




Pelvic Mass Assessment: why terminology matters and How IOTA, ADNEX AND O-RADS guide us

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Southampton, UK
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Disclaimer

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Disclosure

I have received speaker fees from GE for ultrasound lectures (in UK and Europe)

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IOTA

- Standardised language
- Risk models:
 - Simple Descriptors
 - ADNEX model
- 2-step strategy
- Example
- Management: O-RADS
- Summary

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Imaging of the ovaries: predicting the risk of malignancy in adnexal masses is important

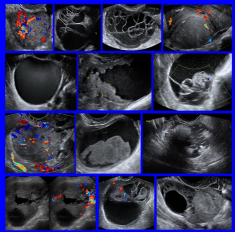
- Diagnose ovarian cancer earlier
- Enable women with malignancies to have surgery in a dedicated oncology centre
- Triage women with benign pathology to benign gynaecology service for
 - conservative management
 - minimally invasive surgery

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The report really matters

- Is the adnexal lesion benign or malignant?
- Previously reports would state:
 - Simple cyst
 - Complex cyst
- Can we do better?
 - Normal / Functional
 - Benign
 - Borderline / Invasive / Metastatic



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Standardisation of terminology

- IOTA group
- Terms and definitions of adnexal pathology
- TRANSVAGINAL ULTRASOUND

2000

Terms, definitions and measurements to describe the sonographic features of adnexal tumors: a consensus opinion from the International Ovarian Tumor Analysis (IOTA) group

D. TIMMERMAN, L. VALENTIN*, T. H. BOURNE†, W. P. COLLINS‡, H. VERRELST§ and L. VERGOTE

Department of Obstetrics and Gynaecology, University Hospitals KU Leuven, Leuven, Belgium, *Department of Obstetrics and Gynaecology, University Hospital Maastricht, Maastricht, †Department of Obstetrics and Gynaecology, St. George's Hospital Medical School, University of London, London, UK, ‡King's College, University of London, UK and §Department of Electrical Engineering, Katholieke Universiteit Leuven, Belgium

KEYWORDS: Ultrasonography, Color Doppler imaging, Ovary, Definitions, Standardization

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IOTA terminology

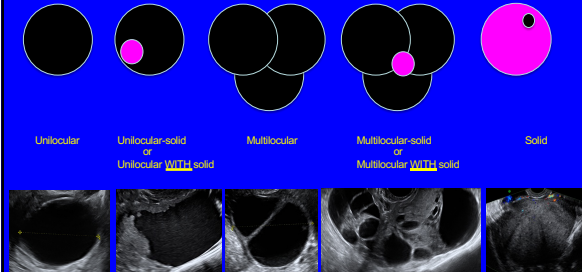
Describe adnexal lesions:

- Locules / solid component
- Cyst contents
- Papillations
- Vascularity
- Shadows
- Ascites

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Locularity

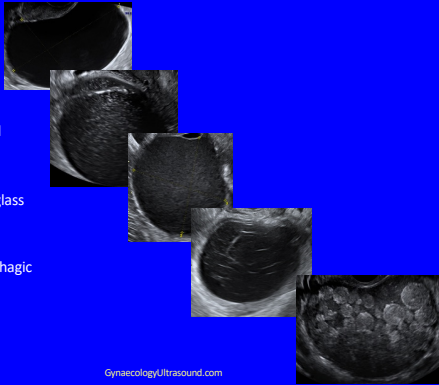


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Cystic contents- echogenicity

- Anechoic
- Low level
- Ground glass
- Haemorrhagic
- Mixed

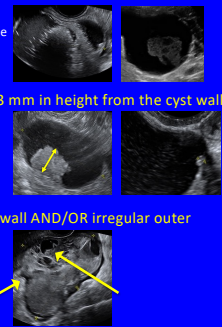


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Solid material / papillations

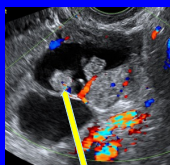
- Solid component – structure that has echogenicity suggestive of tissue
BUT
 - the white ball of a dermoid is not solid tissue
 - blood clot or mucin is not solid tissue
- A papillary projection is a protrusion >3 mm in height from the cyst wall (this also counts as a solid component)
If < 3 mm height = irregularity
- Irregular – means an irregular internal wall AND/OR irregular outer contour of a solid lesion



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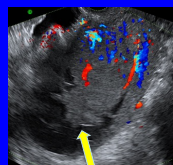
10

Solid material – papillations



Papillations
≥3 mm height

All papillation = solid



not a papillation

Not all solid = papillation

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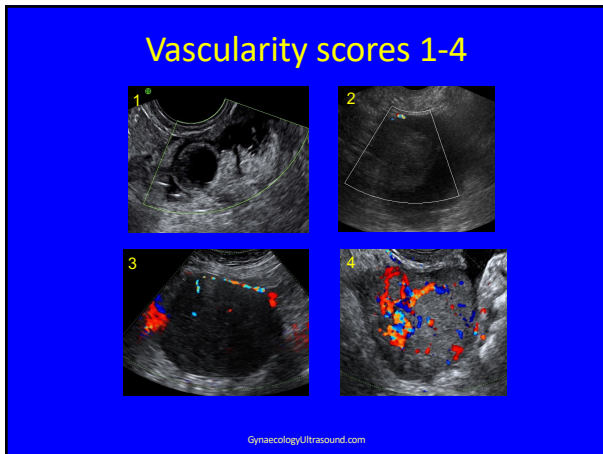
11

Vascularity score

- Colour Doppler
- PRF 0.3 - 0.6 KHz
- Velocity scale 3-6 cm/sec
- Adjust Doppler gain to just below artefact level
- No flow = 1 (none at all)
- Minimal flow = 2 (really have to look for it)
- Moderate flow = 3 (just there)
- Strong flow = 4 (strong, in one area or all over)

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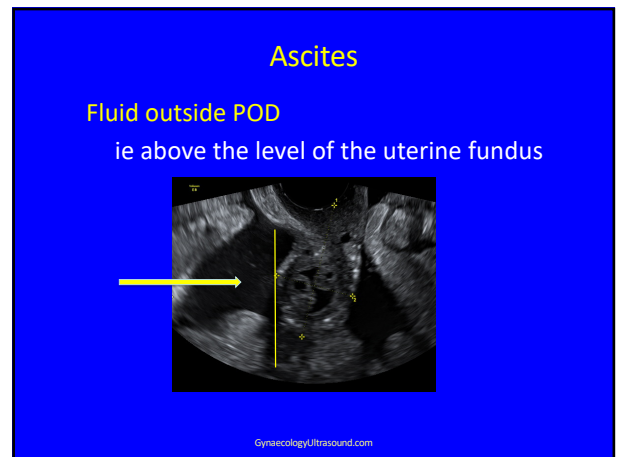
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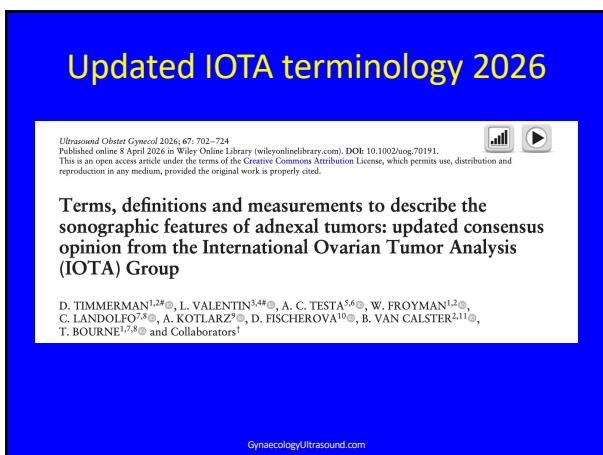
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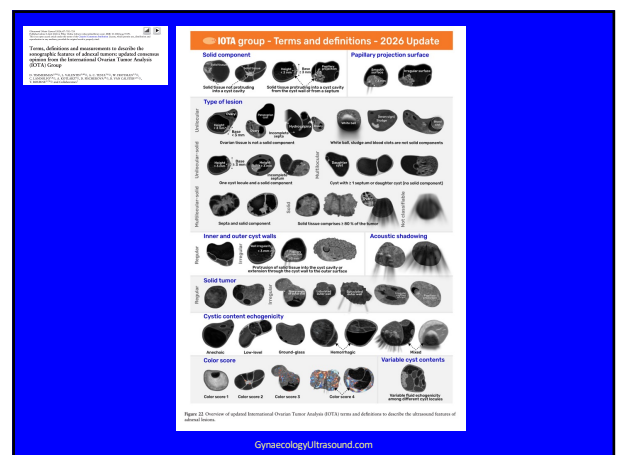
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Updates to the IOTA definitions 2026

Terms, definitions and measurements to describe the ultrasonographic features of adnexal masses updated consensus opinion from the International Ovarian Tumor Analysis (IOTA) Group

Updated definition: If a cyst with one cyst locule contains a **solid component** and the solid component contains **papillary projections**, the mass is multilocular-solid, not multilocular-solid. Figure 9 shows a papillary projection with microvilli.

New definition: If a cyst with one cyst locule contains anechoic fluid and two locules contain **solid** (Figure 10), the mass is multilocular-solid, not multilocular-solid. Figure 9 shows a papillary projection with microvilli.

Updated definition: A solid component must have at least one diameter that is **≥10 mm** to be regarded as a solid component (Figure 6).

Papillary projection in solid masses
Updated definition: A **papillary projection** is a solid mass protruding from a cystic area in the tumor. There are two types: **intracystic** and **extracystic**.

Updated definition: When a mass is classified as a **solid** mass, the number of **papillary projections** should be counted. When using the **ADNEX** model, the number of **papillary projections** should be counted. When using the **ADNEX** model, the number of **papillary projections** should be counted.

Updated definition: If the center cyst wall is **irregular** because of solid tissue growing on the outside of the cyst, this is described as an **irregular center cyst wall** (Figure 10a-c).

Updated definition: The presence of a **solid component** or a **solid component** is a **solid component**. The presence of a **solid component** or a **solid component** is a **solid component**. The presence of a **solid component** or a **solid component** is a **solid component**.

Updated definition: When assigning the **ADNEX** score, the highest degree of vascularization observed within the tumor should be considered ('worst-case scenario' rule). For example, a color score of 4 is given if a tumor contains one highly vascularized solid component, even if the wall or septa or other solid components of the tumor show little vascularity (Figure 2b-c).

New definition: A **multilocular** mass is a mass with a **specific** **multilocular** morphology. A **multilocular** mass is a mass with a **specific** **multilocular** morphology. A **multilocular** mass is a mass with a **specific** **multilocular** morphology.

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IOTA

- Standardised language
- Risk models:
 - Simple Descriptors
 - ADNEX model
- 2-step strategy
- Example
- Management
- Summary

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SIMPLE DESCRIPTORS

Pattern recognition

- 50% adnexal masses usually 'instantly' recognizable:
- Benign <10 cm
 - Endometrioma- premenopausal
 - Dermoid - premenopausal
 - Simple cyst or cystadenoma
 - Other unilocular cysts inc physiological cysts, haemorrhagic cysts
- Multilocular tumour with ascites (postmenopausal)

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Benign Simple Descriptors

Figure 1. International Ovarian Tumor Analysis (IOTA) modified benign Simple Descriptors (Benign Descriptors) illustrated by ultrasound images.

Benign descriptor 1: Unilocular cyst with ground glass echogenicity and largest diameter <10 cm in a premenopausal woman (suggestive of endometrioma)
Benign descriptor 2: Unilocular cyst with mixed echogenicity, acoustic shadows and largest diameter <10 cm in a premenopausal woman (suggestive of benign cystic teratoma)
Benign descriptor 3: Unilocular cyst with anechoic cyst fluid, smooth internal walls and largest diameter <10 cm (suggestive of simple cyst or cystadenoma)
Benign descriptor 4: All other unilocular cysts with smooth internal walls and largest diameter <10 cm

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Example 1

Simple descriptors (B)

unilocular, ground glass echogenicity, <10 cm, pre-menopausal



Endometrioma

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Example 2

Simple descriptors (B)

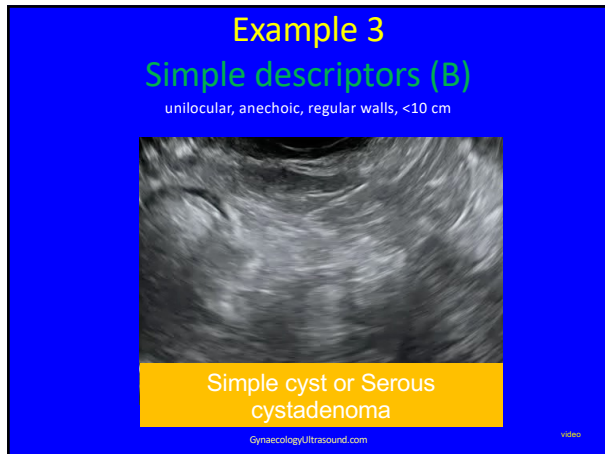
unilocular, mixed echoes, shadows, <10 cm, pre-menopausal



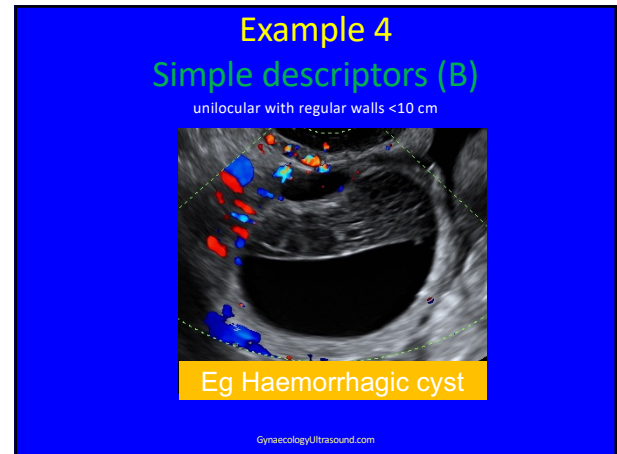
Dermoid

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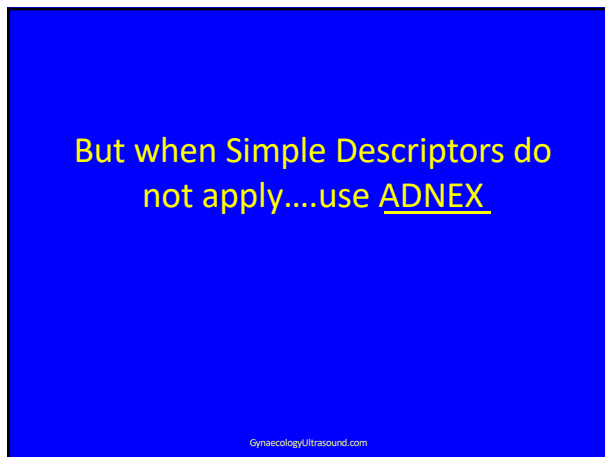
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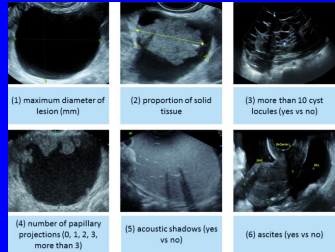
27

2014 - IOTA – ADNEX model
Assessment of Different Neoplasias in the adnexa

From: Views, Vix, Oboyn, 2016;7(1):32-41

2014
Practical guidance for applying the ADNEX model from the IOTA group to discriminate between different subtypes of adnexal tumors.
Van Calster B¹, Van Hoorde K², Eroyman W³, Kalliser J³, Wynants L², Landolfo C³, Anthoulakis C³, Veropde J⁴, Bourne T⁵, Timmerman D³.

- Age
- Type of centre (oncology or other)
- Ca125 (optional)



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ADNEX model

Age 43
Pain and unscheduled bleeding on COC

www.adnextron.com/adnexmodel
desktop or phone



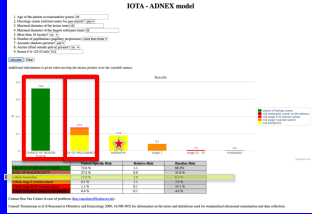
Unilocular-solid cyst
 <10 locules
 Max lesion 82 mm
 Max solid 32 mm
 Low level echogenicity
 >3 papillations
 Shadowing
 Minor vascularity
 No ascites

CA125 = 14.2

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ADNEX results



Choose a 'cut-off' for distinguishing between Benign and Malignant
Eg 10%

ADNEX – malignant – Borderline

Histology : FIGO 1A borderline serous tumour

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ULTRASOUND in Obstetrics & Gynecology



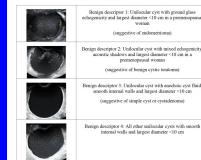
Original Paper

Benign descriptors and ADNEX in two-step strategy to estimate risk of malignancy in ovarian tumors: retrospective validation on IOTA 5 multicenter cohort

C. Landolfo, T. Bourne, W. Froyman, B. Van Calster, J. Ceusters, A. C. Testa, L. Wynants, P. Sladkevicius, C. Van Holsbeke, E. Dornai, R. Fruscio, E. Epstein, D. Franchi, M. J. Kudla, V. Chiappa ... See all authors

First published: 30 September 2022 | <https://doi.org/10.1002/uog.26080>

Figure 3. Benign descriptors. Seven benign descriptors (BD) to estimate benign Simple Descriptors (SD) (descriptors identified by ultrasound images).



BD applicable: <1% risk of malignancy

2-step strategy:
ADNEX with CA125: AUC 0.95

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ULTRASOUND in Obstetrics & Gynecology



Original Paper

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C. Landolfo, T. Bourne, W. Froyman, B. Van Calster, J. Ceusters, A. C. Testa, L. Wynants, P. Sladkevicius, C. Van Holsbeke, E. Dornai, R. Fruscio, E. Epstein, D. Franchi, M. J. Kudla, V. Chiappa ... See all authors

First published: 30 September 2022 | <https://doi.org/10.1002/uog.26080>

Table S14. Sensitivity and specificity of the two-step strategies for the prediction of malignancy, for the two pre-specified additional analyses. Results are based on meta-analysis of center-specific results. The broader definition of 'uncertain outcome' implies that more outcomes are multiply imputed. The sample size is the same as that for the primary analysis ($n = 4995$).

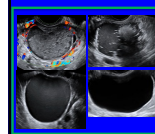
Risk threshold	Two-step strategy using ADNEX with CA125		Two-step strategy using ADNEX without CA125	
	Sensitivity (95% CI)	Specificity (95% CI)	Sensitivity (95% CI)	Specificity (95% CI)
Patients with uncertain outcome omitted ($n=4419$)				
0.01	97.8 (94.5 – 99.1)	49.9 (39.9 – 59.9)	97.4 (94.5 – 98.8)	50.1 (40.2 – 59.9)
0.03	95.8 (92.1 – 97.8)	63.4 (54.7 – 71.3)	96.6 (93.2 – 98.3)	60.4 (51.8 – 68.4)
0.05	94.9 (90.0 – 97.5)	74.7 (67.2 – 80.9)	95.6 (91.1 – 97.9)	72.3 (63.8 – 79.4)
0.10	94.9 (90.0 – 97.5)	82.0 (76.8 – 87.1)	94.0 (88.3 – 97.1)	81.0 (75.0 – 85.8)
0.15	92.3 (86.6 – 95.7)	86.1 (80.4 – 90.1)	92.0 (85.7 – 95.9)	85.1 (78.6 – 89.4)
0.20	90.2 (84.2 – 94.0)	88.7 (84.4 – 91.9)	89.9 (84.0 – 93.8)	87.6 (83.0 – 91.1)
0.25	87.5 (81.5 – 91.6)	90.4 (86.7 – 93.1)	88.0 (81.9 – 93.3)	89.2 (85.1 – 92.2)
0.30	85.7 (80.3 – 89.9)	91.9 (88.3 – 94.5)	86.6 (80.3 – 90.8)	90.5 (86.7 – 93.4)
0.40	82.1 (77.0 – 86.3)	93.5 (90.4 – 95.5)	82.7 (77.7 – 86.8)	92.4 (89.2 – 94.7)
0.50	77.4 (73.1 – 81.2)	95.5 (93.5 – 96.9)	78.3 (73.8 – 82.2)	94.3 (91.7 – 96.1)

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How to use the systems

Benign Simple Descriptors



ADNEX



If not applicable:

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IOTA

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Example

- Image
- Describe lesion using IOTA language
- Benign Simple Descriptors
- ADNEX score

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Benign Simple Descriptors then ADNEX

Figure 1. International Ovarian Tumor Analysis (IOTA) modified benign Simple Descriptors (Simple Descriptors) illustrated by ultrasound images.

	Benign descriptor 1: Unilocular cyst with ground glass echogenicity and largest diameter <10 cm in a premenopausal woman (suggestive of endometrioma)
	Benign descriptor 2: Unilocular cyst with mixed echogenicity, acoustic shadowing, and largest diameter <10 cm in a premenopausal woman (suggestive of benign cystic teratoma)
	Benign descriptor 3: Unilocular cyst with anechoic cyst fluid, smooth internal walls and largest diameter <10 cm (suggestive of simple cyst or cystadenoma)
	Benign descriptor 4: All other multilocular cysts with smooth internal walls and largest diameter <10 cm

IOTA - ADNEX model

1. Age of the patient at examination (years) [64]

2. Maximal diameter of the lesion (mm) [152]

Maximal diameter of the largest solid part (mm) [55]

More than 10 locules? [No] ☐

Number of papillations (papillary projections) [0]

Acoustic shadowing present? [No] ☐

9. Serum CA-125 (U/ml) [27.5]

ADNEX = 80.8%

Predicts Borderline or stage I

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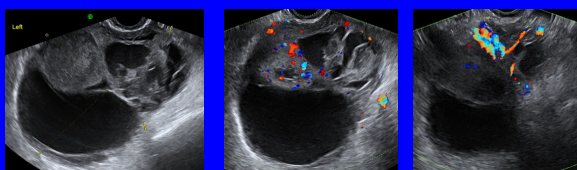
Case 1

- Age 64
- 9/12 Tired, nausea, can't eat, feels full, weight loss, bowel symptoms
- CA125 = 27.5

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Case 1

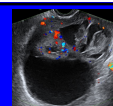


Age 64
152 mm irregular multilocular-solid lesion (or multilocular WITH solid)
Max solid 55 mm
<10 locules
No papillations
Strong vascularity, no shadowing, no ascites
CA125 = 27.5

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Case 1 SIMPLE DESCRIPTORS



Age 64
152 mm irregular multilocular-solid lesion (or multilocular WITH solid)
Max solid 55 mm
<10 locules
No papillations
Strong vascularity, no shadowing, no ascites
CA125 = 27.5

Simple Benign Descriptors

<10 cm

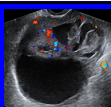
~~Endometrioma-premenopausal~~
~~Dermoid - postmenopausal~~
~~Simple cyst or cystadenoma~~
~~Other unilocular cyst~~

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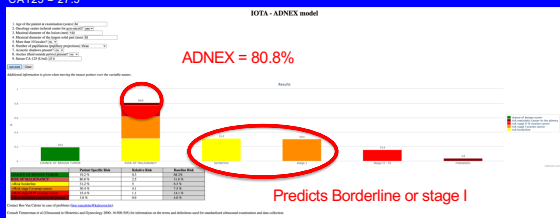
40

Case 1 ADNEX

Age 64
152 mm irregular multilocular-solid lesion (or multilocular WITH solid)
Max solid 55 mm
<10 locules
No papillations
Strong vascularity, no shadowing, no ascites
CA125 = 27.5



ADNEX = 80.8%

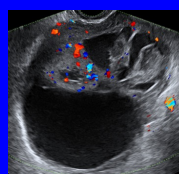


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Case 1

Age 64
152 mm irregular multilocular-solid lesion (or multilocular WITH solid)
Max solid 55 mm
<10 locules
No papillations
Strong vascularity, no shadowing, no ascites
CA125 = 27.5



Easy Descriptors: No

ADNEX: 80.8 %
predicts borderline or stage I

Histology: Granulosa cell tumour, FIGO 1C

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Print chart or use O-RADS app

O-RADS for US
CALCULATOR

Ovarian/Adnexal Reporting and
Data System

iOS Android

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Case 1

Age 64
152 mm irregular multilocular-solid lesion (or multilocular WITH solid)
Max solid 55 mm
<10 locules
No papillations
Strong vascularity, no shadowing, no ascites
CA125 = 27.5

Easy Descriptors: No

ADNEX: 80.8 %
predicts borderline or stage I

Histology: Granulosa cell tumour, FIGO 1C

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Case 1 - O-RADS

Age 64
152 mm irregular multilocular-solid lesion (or multilocular WITH solid)
Max solid 55 mm
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No papillations
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How to use the systems

Benign Simple Descriptors

If not applicable:

ADNEX

O-RADS

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IOTA

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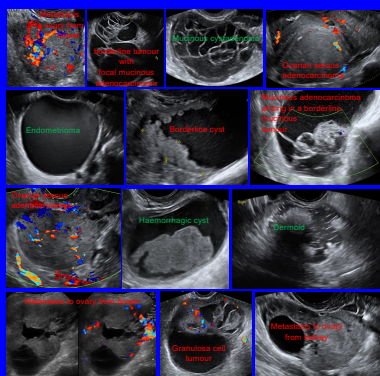
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CO-ADNEX

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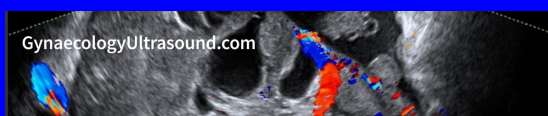
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IOTA language
Simple Descriptors
ADNEX
O-RADS for management

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THANK YOU



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- Next slides are examples benign and malignant
- If there is time

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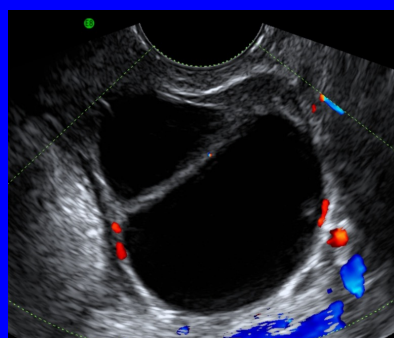
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BENIGN

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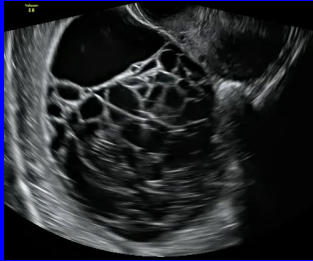
SEROUS CYSTADENOMA



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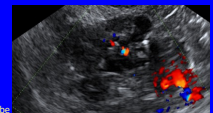
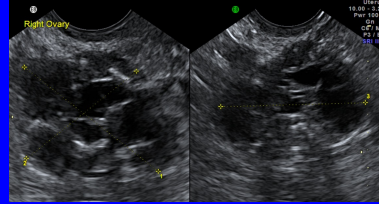
MUCINOUS CYSTADENOMA



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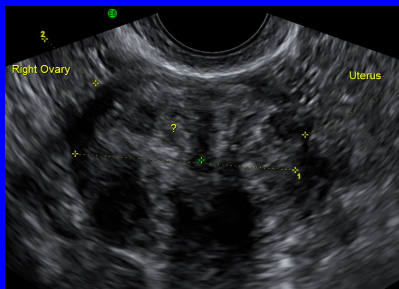
Bilateral Cystadenofibromas



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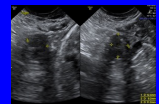
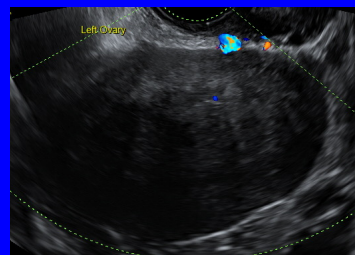
FIBROID



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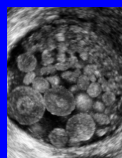
Fibroma



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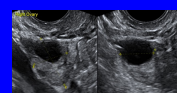
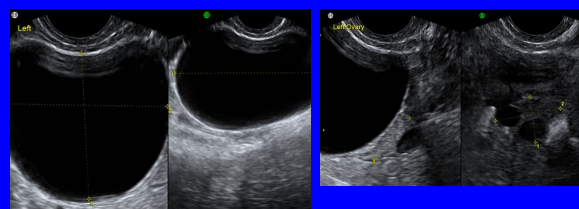
Dermoid



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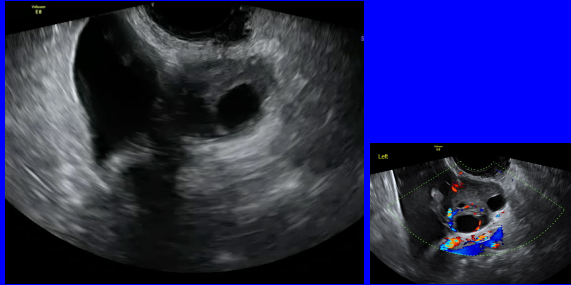
Paratubal cyst



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Peritoneal pseudocyst



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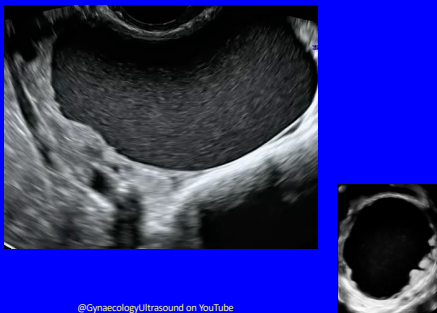
67

MALIGNANT

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Borderline Serous tumour



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Borderline Mucinous Tumour

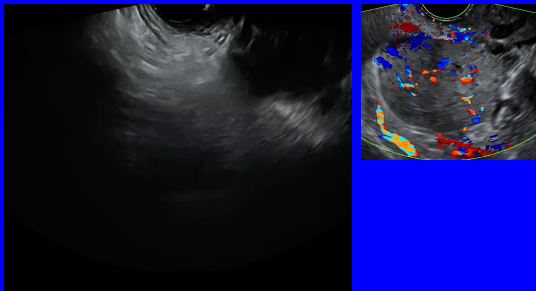


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Malignant Simple descriptor

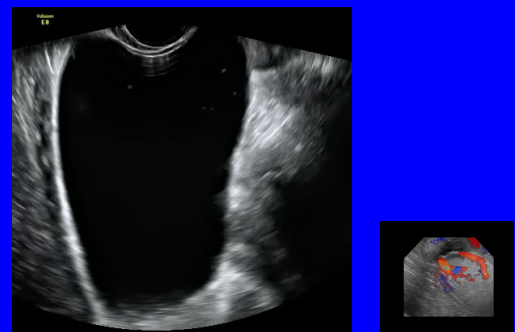
Tumour with at least moderate blood flow, ascites, postmenopausal



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STAGE 1 OVARIAN CANCER



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ASCITES AND SEROSAL DEPOSITS

Serosal deposits



A transvaginal ultrasound image showing a large, irregular, echogenic mass in the pelvic cavity, labeled "Left". The mass appears to be a large, solid, and heterogeneous structure, possibly representing a large fibroid or a complex ovarian mass. The surrounding pelvic structures are visible, and the overall image is in grayscale.

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OMENTAL CAKE



Transvaginal ultrasound image showing a large, solid, and heterogeneous mass in the upper abdomen, characteristic of an omental cake, which is a sign of advanced ovarian cancer.

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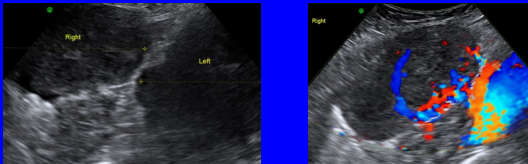
TUMOURS THAT METASTASISE TO THE OVARY

Obstetrical Gynaecology (2017) 20, 100–111
Published online 10 May 2016 in Wiley Online Library (www.interscience.wiley.com). DOI: 10.1002/og.2020

Imaging in gynecological disease (1): ultrasound features of metastases in the ovaries differ depending on the origin of the primary tumor

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Gastric, breast cancer, uterine cancer, and lymphoma: solid
Colorectal and pancreas, gallbladder: multilocular-with-solid

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For more images of adnexal masses

Joint statement

**ESGO/ISUOG/IOTA/ESGE Consensus Statement
on pre-operative diagnosis of ovarian tumors**

Dik Timmermans^{1,2}, François Planchamp,³ Tom Bourne,^{1,2,4} Chiara Landolfo,¹
Andreas del Bosq,⁵ Luis Criva,⁶ David Cibula,⁷ Nicole Cronin,⁸ Daniela Fischerov,⁹
Wouter Frynhamer,¹⁰ Guillermo Gattuso Madsuay,¹¹ Birthe Kater,¹² Annela Laft,¹³
Liliana Meris,¹⁴ Philippe Morice,¹⁵ Denis Quastorf,¹⁶ Antónia Carla Tavares,¹⁷
Ignacio Vergote,¹⁸ Vincent Vandaele,¹⁹ Giovanni Scambia,²⁰ Christina Fotopoulou.²¹

The characteristic ultrasound features of specific types of ovarian pathology (Review)

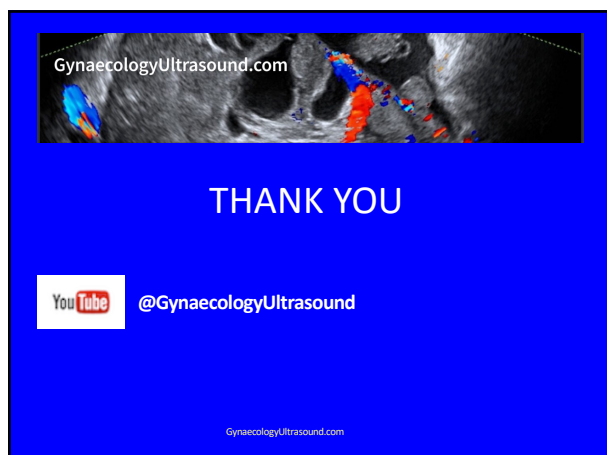
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