

Ultrasound: Screening for Gynaecological Malignancies

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Introduction

◆ Screening tests

◆ The role of ultrasound in screening for:

- Ovarian cancer
- Endometrial cancer
- Cervical cancer

Diagnostic Tests

- ◆ Tests done in symptomatic patients → case finding
- ◆ Symptomatic patients → seek help → undergo diagnostic tests → confirm or exclude a diagnosis

Screening Test

- ◆ A test we do to detect disease in **asymptomatic** patients
- ◆ Apparently healthy individuals → undergo testing → if test positive → anxiety and more tests to confirm or exclude diagnosis
- ◆ Every adverse outcome of screening is iatrogenic and avoidable

Screening Criteria

- ◆ Is about early detection to allow for effective treatment
- ◆ The Disease:
 - Medically important and clearly defined
 - Prevalence must be known
 - Known natural history
 - Effective intervention must be available
- ◆ Cervical ca vs. Alzheimer's

Sensitivity

- ◆ Ability of test to find those with disease

		Disease	
		Positive	Negative
Test	Positive	True positive a	False positive b
	Negative	False negative c	True negative d

$$\text{Sensitivity} = \frac{a}{a + c}$$

$$\text{Specificity} = \frac{d}{b + d}$$

$$\text{Positive predictive value} = \frac{a}{a + b}$$

$$\text{Negative predictive value} = \frac{d}{c + d}$$

Specificity

- ◆ Ability to identify those **without** the disease

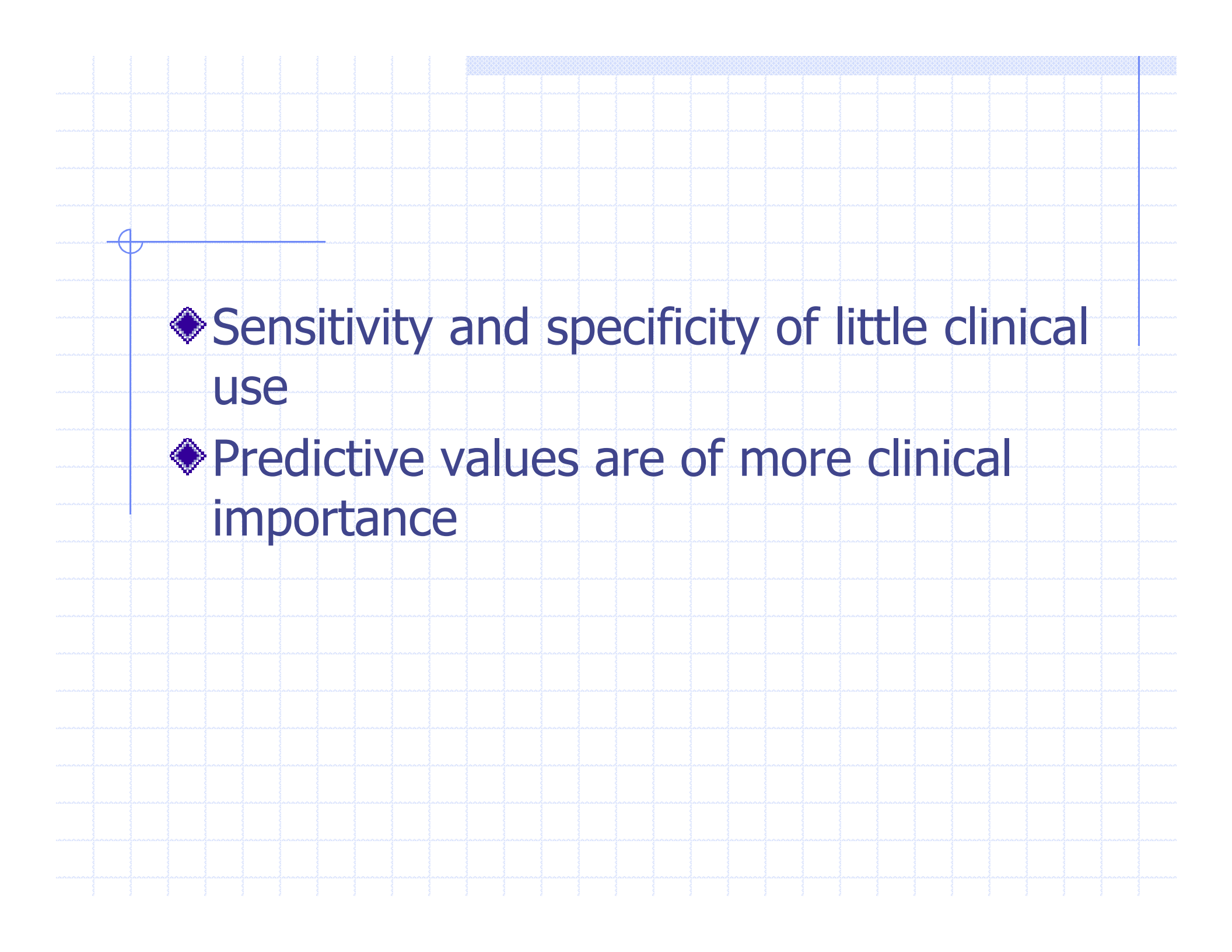
		Disease	
		Positive	Negative
Test	Positive	<p>True positive</p> <p>a</p>	<p>False positive</p> <p>b</p>
	Negative	<p>False negative</p> <p>c</p>	<p>True negative</p> <p>d</p>

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- 
- ◆ Sensitivity and specificity of little clinical use
 - ◆ Predictive values are of more clinical importance

Predictive Values

- ◆ Positive predictive value or predictive value of a positive test
- ◆ Negative predictive value or the predictive value of a negative test

		Disease	
		Positive	Negative
Test	Positive	True positive a	False positive b
	Negative	False negative c	True negative d

$$\text{Sensitivity} = \frac{a}{a + c}$$

$$\text{Specificity} = \frac{d}{b + d}$$

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$$\text{Negative predictive value} = \frac{d}{c + d}$$

Predictive Values

- ◆ Influenced by **prevalence** of disease

**Sexually transmitted disease clinic
(prevalence=30%)**

Chlamydia infection

		Positive	Negative	
PCR test	Positive	294 a	21 b	315
	Negative	6 c	679 d	685
		300	700	

Predictive value positive=0.93
 Predictive value negative=0.99

**Private practice
(prevalence=3%)**

Chlamydia infection

		Positive	Negative	
PCR test	Positive	29 a	29 b	58
	Negative	1 c	941 d	942
		30	970	

Predictive value positive=0.50
 Predictive value negative=1.00

Ovarian Cancer

- ◆ A leading cause of cancer related death among women in the developed world
- ◆ >70% present with advanced stage disease → 30% 5 yr survival
- ◆ Stage I 5 yr survival >85%

Evidence?

- ◆ Kentucky trial
 - 14469 TVS annually
 - 180 underwent surgery
 - 17 ovarian cancers detected
 - ◆ 5 stage I
 - ◆ 3 stage II
 - 4 false negative TVS

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- 4 false negative TVS

◆ Hirosaki trial

- 51550
- 324 underwent surgery
- 22 ovarian cancers detected
 - ◆ 12 stage I
 - ◆ 2 stage II

Evidence

◆ Kentucky trial:

- PPV 9.4%
- Sens 81%

◆ Hirosaki trial:

- PPV 6.8%

Systematic Review

- ◆ Asymptomatic general risk postmenopausal women
- ◆ 20 studies:
 - ◆ 10 000 annually screened Ca-125 for 3 yrs
 - ◆ 800 will have ultrasound scan
 - ◆ 30 will undergo surgery
 - ◆ 6 will have ovarian cancer → 3 will be early stage

Fung et al, *JO&G Canada*, Aug 2004

Improving Screening

- ◆ Second line studies that might increase TVS accuracy:
 - Morphologic tumor indexing
 - Doppler sonography
 - Ca-125

Populations

- ◆ No family history
 - Life time risk: 1.3% (1 in 70)
 - Do not screen
- ◆ First degree family history
 - Life time risk: 3 to 4%
 - ??screen
- ◆ Family history breast and/or ovarian cancer
 - Life time risk: >15%
 - Screen from 35 yr. Offer prophylactic surgery

High Risk Populations

- ◆ Sparse data regarding screening in this group
- ◆ No evidence of the impact of screening on mortality
- ◆ Two single-arm trials currently running in the USA and UK with the aim of developing a screening strategy

Current RCTs

- ◆ PLCO cancer screening trial (USA)
 - Intervention and control arms
 - CA-125 and TVS for 3 yrs, then Ca-125 for 2 yrs
 - 13 yrs follow-up after randomization

Current RCTs

◆ UKC-TOCS

- 200 000 women → ultrasound, control, multi-modal
- Results expected in 8 yrs

Ovarian Ca Screening: Summary

- ◆ TVS can detect ovarian ca among asymptomatic women. Mortality benefit not yet proven
- ◆ More benign masses than malignant ones are detected → excessive surgical interventions among healthy, active asymptomatic women
- ◆ Second line studies may improve PPV

Ovarian Ca Screening: Summary

- ◆ Ovarian cancer → low prevalence in general population
- ◆ At present: ultrasound ovarian cancer screening in general population only as part of research settings
- ◆ Screening for very high risk group as well as ?intermediate risk group

Endometrial Cancer

- ◆ Routine screening currently not justified
- ◆ Asymptomatic post menopausal women
→ educated about vaginal bleeding
- ◆ All pmb requires investigation
 - TVS
 - Endometrial office biopsy



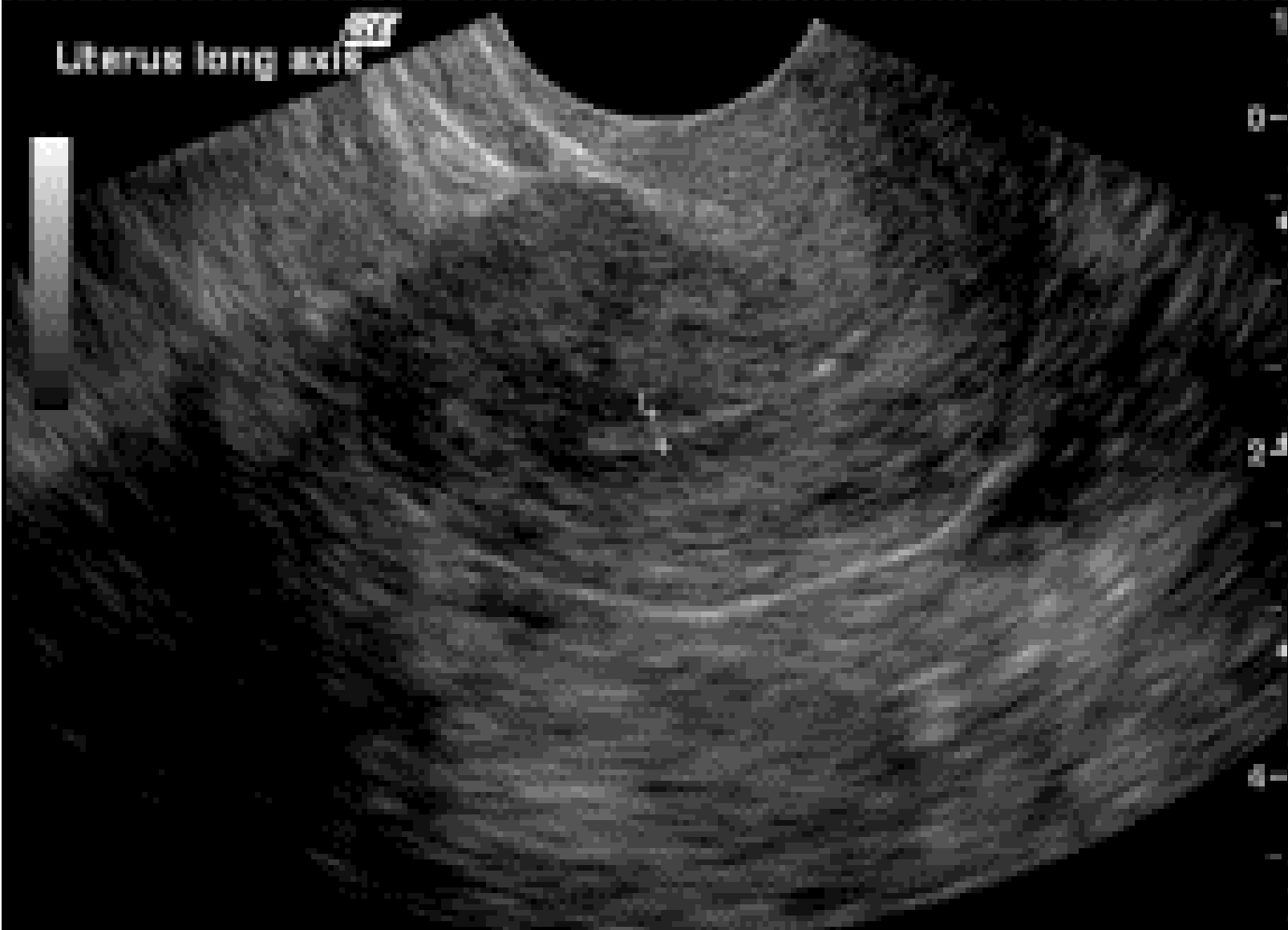
Uterus long axis

ST



1	R
	Freq 8.0 MHz
	Gain 50
0	Gain 10
	Map 200
	D 5.0 cm
	DRL 73
	PR 20 Hz
	AO 60 %

1 L 1.20 cm

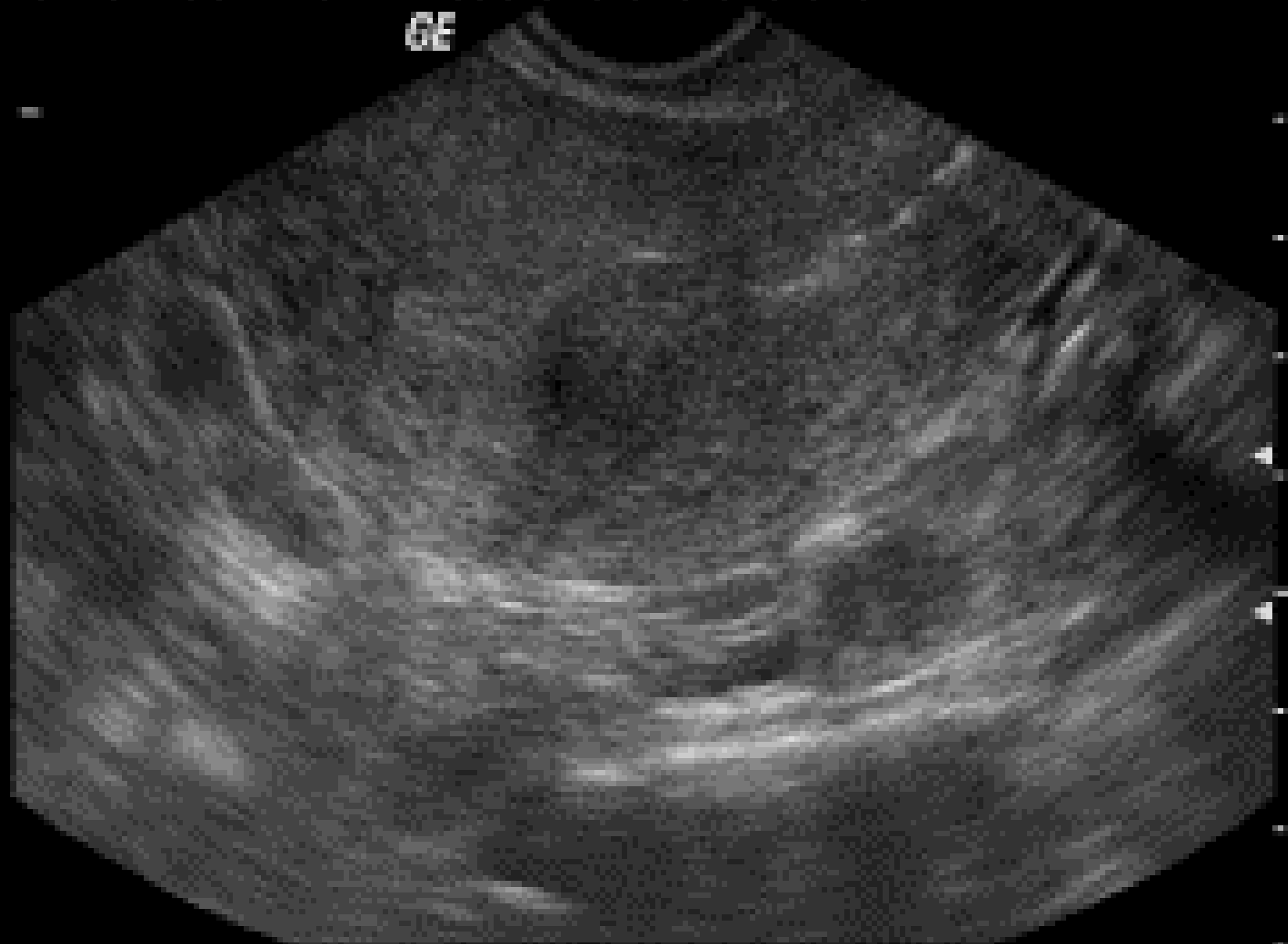


NYU MEDICAL CENTER

B114

GE

CH0
8cm
DR72
G 54



MLC9 4

NYU MEDICAL CENTER

B11*

GE

LONG UTERUS

CH0
8cm
DR72
3 54



+ 15.8cm

x 10.7cm

x 12.5cm

HI 00.4

Cervical Cancer

- ◆ Assessment of bladder wall and mucosa infiltration
- ◆ Abdominal ultrasound:
 - Sensitivity 100%, Specificity 76.5%
 - PPV 60.4%, NPV 100%

De Jonge and Miskin, SAMJ 1995

KALAFONG HOSPITAL
SSD 5000

Y 3 13-06-03
08:25:55
104/105 2
23Hz DVA: 52%
2.14R



_R15 G53 C4 A1

1: Abdomen

KALAFONG HOSPITAL

IDC
[

: YJ

18-10-'04

: F11

08:09:53

22Hz

3.5M R-H
DVA: 100%



R15 G45 C3



1: Abdomen

KALAFONG HOSPITAL

ID# [

: Y]

: F11 18-10-'04
08:27:29

17Hz 3.5M R-H
DVA: 100%



+DIST. cm



MEASUREMENT
B-1

R08 G33 C3

1
Data
Clear

2
DIST.

3
Area
Trace

4
Area
Ellipse

5
Angle

6
Next
Page

KALAFONG HOSPITAL

IDC
[

: YJ

02-08-04

: 11

11:30:24

18Hz

3.5M R-H

DVA: 100%



R13 062 C3



1: Abdomen