Lung cancer screening

Matthew Dunn
Head of Radiation physics
Matthew.dunn@nuh.nhs.uk

Lung cancer background

Lung cancer statistics

Cases

47,235

New cases of lung cancer, 2014-2016 average, UK

Deaths

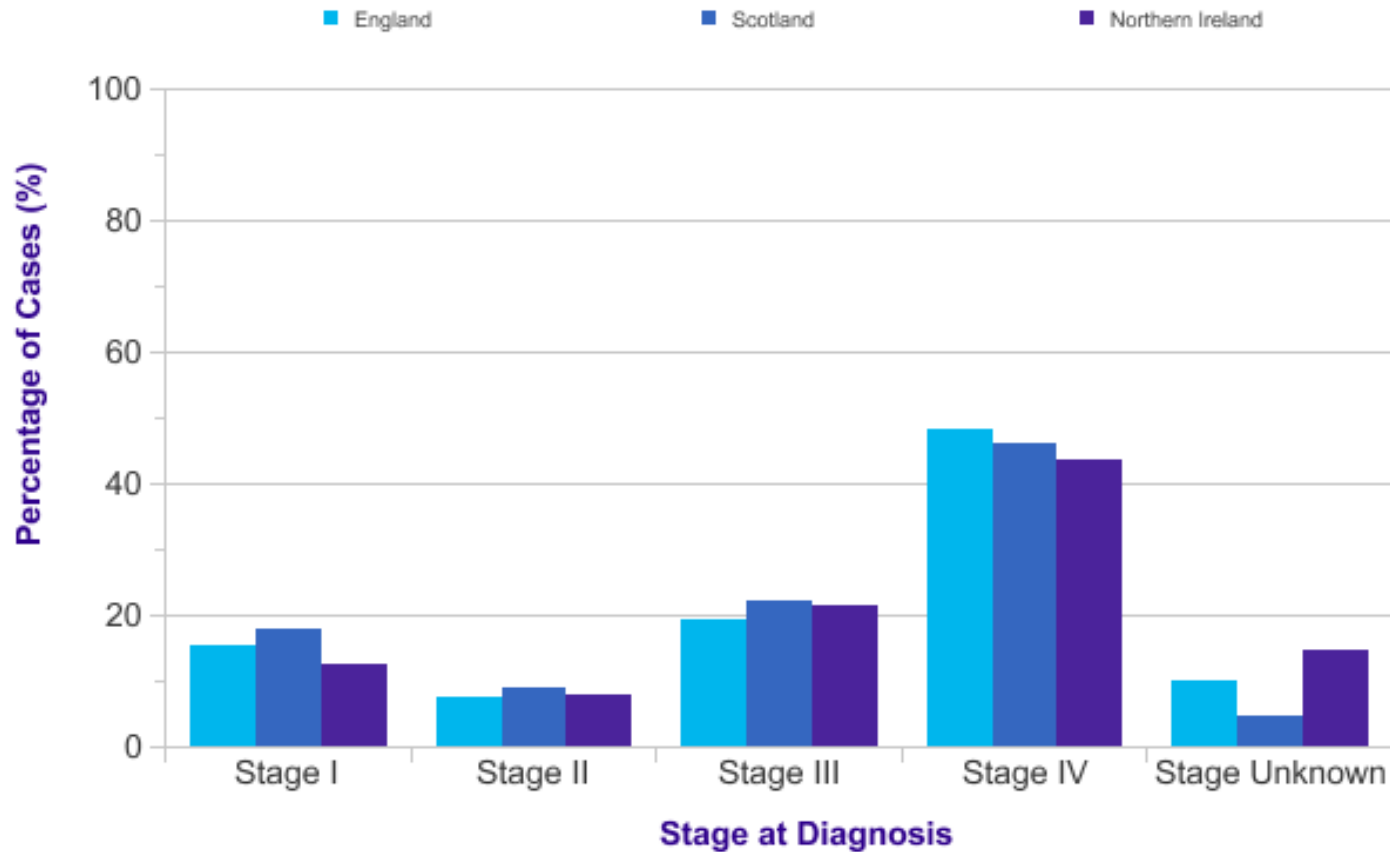35,620

Deaths from lung cancer, 2016, UK

Survival

5%

Survive lung cancer for 10 or more years, 2010-11, England and Wales

Preventable cases

79%

Lung cancer cases are preventable, UK, 2015

CANCER RESEARCH UK

Lung cancer background

https://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/lung-cancer/incidence - sept 2019
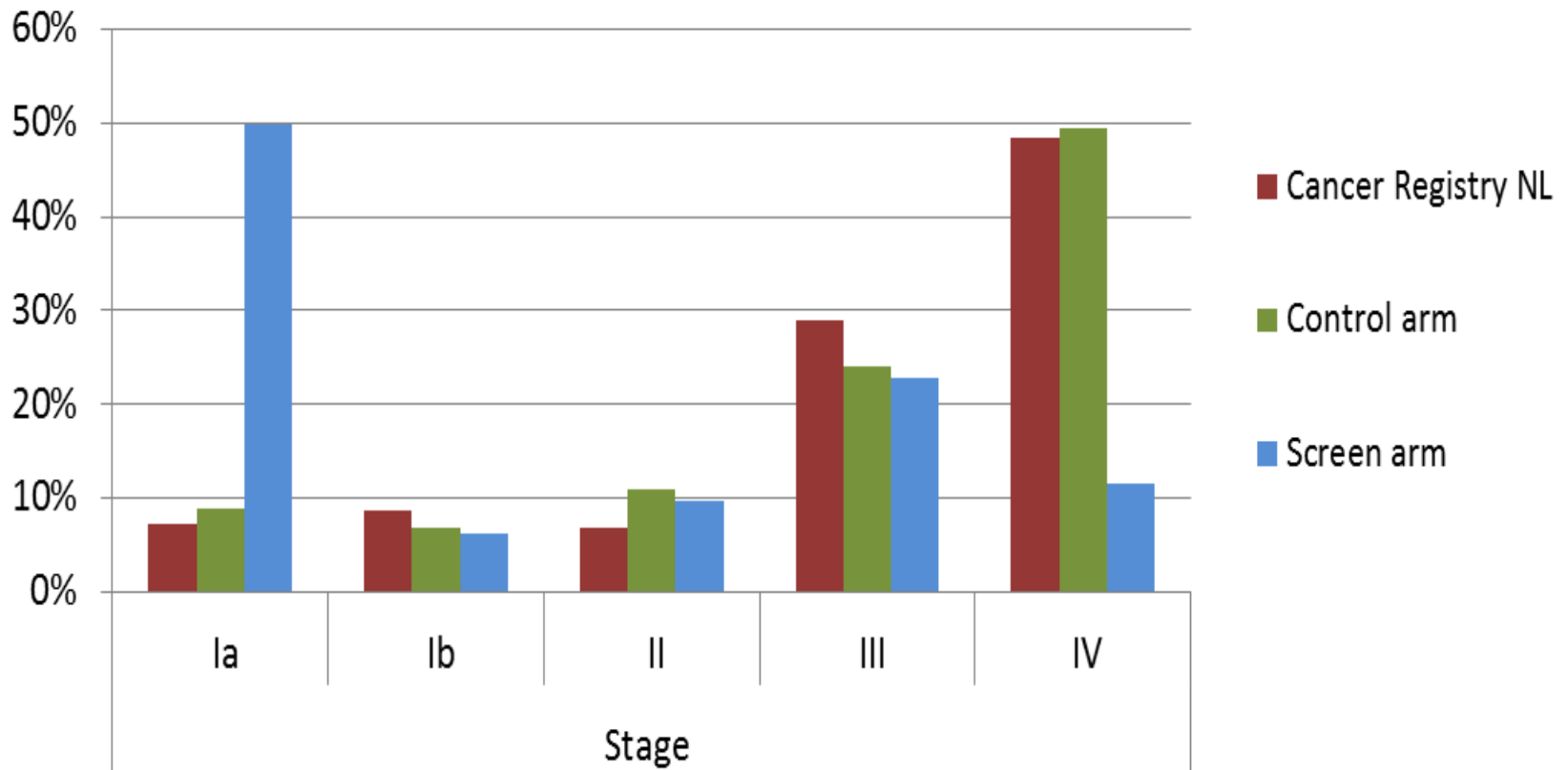
Lung cancer background

So….

Can CT find lung cancers early ?

Yousaf-Khan et al., in preparation

Couldn't we use a CXR?

NLST: Cumulative Numbers of Lung Cancers

The National Lung Screening Trial Research Team . N Engl J Med 2011;365:395-409.
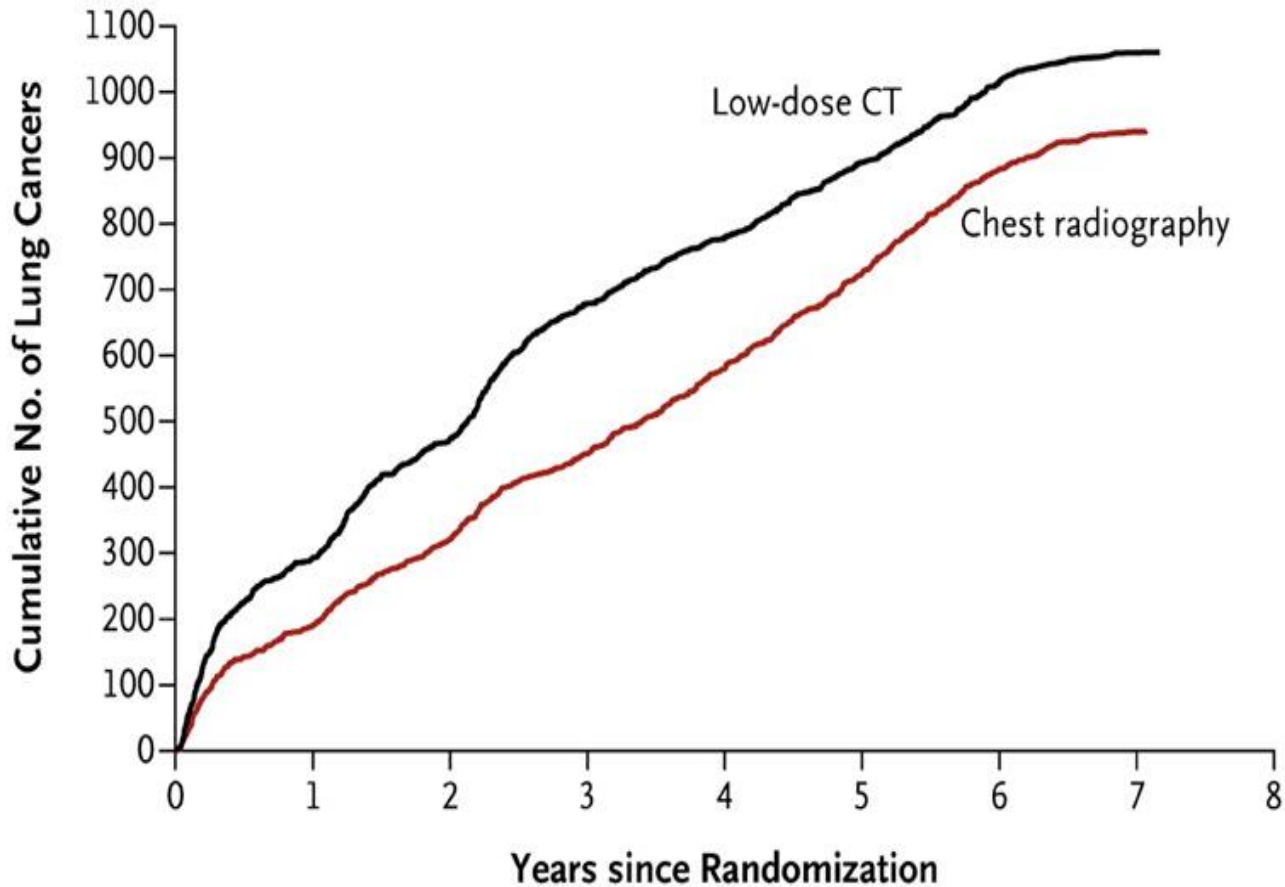
Lung cancer background

Do patients that are screened live longer?

Lung cancer background

Percent LC Mortality Decrease			
Trial	Men	Women	50:50 M/F
NLST*	8%	27%	**18%**
NELSON**	26%	39-61%	**33 – 44%**

Pinsky et al. The National Lung Screening Trial:. *Cancer* 2013; **119**(22): 3976-83.   +Aberle, et al. The National Lung Screening Trial: overview and study design. *Radiology* 2011; **258**(1): 243-53.
**Effects of Volume CT Lung Cancer Screening: Mortality Results of the NELSON Randomised-Controlled Population Based Trial De Koning et al 2018
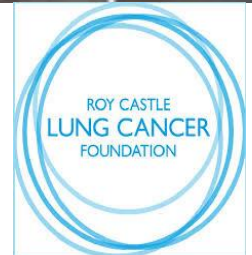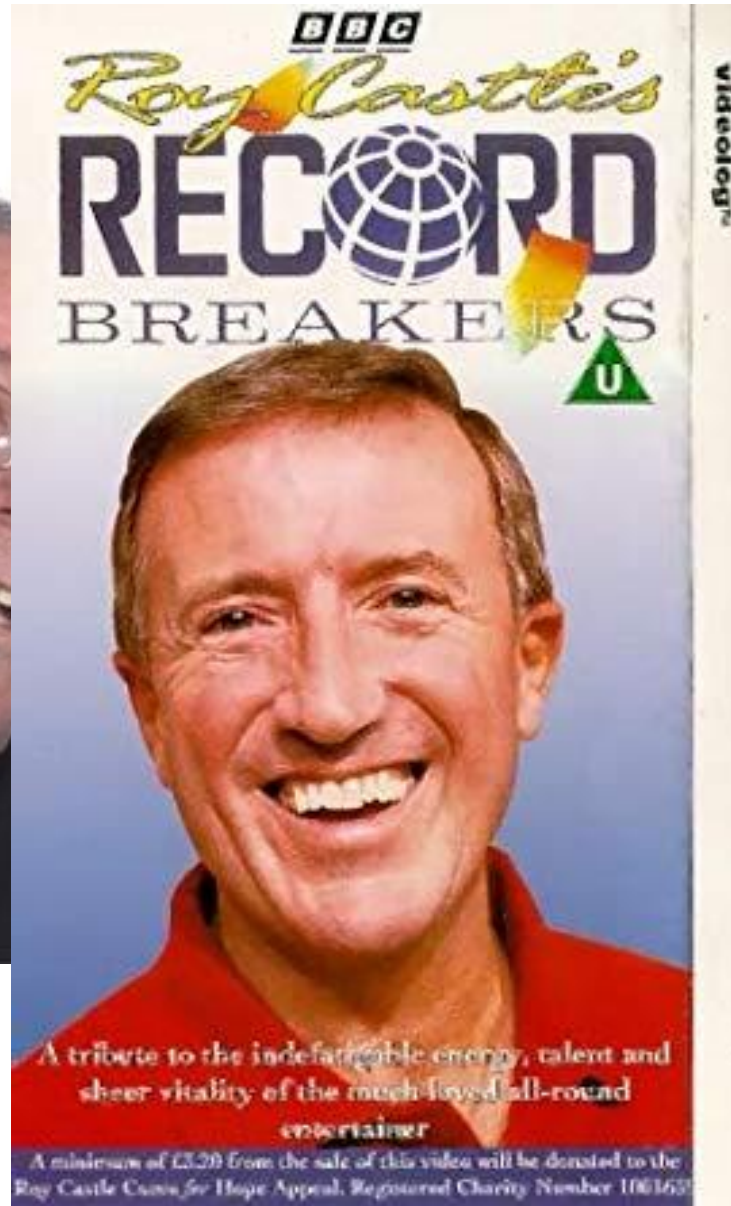
Lung cancer background

Location	UKLS	Manchester	Liverpool	Nottingham	London (LSUT)	London	Leeds
Number screened (planned)	1997	1429 (5,000) 1194 (incidence)	1319	160 (200)	765	(25,000)	(7,800)
Pilot / trial	RCT	Pilot	Pilot	Pilot	Lung screen uptake trial	Grail study	Yorkshire Screening trial
Age range	50-75	55-74	58-70	55-75	60-75	55-75	55-80
Participation	11%			35%	50%		
Lung cancer rate	2.1%	3% prevalence 1.6% incidence	1.9%	2%	4%		
Stage I and II	86%	80%, 79%	76%	66%	71%		

Cancer tests in supermarket car parks to be launched by NHS

Lung cancer background

ncer caught early.
e he got scanned.

tion and give people
nce to beat lung cancer:
ycastle.org/letsroll
#LetsRoll

Smoking cessation

Information and shared decisions

Resources

Add-on health intervention

Selection

Treatment

Participation

Clinical work-up

Cost Effectiveness

Scanning process

Management of Incidental findings

Management of indeterminate findings
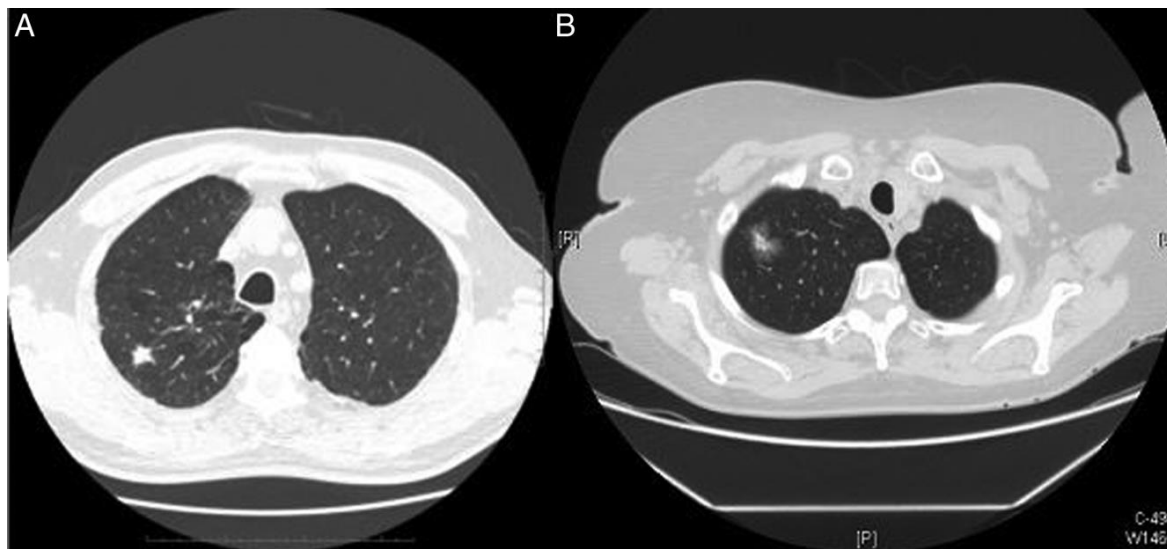
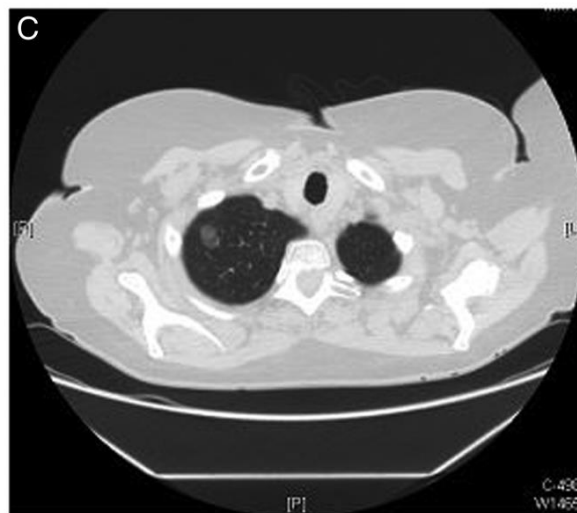# Diagnosis

CT screening can pick up many diseases e.g.

- Lung cancer (large easy to spot tumours -> small nodules)
- Emphysema / COPD
- Coronary calcium and heart disease
    N.B. often more risk to mortality than a lung nodule

Nodule types

Solid nodule

Part-solid nodule
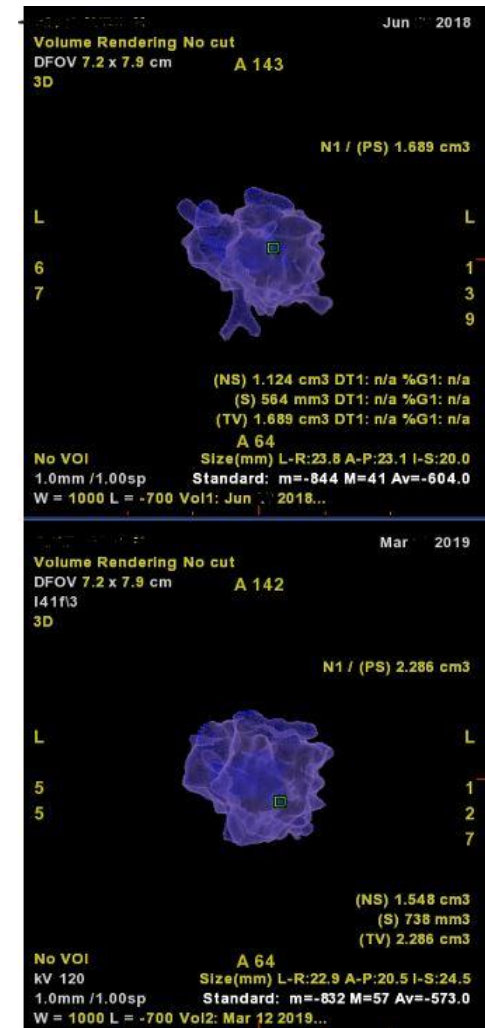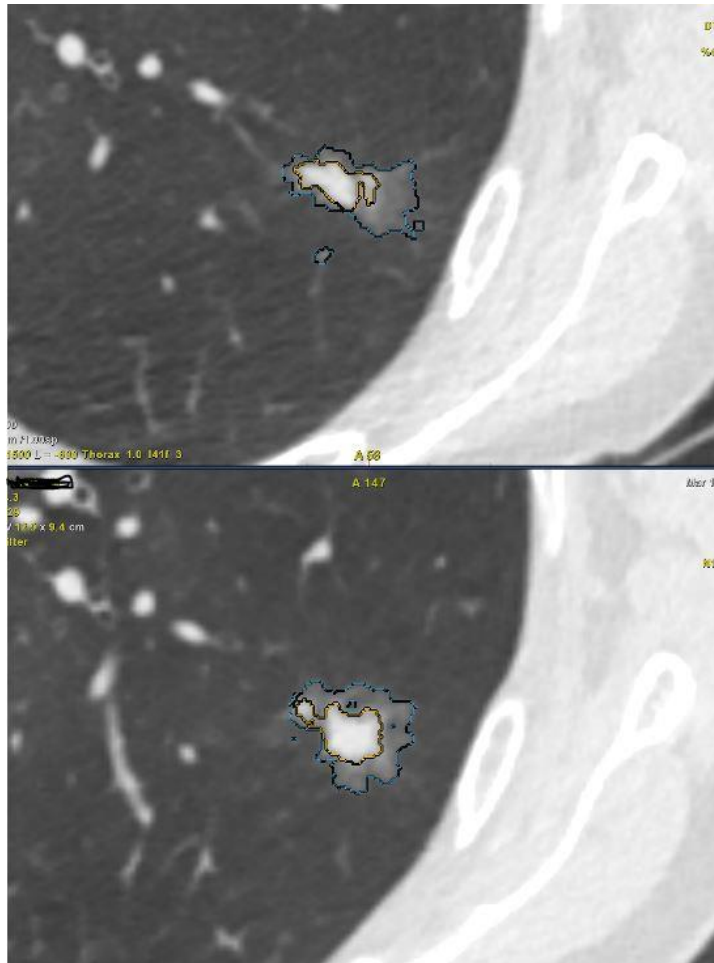
Pure ground glass nodule

Nodule follow up

BTS guidance:

- *Step 1*
  No follow up for nodules < 5mm and typically benign lesions with benign calcifications like hamartomas and perifissural nodules.
- *Step 2*
  Only lesions of 5mm or more require follow up. Divide lesions into solid and subsolid (groundglass or part solid)
- *Step 3*
  Use the Brock Model application to assess the risk of malignancy for solid lesions >8mm and subsolid lesions that are stable during 3 month follow up.
- *Step 4*
  Use the Herder model when you perform a PET-CT.

Nodule follow up

35% increase in volume
Operator of software cannot easily modify measurements.

Nodule follow up

Quantitative Features of Liver Lesions, Lung Nodules, and Renal Stones at Multi–Detector Row CT Examinations: Dependency on Radiation Dose and Reconstruction Algorithm[1]

Justin Solomon, MS
Achille Mileto, MD
Rendon C. Nelson, MD
Kingshuk Roy Choudhury, PhD
Ehsan Samei, PhD

Conclusion: Radiation dose settings and reconstruction algorithms affect the extraction and analysis of quantitative imaging features in lesions at multi–detector row CT.

Nodule follow up

Lung nodules: size still matters
AnnaRita Larici, Alessandra Farchione, Paola Franchi, Mario Ciliberto, Giuseppe Cicchetti, Lucio Calandriello, Annemilia del Ciello, Lorenzo Bonomo
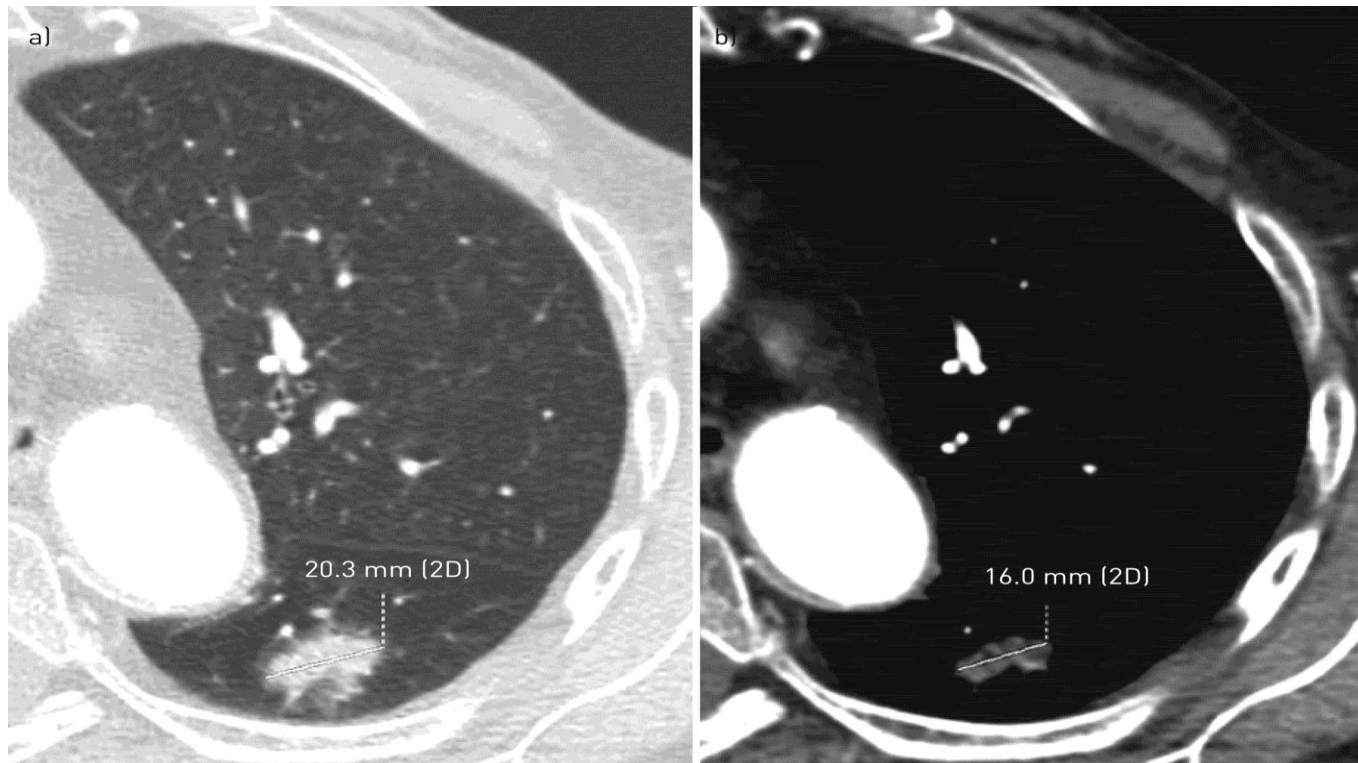
Nodule follow up

So we could be measuring:

- Measuring an irregular 3D object
- In a patient (?moving)
- Using CT callipers or software
- With different operators or measurement software
- Using different scanner models or manufacturer
- Different scanning parameters (recon filter, IR, dose, patient posn etc)
- Estimating the doubling time

- Based on an exponential growth model

Pick the measurement uncertainties out of that lot!!!

There is some work to be done.

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