hayler,[3] Coral Higgins,[4] John Howells,[7] Klaus Irion,[8] Devinda Karunaratne,[8] Jodie Kelly,[1]

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News

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1:28 am - 21 N

NHS England action to save lives by catching more cancers early

21 November 2017

Cancer Innovation

NHS England Chief Executive, Simon Stevens, will today announce the scaling up of an innovative scheme that catches lung cancer early by scanning patients, along with new details of a more sensitive bowel cancer test that could save thousands of lives.

Speaking at the Economist War on Cancer event in London, he will highlight the success of the Manchester scanner scheme, where mobile scanners are detecting four out of five cases of lung cancer in the early stages when it is easier to treat. The mobile scanning trucks have picked up one cancer for every 33 patients scanned over the course of a year.

NHS England is now funding scanners in other areas as part of a national programme to diagnose cancer earlier, improve the care for those living with cancer and ensure each cancer patient gets the right care for them.

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What is next…

- Incidence round of screening almost complete
- Community Lung Health Study:
  - Effect of community location
  - Effects on smoking habits
  - Effects on symptoms and general health
- CVD risk assessment; COPD diagnosis; ILD diagnosis

- **£4.2 million commissioning of a screening service across North Manchester**
  - Opportunity to validate the pilot findings
  - To start summer 2018
  - >10,000 LHCs
  - 5,000-6,000 LDCTs

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Acknowledgements

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  Peter Elton
  Graham Wardman
  Julie Foster
  Graham Hayler
  Julie Pickford
  Rachel Pearson
  Michelle O'Leary
  Maggi Simons
- **UHSM**
  Phil Barber
  Richard Booton
  Phil Crosbie
  Matt Evison
  Anna Sharman
  Richard Sawyer
  Stephanie Carney
  Elaine Smith
  Rebecca Duerden
  Melanie Greaves
  Rajesh Shah
  Angela Watts
  Jodi Kelly
  Rachel Noble
  Deborah Rose
  Sarah Manson
  Kath Hewitt
  Leena Joseph
  Tim Barlow
- **Radiology Consortium**
  Melanie Greaves
  Anna Sharman
  Rebecca Duerden
  Elaine Smith
  Richard Sawyer
  John Howells
  James Whittaker
  Stuart Mellor
  Tom Newton
  Devindra Karunaratne
  Klaus Irion
  Anna Walsham
  Ben Taylor
  Nick Screaton
- **Alliance Medical**
  Ann Heathcote
  Simon Nelson
- **Medical Physics**
  Will Mairs
- **Patient Representative**
  Josephine Eaglesfield
- **Community Engagement**

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haval.balata@mft.nhs.uk

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