



# **O-RADS** Ovarian Reporting and Data System

Ultrasound Lexicon Module  
ACR O-RADS Committee

## O-RADS Lexicon

- The O-RADS lexicon was developed to establish a standardized set of terms and descriptors of ovarian and adnexal findings to assist in risk stratification and appropriate management
- An attempt was made to select terms/descriptors in use by the IOTA (International Ovarian Tumor Analysis) Group\* which has compiled decades of outcomes data on ovarian lesion characterization
- Occasionally, synonyms were agreed upon to maintain familiarity amongst users
- Other synonyms refer to terms which may be in common usage in some locations, but are not preferred descriptors in this lexicon

# O-RADS Lexicon Outline

- ❑ General definitions
- ❑ Major categories
  - Physiologic
    - Follicle/Corpus Luteum
  - Lesion
    - Unilocular +/- solid
    - Multilocular +/- solid
    - Solid
- ❑ Size
- ❑ Solid/solid-appearing lesion
  - External contour
  - Internal content
- ❑ Cystic lesions
  - Inner margins/internal walls
  - Internal content
    - Cystic component
      - Fluid descriptors
      - Dermoid descriptors
      - Hemorrhagic cyst descriptors
      - Septations
    - Solid/solid-appearing component
- ❑ Vascularity
- ❑ General and extra-ovarian findings
  - Paraovarian cyst
  - Fallopian tube descriptors
  - Peritoneal inclusion cyst
  - Fluid descriptors
  - Peritoneal thickening, nodules
  - Adenopathy

# General Definitions

- Unilateral/Bilateral
- Cyst
- Solid/solid-appearing
- Physiologic
- Lesion

**NOTE:** The term “complex” is **NOT** included anywhere in the lexicon as it is deemed vague, confusing and its use is highly discouraged

# General Definitions

- **Unilateral/Bilateral**
  - Unilateral
    - The assessment should be performed on one side
  - Bilateral
    - The assessment should be performed individually on each side

# General Definitions

## ■ Cyst

- Origin may be physiologic or non-physiologic (non-neoplastic or neoplastic)
- Fluid containing lesion whose internal fluid contents may vary from anechoic to differing degrees of internal echoes but is usually associated with acoustic enhancement and is avascular
- May contain solid components which may be tissue or non-tissue and range from avascular to vascular

## General Definitions

- **Solid/solid-appearing** (lesion or component)
  - A structure that has echogenicity suggestive of tissue (e.g. myometrium or ovarian stroma)
  - Note, the presence of flow (that can be confirmed with spectral Doppler if necessary) is diagnostic of solid tissue; the absence of flow is less helpful and the lesion may then be considered solid-appearing, depending on other features
  - Also judged by its echogenicity, size, and by the absence of internal movement which may be elicited when moving the transducer

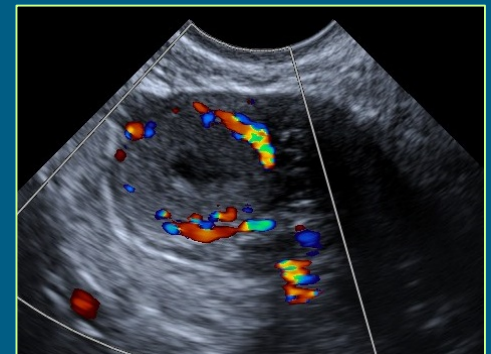
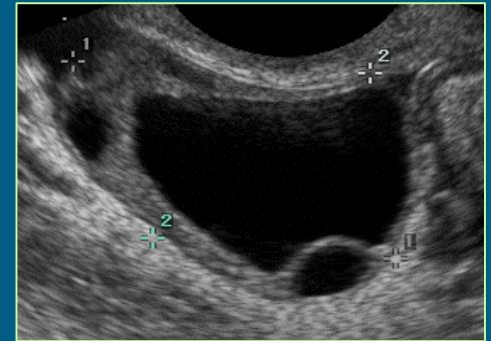
# General Definitions

- **Physiologic**
  - That which is consistent with normal ovarian physiology (i.e. follicle and corpus luteum)
- **Lesion**
  - That part of an ovary (or adnexa) judged by imaging to not be consistent with normal physiology
  - Not a stand alone term/descriptor; needs additional descriptors to be appropriately defined
  - More of a neutral term and should be used instead of “mass”
  - Can be divided into 5 major IOTA categories (to follow)



# Physiologic Category

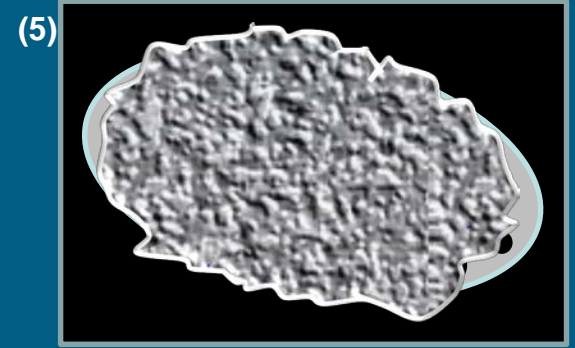
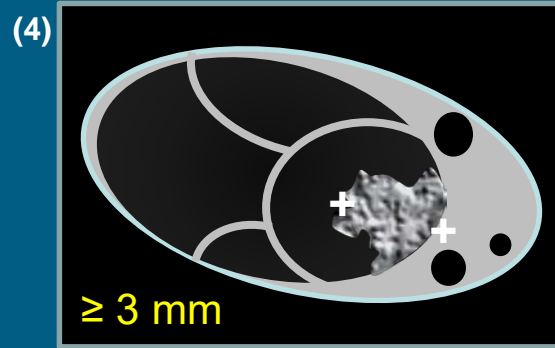
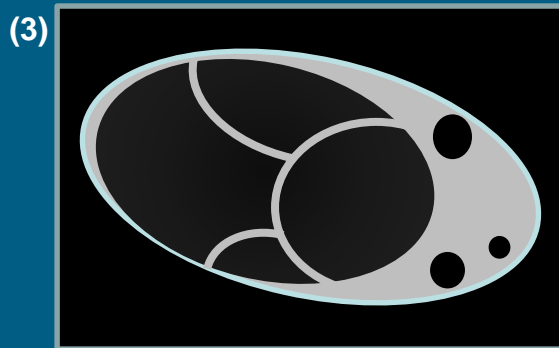
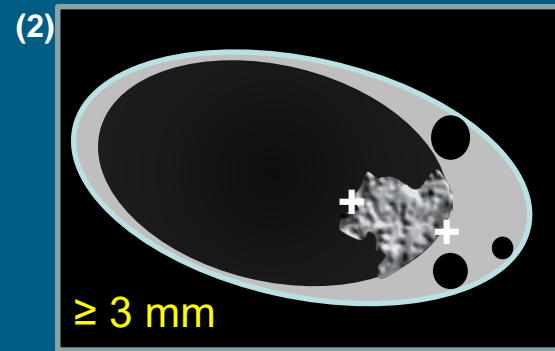
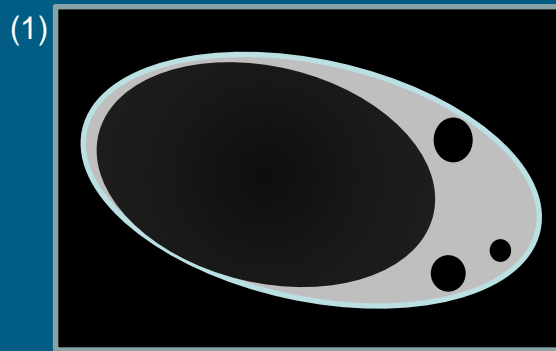
- Follicle:
  - Simple (unilocular, anechoic) cyst,  $\leq 3$  cm in maximum dimension, in premenopausal group
- Corpus luteum
  - Thick-walled cyst  $\leq 3$  cm that may have crenulated inner margins, internal echoes and (often intense) peripheral color Doppler flow
  - May sometimes appear as a hypoechoic region in the ovary with peripheral vascularity without a characteristic cystic component



## Lesion Category (IOTA Classification)

- 5 groups
  1. Unilocular cyst, **no** solid component(s)
    - Simple cyst (subcategory of unilocular)
  2. Unilocular cyst, **with** solid component(s)
  3. Multilocular cyst, **no** solid component(s)
  4. Multilocular cyst, **with** solid components
  5. Solid ( $\geq 80\%$ )
    - Purely solid (subcategory of solid; 100% solid)

# Lesion Category (IOTA Classification)



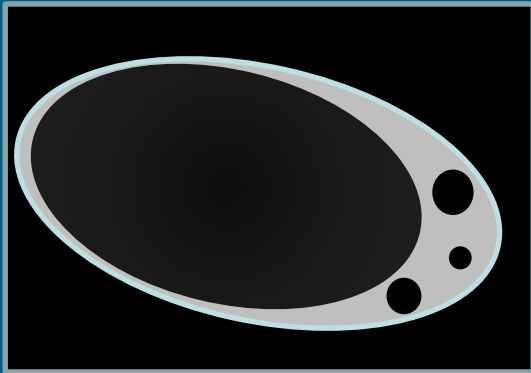
## Unilocular cystic lesion, no solid component

- Cystic lesion with a single locule (contains no complete septa), and no solid/solid-appearing component
- Incomplete septa (discontinuous), an irregular wall with focal thickening  $< 3$  mm in height or internal echoes may be present
- A **simple** cyst is a **subset** of a unilocular cyst, and has **no internal components** (thus anechoic), demonstrates acoustic enhancement, a smooth thin wall, and no internal septations (complete or incomplete)

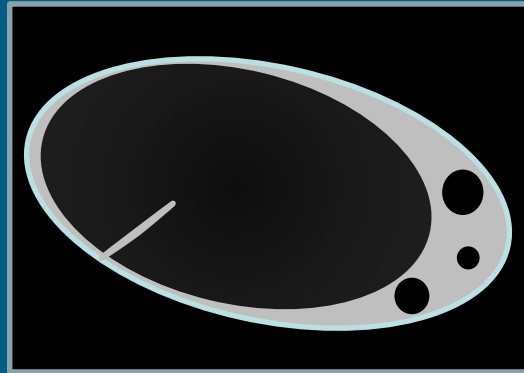
## Unilocular cystic lesion, no solid component

- The following are **NOT** considered **solid/solid-appearing** for the purposes of this lexicon:
  - Hemorrhagic products
  - Mucinous or fat containing material
  - Avascular hyperechoic structure with acoustic shadowing (i.e. Rokitansky nodule)
  - Normal ovarian tissue (e.g. Normal ovary within a peritoneal inclusion cyst)
  - Septa

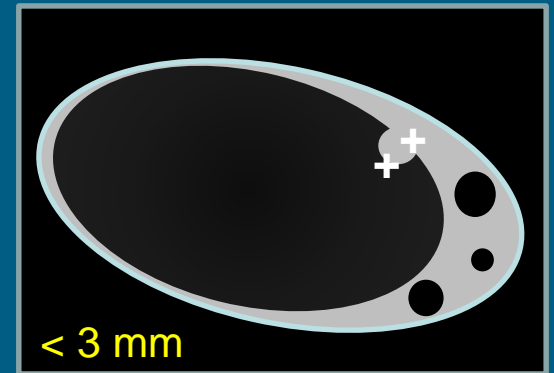
# Unilocular cystic lesion, no solid component



Simple cyst

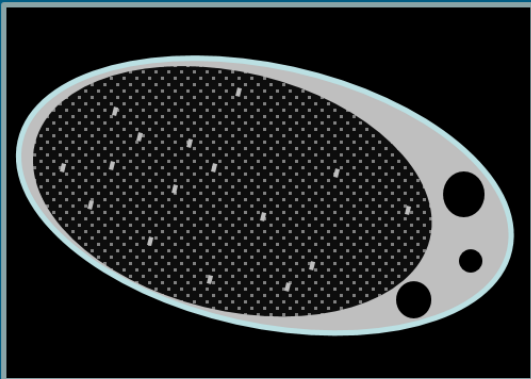


Incomplete septum

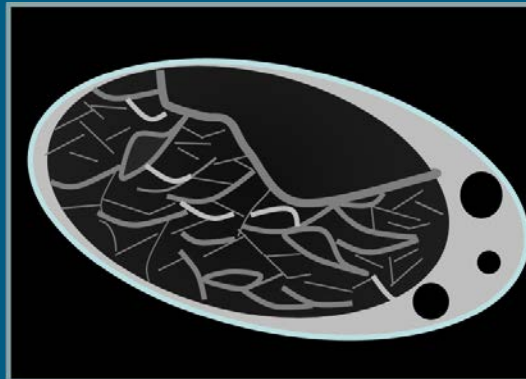


< 3 mm

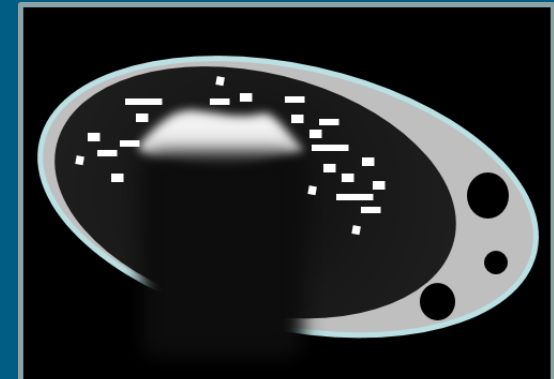
Irregular inner wall



Internal echoes



Hemorrhagic cyst

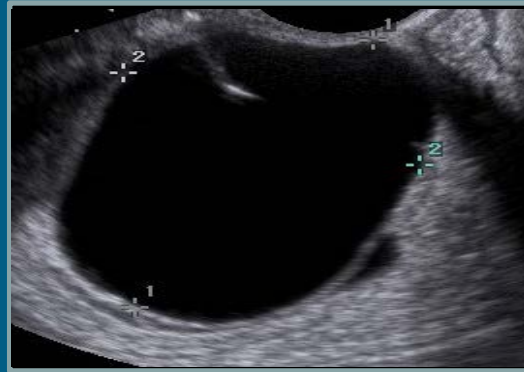


Dermoid cyst

# Unilocular cystic lesion, no solid component



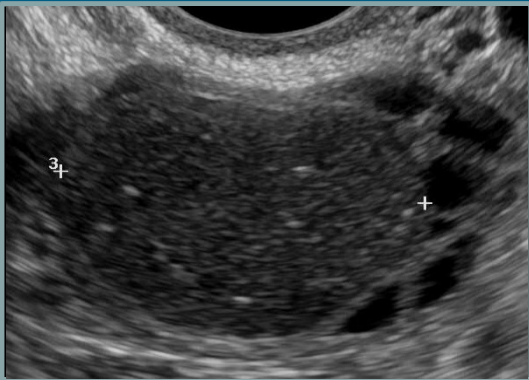
Simple cyst



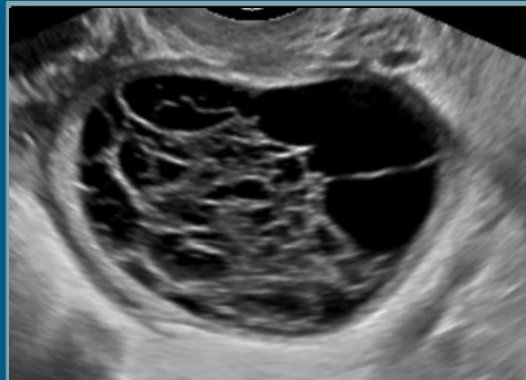
Incomplete septum



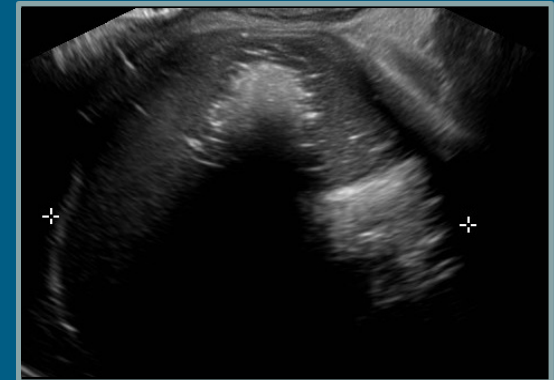
Irregular inner wall



Internal echoes



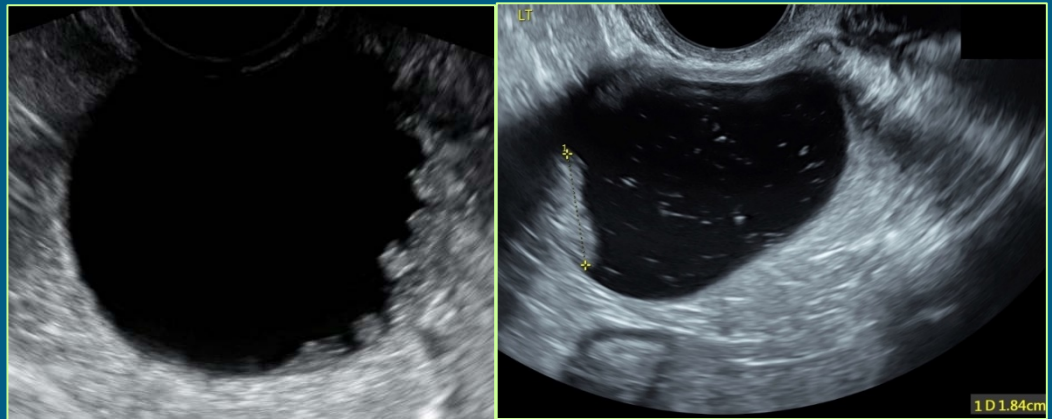
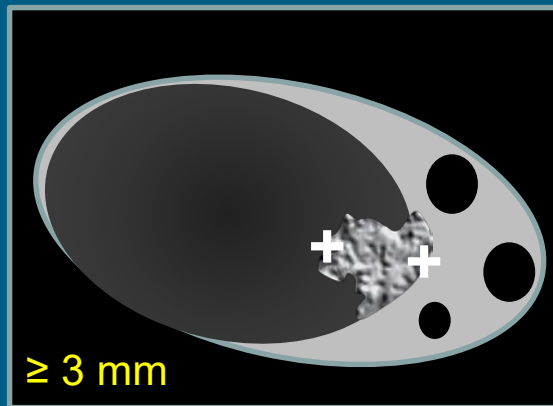
Hemorrhagic cyst



Dermoid cyst

## Unilocular cyst, with solid component(s)

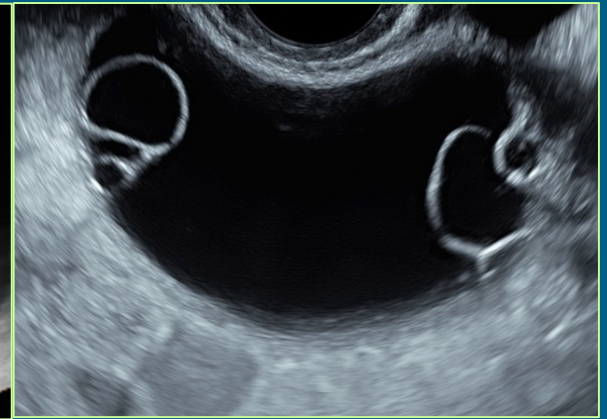
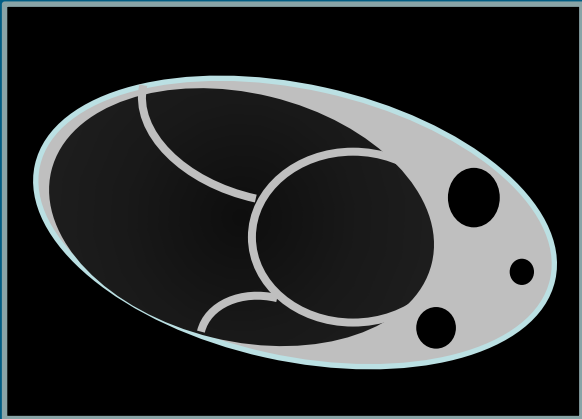
- Cystic lesion with a single locule (i.e. contains no complete septa), which contains a solid/solid-appearing component  $\geq 3$  mm in height





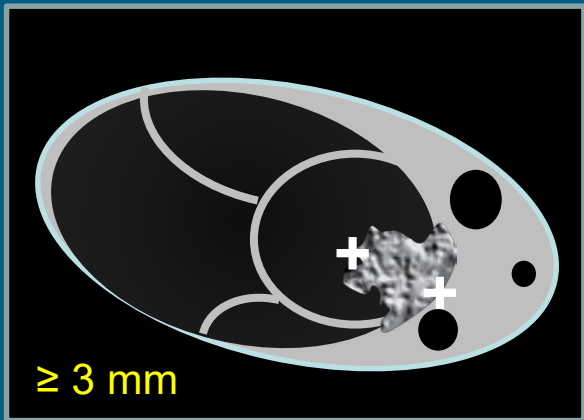
## Multilocular cyst, no solid component(s)

- Cystic lesion with more than one locule (at least one complete septum) and no solid/solid-appearing component
- May include an irregular wall with focal thickening < 3 mm in height or internal echoes



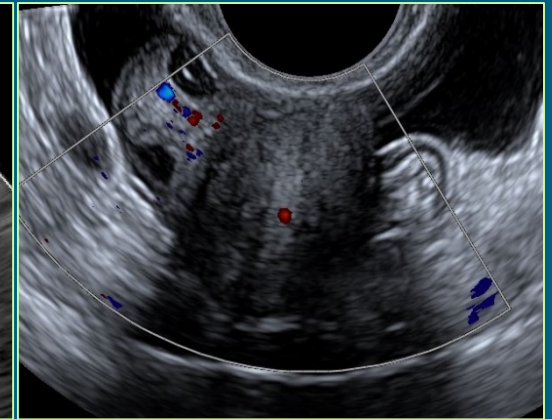
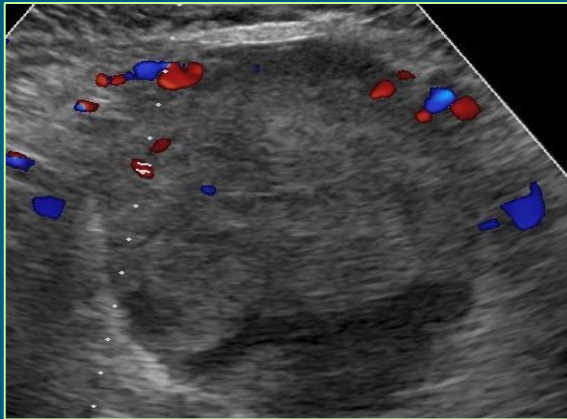
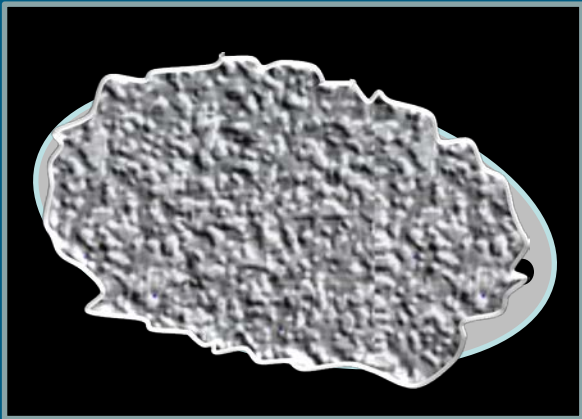
## Multilocular cyst, with solid component(s)

- Cystic lesion with more than one locule (at least one complete septum), which also contains a solid/solid-appearing component  $\geq 3$  mm in height



# Solid

- A structure that has echogenicity suggestive of tissue (e.g. myometrium or ovarian stroma) without characteristics of a cyst (definition solid/solid appearing would apply)
- Considered solid if the lesion is at least 80% solid when assessed in a two-dimensional section
- A purely solid lesion is a subset of solid that is 100% solid with no cystic components



# Size

- When measuring a lesion, one may consider:
  - Maximum diameter of lesion in any plane
  - Maximum diameter of largest solid component in any plane
  - Maximum diameterss of lesion (largest 3 diameters in 2 perpendicular planes; one of these will be the maximum diameter of the lesion)
- Volume of a lesion is optional
  - Obtained from largest 3 diameters in 2 perpendicular planes ( $0.52 \times \text{length} \times \text{height} \times \text{width}$ ) OR 3D ultrasound

**NOTE:** Though most US systems measure to the hundredth place, for the purposes of the lexicon, it is suggested to report to the nearest tenth.

# Solid/solid-appearing Lesion

## External Contour

- Smooth
  - Regular outer margin of solid lesion
- Irregular/Not smooth
  - A non-uniform outer margin
  - A lobulated appearance is considered irregular

## Internal Content

- Hypoechoic\*
- Isoechoic\*
- Hyperechoic\*
- Acoustic shadowing
- Calcifications

\*Compared to an internal reference (most commonly normal ovarian stroma)

# Cystic Lesion

## Inner margin/Internal Wall

- Smooth
  - Regular, uniform throughout
- Calcified
  - High level echogenicity which is curvilinear or plaque-like
  - Associated with acoustic shadowing when dense or large enough
- Irregular
  - Non-uniform, focal thickening of < 3 mm, papillary projections or mural nodules, irregular incomplete septa

## Internal Content

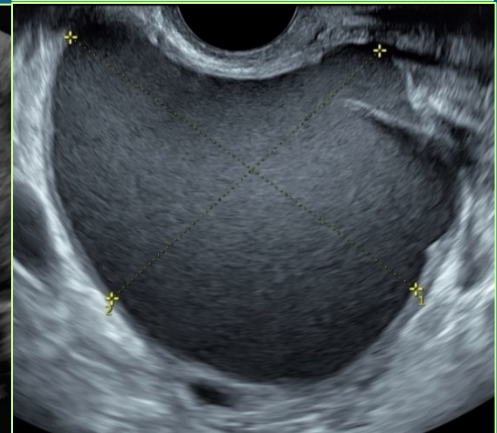
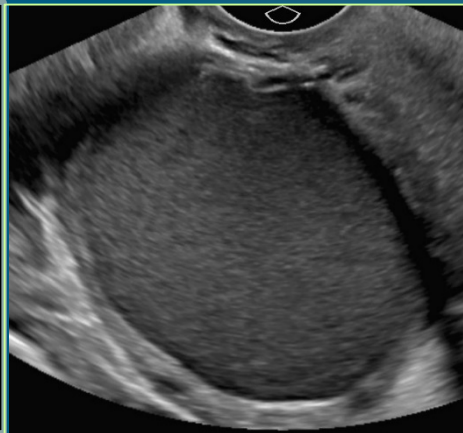
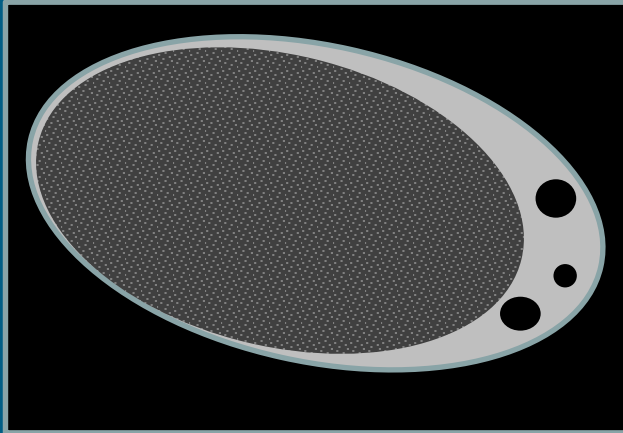
- Fluid descriptors
  - Anechoic/simple fluid
  - Hyperechoic components
  - Ground glass or homogeneous low-level echoes
  - Scattered low-level echoes
  - Fluid/fluid level
- Dermoid descriptors
- Hemorrhagic cyst descriptors
- Septations
  - Complete
  - Thin:  $\leq 3$  mm
  - Thick:  $> 3$  mm
- Solid/solid-appearing component



# Cystic Lesion – Internal content, fluid descriptors

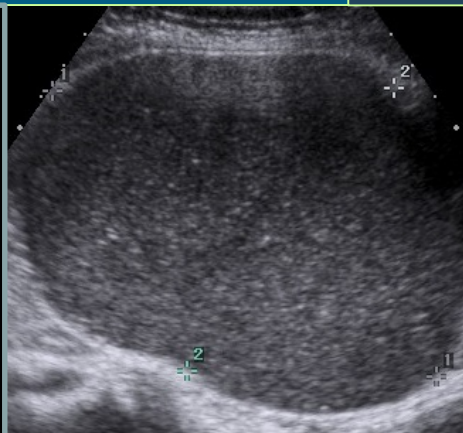
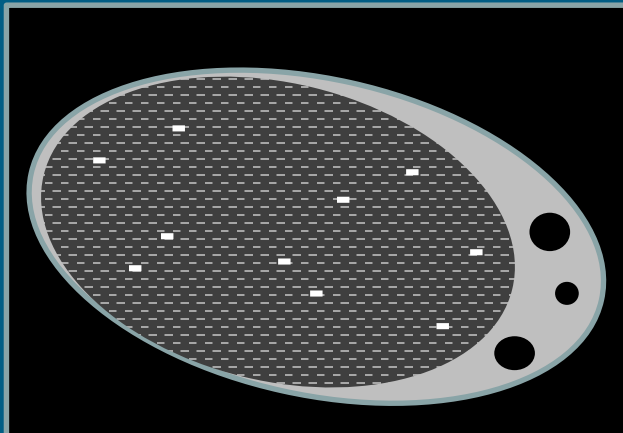
- Ground glass or homogeneous low-level echoes

Typical for endometrioma



- Scattered low-level echoes

Typical for mucinous cystadenoma



# Dermoid Descriptors

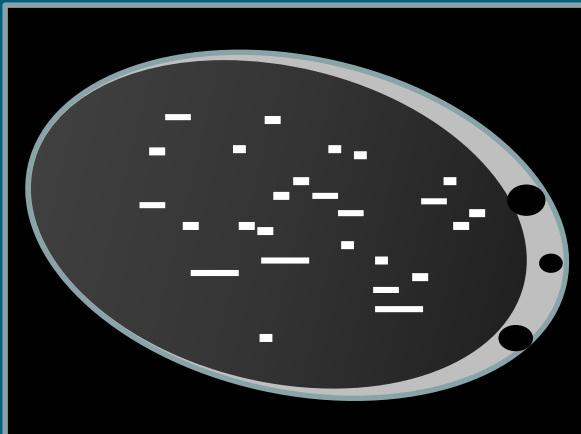
- Hyperechoic lines and dots
  - Bright linear echoes and foci (representing linear echoes seen en face)
  - Represents sections through hair within the liquefied component
- Acoustic shadowing from a hyperechoic component
  - Attenuation of the acoustic beam distal to a hyperechoic component
- Floating hyperechoic spherical structures
  - Non-dependent hyperechoic spherules +/- acoustic shadowing
  - Uncommon, but highly characteristic

**NOTE:** “tip of the iceberg”, “rokitansky nodule”, “dermoid mesh”, “dot-dash” and “dermoid balls” may be in common usage in some locations, but are **not preferred** descriptors in this lexicon

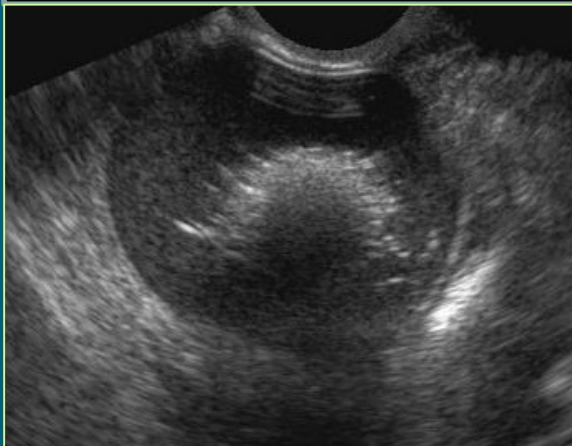
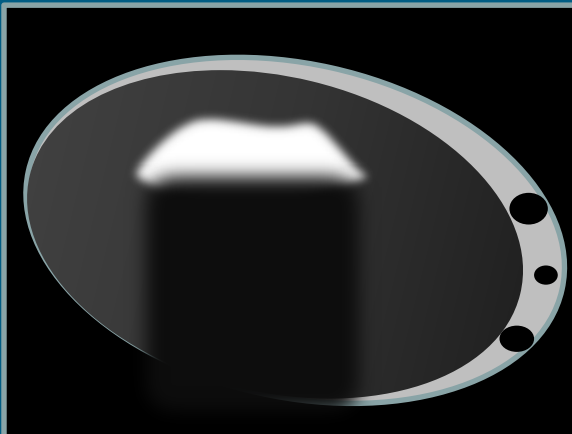


# Dermoid Descriptors

- Hyperechoic lines and dots



- Acoustic shadowing from a hyperechoic component



- Floating hyperechoic spherical structures



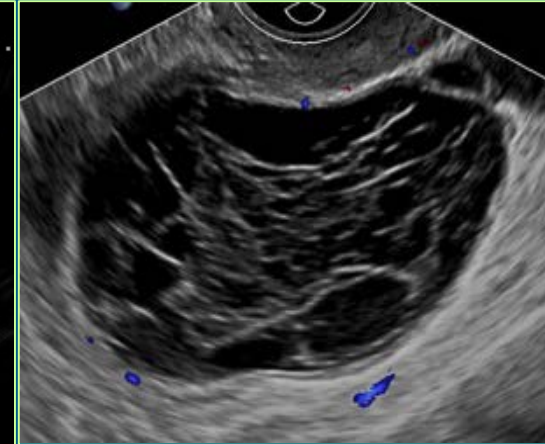
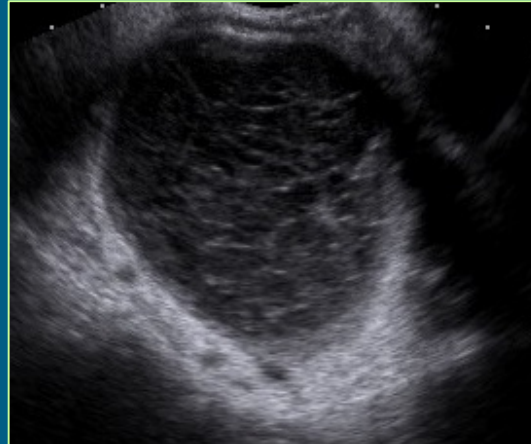
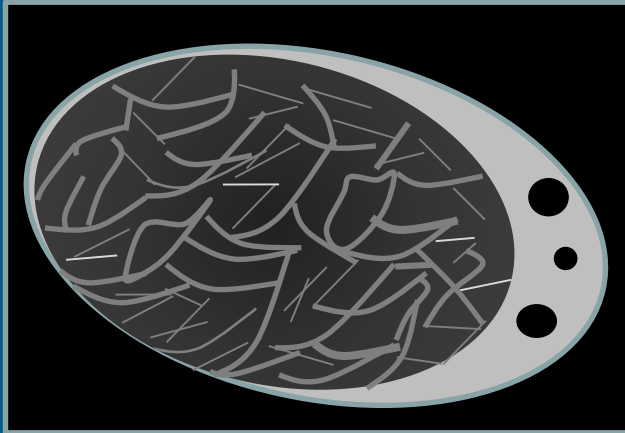
# Hemorrhagic Cyst Descriptors

- Reticular pattern
  - Fine thin intersecting lines due to fibrin strands
  - Not considered to be “septations”, which are usually thicker and more continuous
- Retracting clot
  - Avascular echogenic component with angular, straight, or concave margins

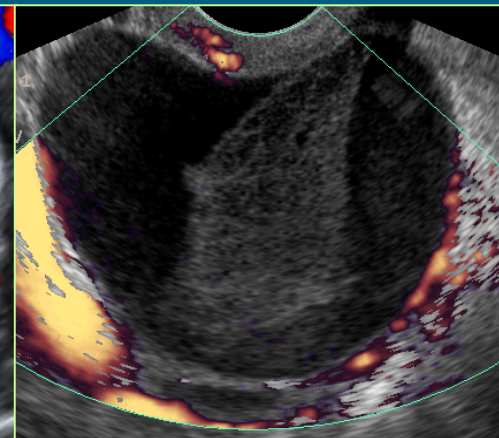
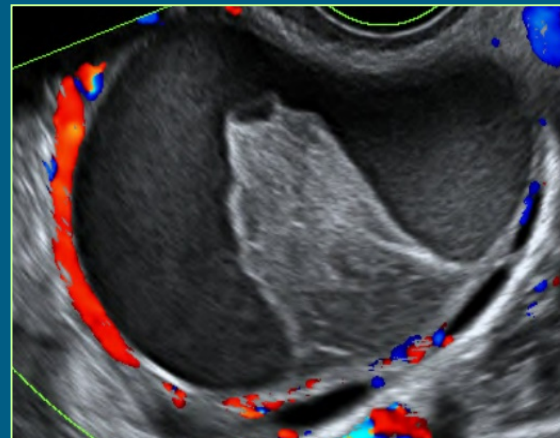
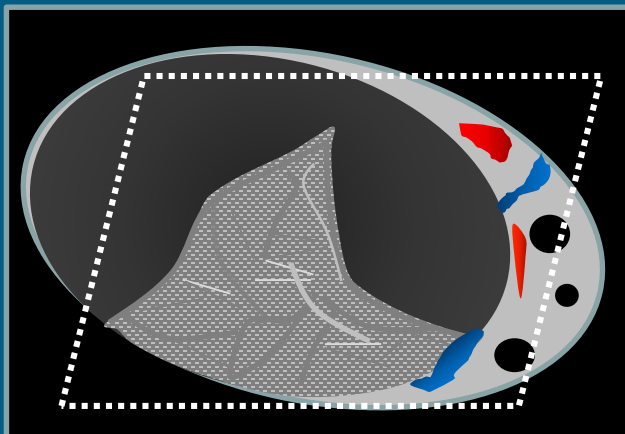
**NOTE:** “cobweb”, “fishnet”, “lacy”, “spider web” may be in common usage in some locations, but are **not preferred** descriptors in this lexicon

# Hemorrhagic Cyst Descriptors

- Reticular pattern



- Retracting clot



# Internal content, solid/solid-appearing component

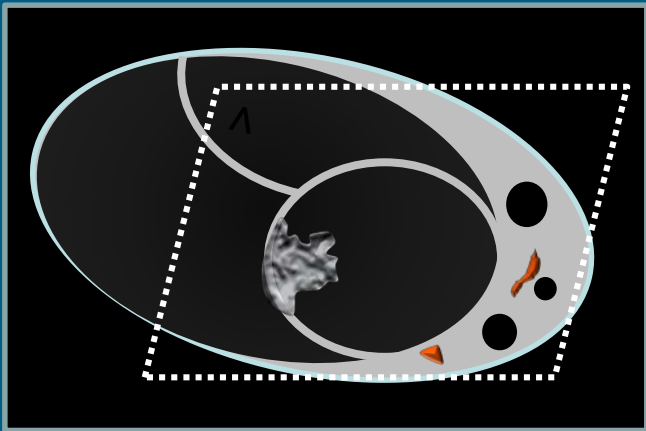
- Irregular
  - External contour of the solid component within a cystic lesion is nonuniform (i.e. spiky or lobular)
  - Contour of any internal cystic area(s) is nonuniform (i.e. spiky or angular rather than smooth)
- Smooth
  - No external or internal contour irregularities of the solid component
- Papillary projection(s) or nodule(s)
  - A solid component with height  $\geq 3$  mm that protrudes into the cyst cavity
  - External contour has an outwardly convex border and may be smooth or irregular
  - Can be mural or septal in origin
  - Additional descriptors
    - Height
    - Number

# Vascularity

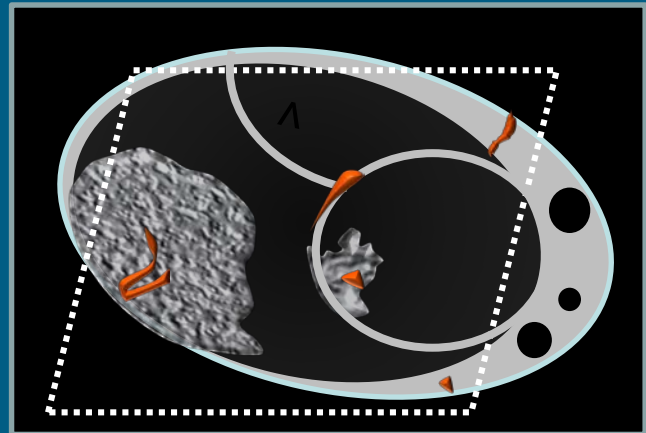
- Circumferential Doppler flow in cyst wall
  - A solid component with height  $\geq 3$  mm that protrudes into the cyst cavity
  - External contour has an outwardly convex border and may be smooth or irregular
  - Can be mural or septal in origin
- Internal color Doppler flow
  - Color Doppler flow is detected internally within a solid lesion/component or in a septation of the lesion, with or without peripheral (wall) flow
- Color score 1- 4 (IOTA classification)
  - Overall subjective assessment of entire lesion

**NOTE:** “Peripheral flow” and “Ring of fire” may be in common usage in some locations, but are **not preferred** descriptors in this lexicon

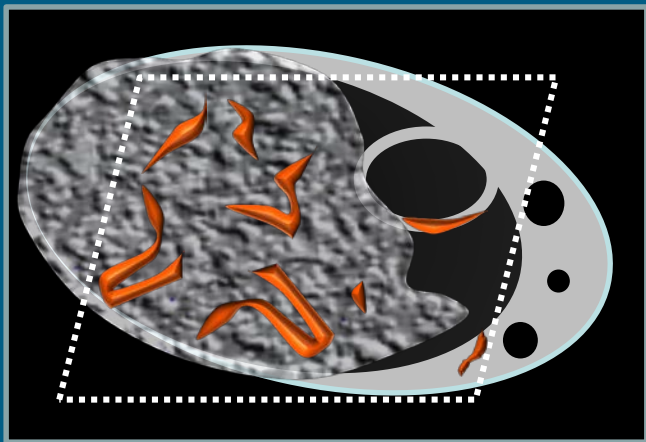
## Color Score 1- 4 (IOTA Classification)



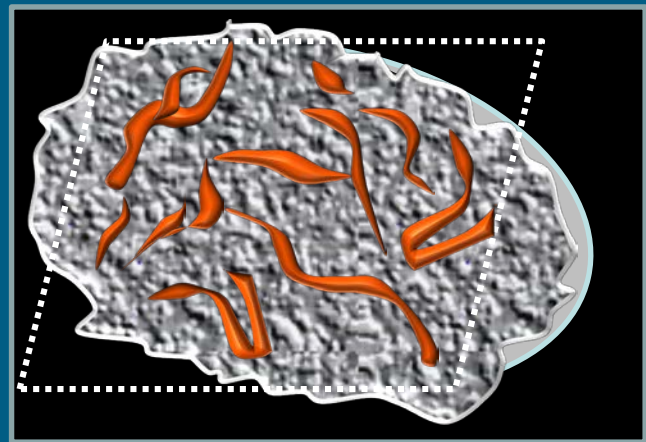
Color score 1 – No blood flow



Color score 2 – minimal flow



Color score 3 – moderate flow



Color score 4 – marked flow

## General and extra-ovarian findings

- Paraovarian cyst
- Fallopian tube descriptors
- Peritoneal inclusion cyst
- Fluid descriptors
- Peritoneal thickening, nodules
- Adenopathy

## Paraovarian cyst

- Simple cyst existing separate from the ovary
- Moves independent of the ovary when pressure is applied by the transducer

**NOTE:** Paraovarian and paratubal are used interchangeably as the origin (both Wolffian duct remnants) often cannot be determined by US alone. Paraovarian will therefore be used to encompass both and there is no need to include paratubal in the differential.



# Fallopian tube descriptors

- Incomplete septation
  - Appear as incomplete septations due to tubular nature of the lesion when visualized along an oblique plane
- Tubular
  - Substantially longer in one dimension than in the two perpendicular dimensions
- Endosalpingeal folds
  - Short round projections around the inner wall of tubular structure
  - Best seen when orthogonal to the length (short axis) of a fluid-filled tube
  - Typically < 3mm in height

**NOTE:** “pseudoseptations”, “cogwheel” and “beads-on-a-string” may be in common usage in some locations, but is **not** a **preferred** descriptor in this lexicon

## Peritoneal inclusion cyst

- Cystic lesion with the ovary either at the margin or suspended within the lesion
- Cyst follows the contour of the adjacent pelvic organs, contains septations and does not exert mass effect (passive configuration)
- Associated with post-surgical or post inflammatory status in the pelvis

**NOTE:** “Peritoneal pseudocysts” may be in common usage in some locations, but is **not** a **preferred** descriptor in this lexicon

# Fluid descriptors

## ■ Ascites

- If anteverted/anteflexed uterus, fluid extending beyond the pouch of Douglas (cul-de-sac) and/or above uterine fundus
- If retroverted/retroflexed, fluid anterior to uterus (between uterus and bladder)

## ■ Cul-de-sac fluid

- Confined to pouch of Douglas as defined by remaining below uterine fundus or between uterus and bladder when uterus retroverted/retroflexed
- In appropriate context (menstruating female), may be considered physiological fluid

## ■ Anechoic/simple fluid

## ■ Fluid containing internal echoes (not simple)

## Peritoneal thickening/nodules

- Nodularity or diffuse thickening of the peritoneal lining(s) or along the bowel serosal surface or peritoneum
- Associated with malignant etiologies and raises concern for peritoneal carcinomatosis

**NOTE:** Peritoneal implants/deposits may be in common usage in some locations, but is **not** a **preferred** descriptor in this lexicon

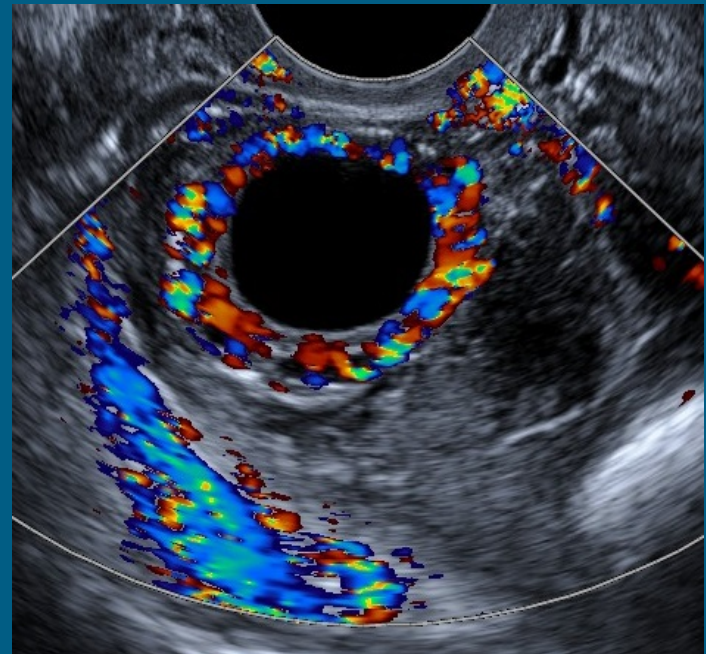
# Adenopathy

- Lymph nodes
- Should be measured in short axis and location reported for management considerations

# **Test Your O-RADS Lexicon Knowledge**

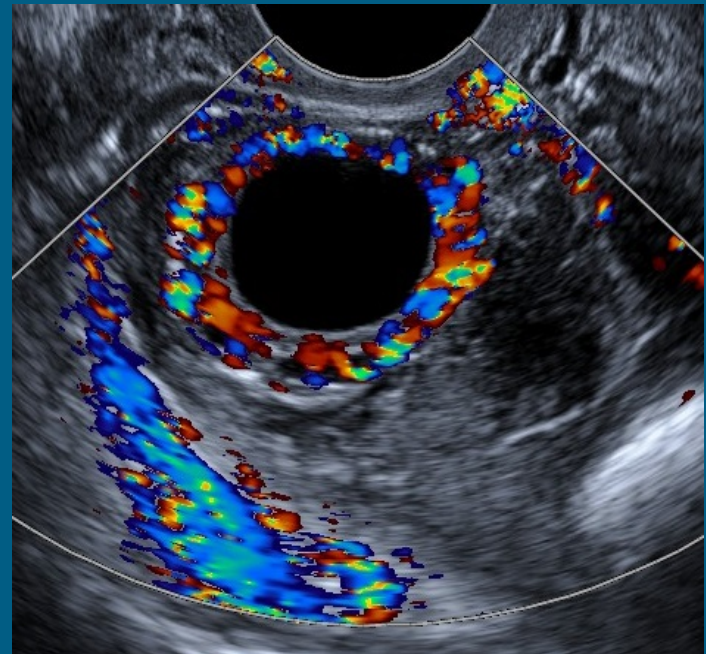
## Which descriptors apply? (select all)

- A. Physiologic
- B. Lesion
- C. Hemorrhagic Cyst
- D. Follicle
- E. Corpus Luteum



## Which descriptors apply? *(select all)*

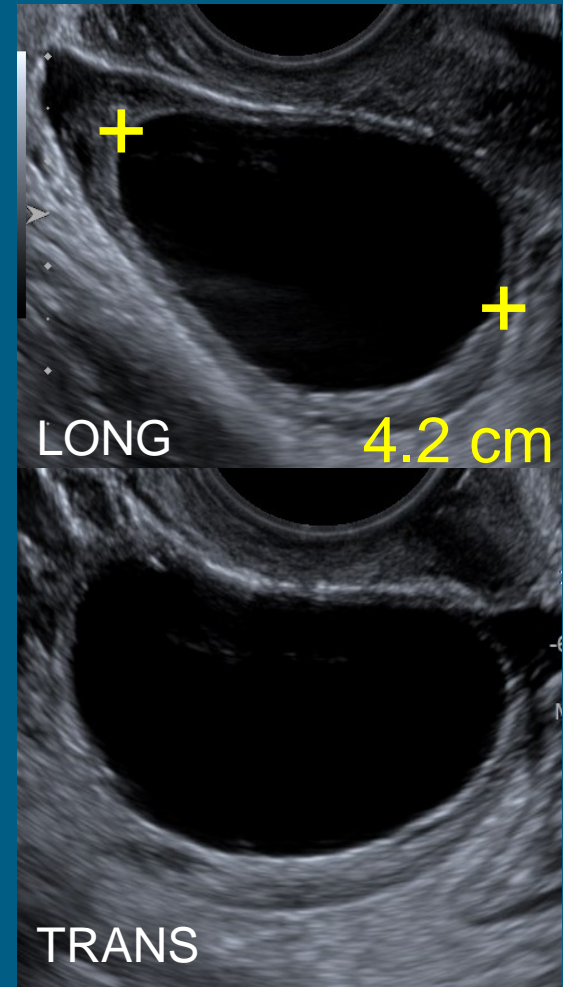
- A. Physiologic
- B. Lesion
- C. Hemorrhagic Cyst
- D. Follicle
- E. Corpus Luteum





## Which descriptors apply? *(select all that apply)*

- A. Physiologic
- B. Lesion
- C. Simple Cyst
- D. Unilocular cyst, no solid component



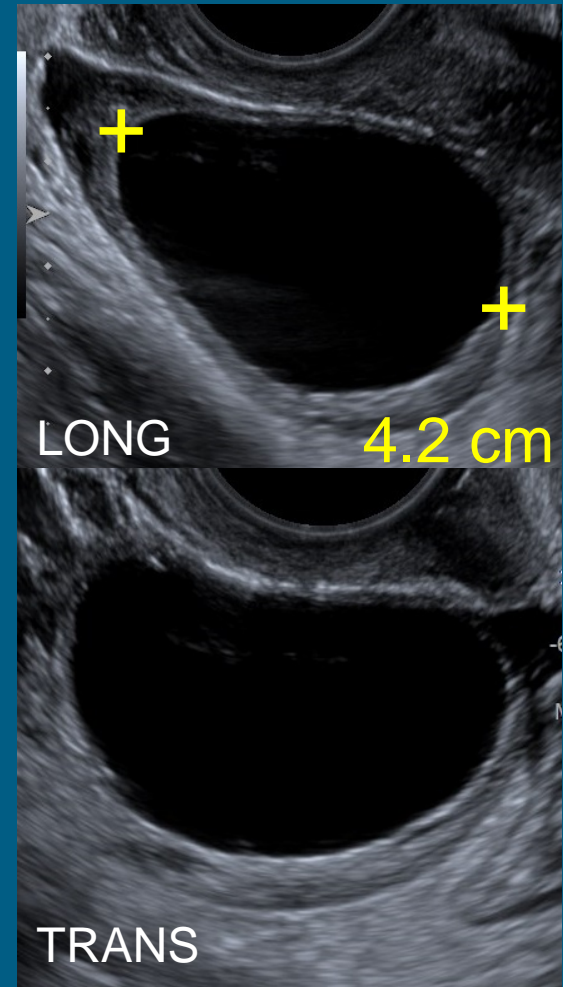
## Which descriptors apply? *(select all that apply)*

- A. Physiologic

- B. Lesion

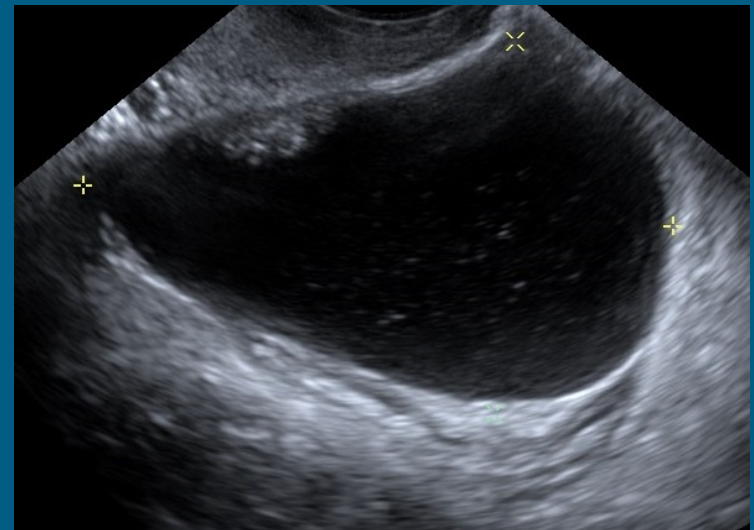
- C. Simple Cyst

- D. Unilocular cyst, no solid component



## Which descriptors apply? *(select all that apply)*

- A. Homogenous low-level echoes
- B. Scattered low-level echoes
- C. Hyperechoic lines and dots
- D. Papillary projections
- E. Acoustic shadowing from a hyperechoic component



Dx: Borderline mucinous  
cystadenoma

## Which descriptors apply? *(select all that apply)*

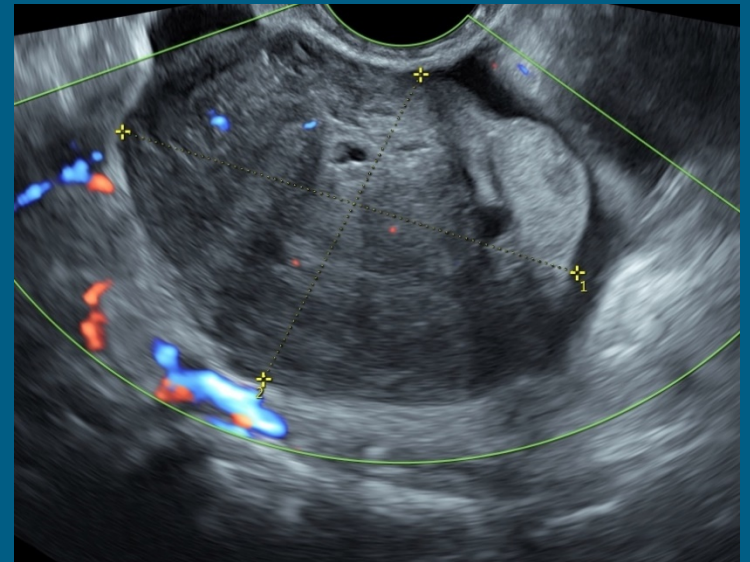
- A. Homogenous low-level echoes
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- C. Hyperechoic lines and dots
- D. Papillary projections
- E. Acoustic shadowing from a hyperechoic component



Dx: Borderline mucinous  
cystadenoma

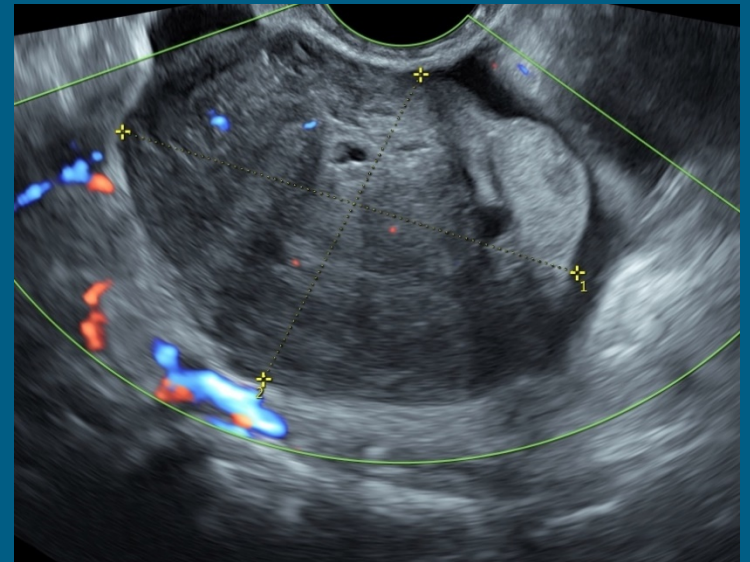
## Which descriptors apply? (*select all*)

- A. Solid
- B. Irregular outer contour
- C. Smooth outer contour
- D. Homogenous low level echoes



## Which descriptors apply? (*select all*)

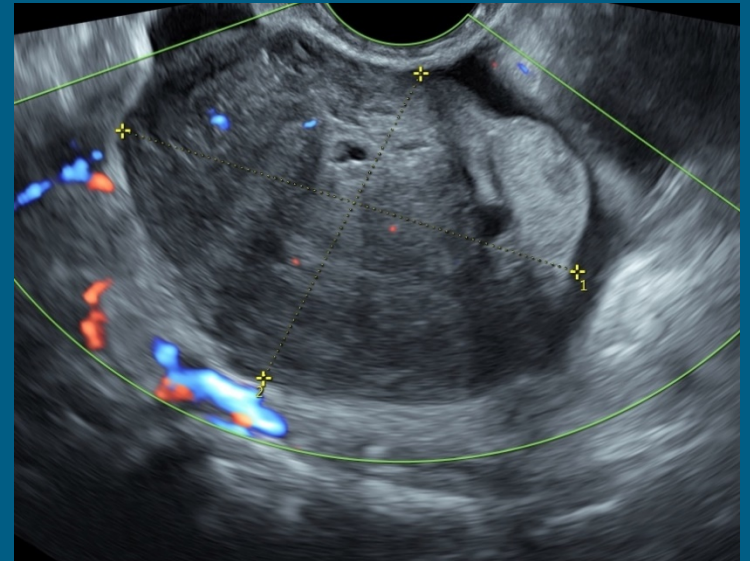
- A. Solid
- B. Irregular outer contour
- C. Smooth outer contour
- D. Homogenous low level echoes





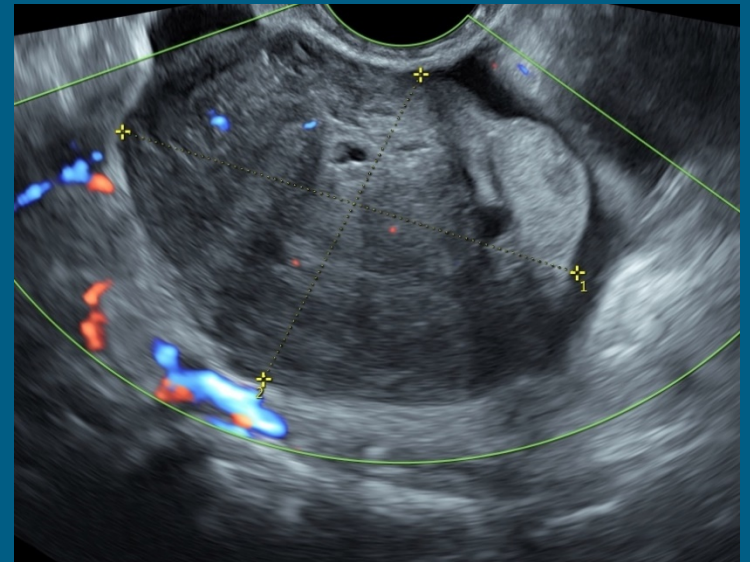
## What is the best color score for this lesion?

- A. Color score 1
- B. Color score 2
- C. Color score 3
- D. Color score 4



## What is the best color score for this lesion?

- A. Color score 1
- B. Color score 2
- C. Color score 3
- D. Color score 4

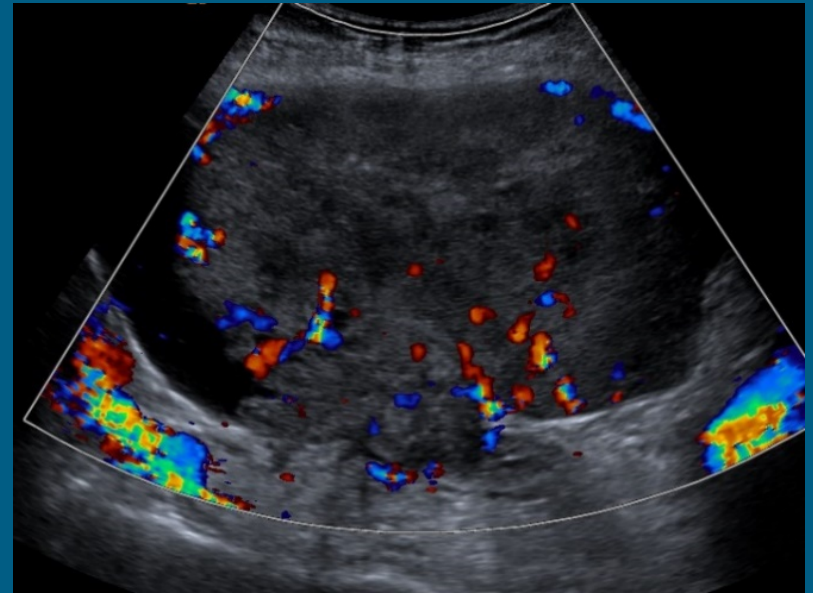


Dx: Fibrothecoma



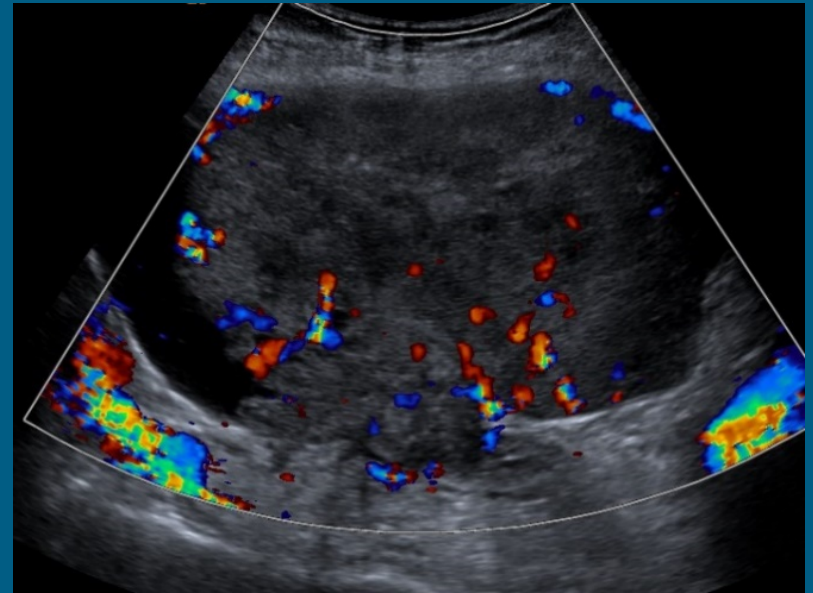
## Which descriptors apply? (select all)

- A. Cystic with irregular solid component
- B. Solid
- C. Smooth outer contour
- D. Irregular outer contour
- E. Internal vascularity
- F. Peripheral vascularity



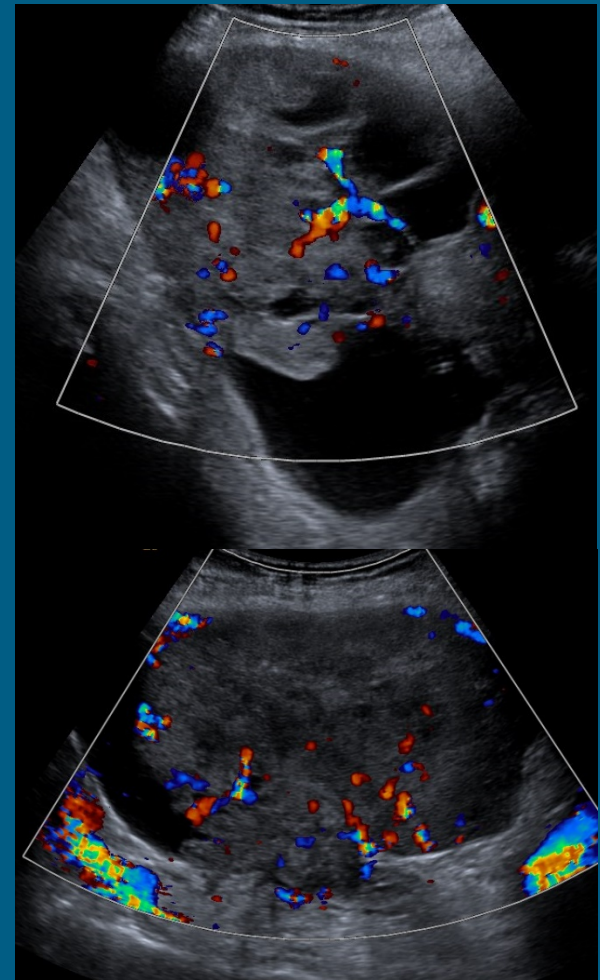
## Which descriptors apply? (select all)

- A. Cystic with irregular solid component
- B. Solid
- C. Smooth outer contour
- D. Irregular outer contour
- E. Internal vascularity
- F. Peripheral vascularity



## What is the best color score for this lesion?

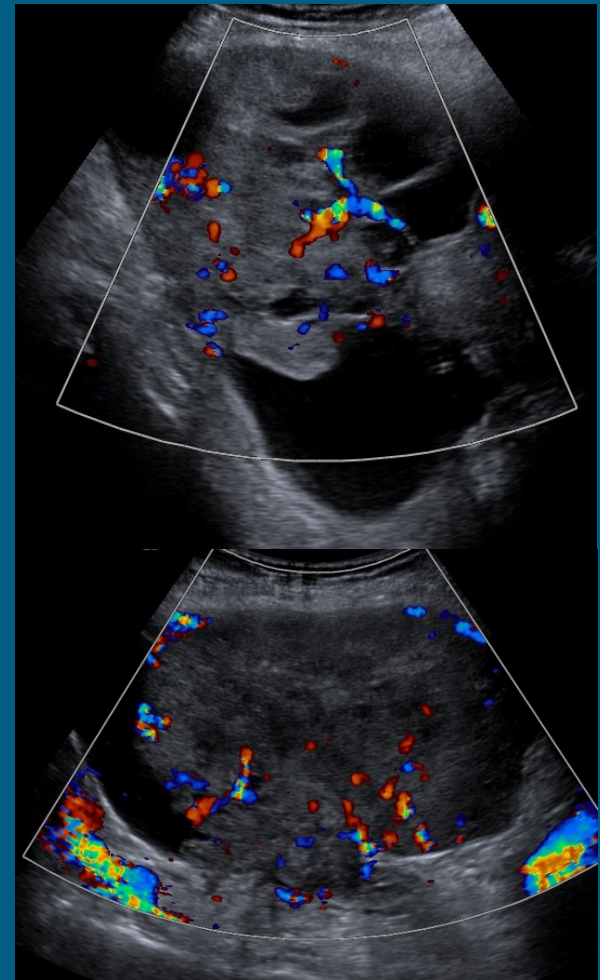
- A. Color score 1
- B. Color score 2
- C. Color score 3
- D. Color score 4



## What is the best color score for this lesion?

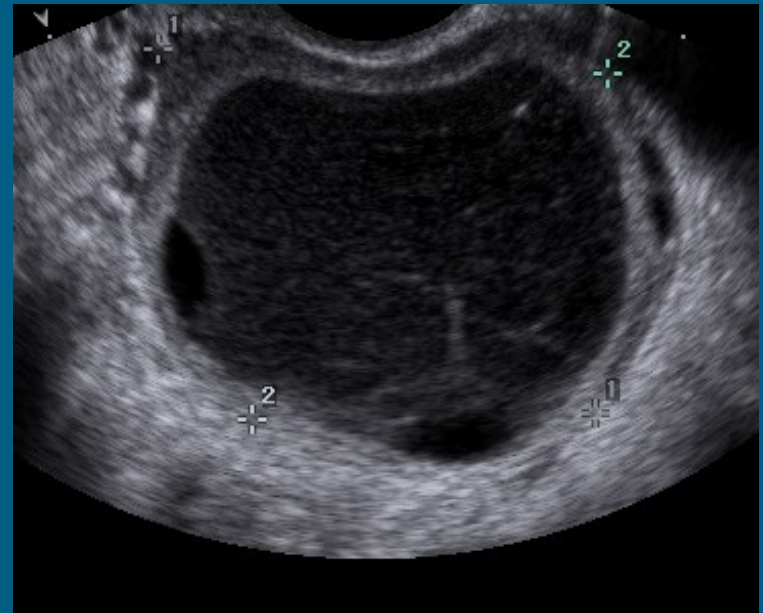
- A. Color score 1
- B. Color score 2
- C. Color score 3
- D. Color score 4

Dx: High grade serous  
cystadenocarcinoma



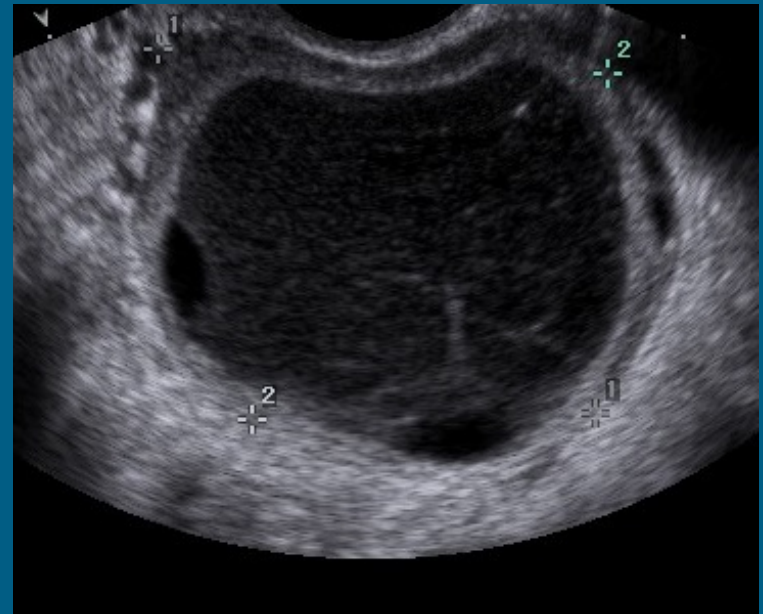
## How is this lesion best characterized?

- A. Corpus luteum
- B. Dermoid
- C. Mucinous cystadenoma
- D. Hemorrhagic cyst



## How is this lesion best characterized?

- A. Corpus luteum
- B. Dermoid
- C. Mucinous cystadenoma
- D. Hemorrhagic cyst



Reticular pattern