



## O-RADS MRI: Frequently Asked Questions

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## **A. Contrast and Time Intensity Curves**

**Question A1:**

Does contrast need to be used for adnexal mass characterization using the O-RADS MRI risk score?

**Answer:**

YES: Gadolinium based contrast is part of the protocol requirements for using the O-RADS MRI Risk Score



**Question A2:**

How do you acquire the DCE MRI series?

**Answer:**

DCE MRI: 3D T1WI with fat sat

- Slice thickness: 3mm or less
- Minimal temporal resolution < 15 seconds
- Begin the scanning, then 30 second later start the injection, without interruption of the scanning
- Total duration after injection: 4 minutes

**Question A3:**

**How are the ROIs placed to construct the time intensity curves?**

**Answer:**

Suggested method:

- Scrolling through the entire lesion look for the earliest and most intense area of enhancement within the solid tissue
- Avoid placing ROIs on vessels by using the T2-weighted and diffusion weighted image to assure the ROI is placed on solid tissue
- Placing different ROIs will result in different time intensity curves; choose the highest risk time intensity curve to score the lesion

**Question A4:**

Is there variability in myometrial enhancement, affecting the use of the myometrium as an internal reference for enhancement?

**Answer:**

Yes, because there is variation in myometrial enhancement throughout the menstrual cycle, but this pitfall can be avoided. According to a study that evaluated the variation of myometrial enhancement on DCE in relationship to the patient's menopausal status and menstrual cycle, it was found that the junctional zone is much more dependent on the hormonal status compared to the external myometrium. ***Placing the ROI over the external myometrium avoids variability.***

**Question A5:**

What software do you recommend for time intensity curve analysis?

**Answer:**

The software depends on your PACS vendor as most vendors have some version of mean curve function for dynamic series; Examples: DynaCad, GE Advantage workstation, Intellispace Philips, etc.

Usually there are DCE tools available for breast, prostate or cerebral perfusion, and these can be utilized.

**Question A6:**

Is the time intensity curve done by the technologists as a routine, or is it done by the radiologists on a MR workstation?

**Answer:**



Currently, it is recommended that the time intensity curve are *created by the radiologist* in order to assure the ROI is placed over the solid tissue that demonstrates the earliest and most intense enhancement

**Question A7:**

Is it necessary to use the time intensity curves for O-RADS MRI risk stratification?

**Answer:**

No, but it is recommended for maximal specificity. Time intensity curve (TIC) analysis is recommended because distinction between O-RADS MRI score 3 and score 4 / 5 cannot be made without TIC analysis, introducing a tendency to upscore lesions.

Although the O-RADS MRI score can be used with non-dynamic contrast enhanced MRI, the solid tissue can only be assessed as enhancing  $\leq$  outer myometrium (O-RADS MRI 4) versus  $>$  outer myometrium (O-RADS MRI 5) at 30-40 seconds.

**Question A8:**

If DCE cannot be performed, can you still use the O-RADS MRI risk score?

**Answer:**

YES, however, the solid tissue can only be assessed as enhancing  $<$  outer myometrium (O-RADS MRI 4) versus  $>$  outer myometrium (O-RADS MRI 5).

**Question A9:**

What is the suggested comparison in patients who have undergone hysterectomy?

**Answer:**

If there is a previous hysterectomy, you can still differentiate the low risk curve (slow and flat with no shoulder) from an intermediate/high risk curve with a shoulder and plateau, and assign an O-RADS MRI Score 3 (low risk curve) or an O-RAD MRI Score 4/5, respectively; however intermediate and high risk curves cannot be differentiated

## **B. Lesion Characteristics and Types of Lesions**

**Question B1:**

What is the difference between a papillary projection and a mural nodule?

**Answer:**

Papillary projection: Protrusion that has an acute angle with the cyst wall, septation or surface of the ovary, and can have a *visible branching architecture and must be at least 3mm*

Mural nodule: Protrusion that has a rounded contour with an *outwardly convex borders and an obtuse angle* in relation to the cyst wall or septation and must be at least 3mm

**Question B2:**

What is an incomplete septum?

**Answer:**

Septation that is *discontinuous* and does not run all the way from one side of the cyst wall to the other

**Question B3:**

Do you classify an endometrioma with multiple smooth septations as O-RADS MRI 2 or O-RADS MRI 3?

**Answer:**

The number of locules governs risk stratification for cysts which do not contain lipid. Classic unilocular endometrioma is **O-RADS MRI 2**. Endometriomas with multiple smooth septations and no solid tissue are classified as **O-RADS MRI 3**, although in the radiology report the diagnosis of multilocular endometrioma may be given. If there is enhancing solid tissue (irregular septations, nodules, papillary projections or larger solid portion), the lesion is classified based on the enhancement pattern of the solid tissue (**O-RADS MRI 4 or 5**).

Note: Care should be taken not to misdiagnose multiple adjacent UNILOCULAR endometriomas as a multilocular endometrioma. Multiple adjacent UNILOCULAR endometriomas are scored **O-RADS MRI 2** and a MULTILOCULAR endometrioma is scored **O-RADS MRI 3**.

**Question B4:**

Do you classify a dermoid with multiple septations as O-RADS MRI 2 or O-RADS MRI 3?

**Answer:**

Dermoids can have enhancing smooth or irregular septations and an enhancing Rokitansky nodule, and would still be classified as an **O-RADS MRI 2**. However if the dermoid has a large amount of enhancing solid tissue that is not compatible with a Rokitansky nodule, the lesion is classified as **O-RADS MRI 4**.

**Question B5:**

How do you know when a component is a Rokitansky nodule versus a concerning amount solid tissue in a fatty lesion?

**Answer:**

A *Rokitansky nodule enhances* and is associated with *fat*. Commonly a Rokitansky nodule is adjacent to septations within the dermoid.

There is a paucity of data on how much solid tissue should raise suspicion. In a dermoid that has undergone degeneration, the malignant solid tissue usually does not contain fat and there is more solid tissue than expected for a Rokitansky nodule. The malignant solid tissue also tends to be within the wall of the lesion.

**Question B6:**

Do you classify hemorrhagic cysts as O-RADS MRI 2 or 3?

**Answer:**

In pre-menopausal women

- If the hemorrhagic cyst does not have an enhancing wall
  - $\leq 3\text{cm}$  can be assigned an O-RADS MRI Score 1
  - $> 3\text{cm}$  can be assigned an O-RADS MRI Score 2
- If the hemorrhagic cyst has an enhancing wall



- $\leq 3\text{cm}$  can be assigned an O-RADS MRI Score 1
- $> 3\text{cm}$  can be assigned an O-RADS MRI Score 3

In post-menopausal women

- If the hemorrhagic cyst does not have an enhancing wall, it can be assigned an O-RADS MRI Score 2, regardless of size
- If the hemorrhagic cyst has an enhancing wall, it can be assigned an O-RADS MRI Score 3, regardless of size

### **Question B7:**

In an ovarian lesion with solid components that only have dark T2 and dark DWI signal intensity (e.g. fibroma), do you still perform the contrast enhanced portions of the exam?

### **Answer:**

Yes, contrast is important because not all dark signal on T2 and DWI represents solid tissue. Debris, clot, hemosiderin can all appear markedly hypointense, but these do not enhance and are not considered solid tissue. If the lesion is of uniformly dark signal on T2 and DWI, TIC curves do not need to be generated, the lesion can be scored as O-RADS MRI 2, and the lesion is likely a fibroma. If there is no enhancement, the finding is likely debris or blood.

### **Question B8:**

If a unilocular or multilocular cystic adnexal lesion has a solid component that is dark signal on T2 and dark signal on DWI, is the lesion assigned an O-RADS MRI Score 2 regardless of the cystic component?

### **Answer:**

An adnexal lesion that has a dark T2 / dark DWI solid component and a unilocular or multilocular cystic component can be assigned an O-RADS MRI Score 2. Smooth septations can be present, however if the septations are irregular or there is solid tissue that is not homogeneously low signal, the lesion should be scored according to the enhancement of the irregular septations or solid tissue.

### **Question B9:**

In an ovarian lesion that has both solid components with dark T2 and dark DWI signal intensity and other solid components with non-dark T2 and DWI signal intensity (ie. high or intermediate signal intensity), do you still assign an O-RADS MRI Score 2?

### **Answer:**

If there is solid tissue that has a component with high or intermediate signal intensity on T2 and DWI, the lesion should be scored according to the enhancement of the non-dark solid tissue component (ie. the solid tissue component that is high or intermediate signal). In this case, the non-dark solid tissue dictates the O-RADS MRI score.

Care should be taken with solid tissue that appears to have low signal components on T2, as some papillary projections and nodules related to cancers will have low signal components on the T2 but will be high signal on the DWI. Furthermore, careful windowing will help identify papillary projections, which often have a low signal stalk, with small amounts of higher signal glandular tissue.

## **C. Other Topics**



**Question C1:**

Which population is O-RADS MRI applied to: premenopausal or postmenopausal women?

**Answer:**

O-RADS MRI Score applies to all women, regardless of menopausal status.

**Question C2:**

For the DWI series acquisition, is b1000 or b1200 better?

**Answer:**

Either B-value = 1000 or B-value = 1200 works for analysis of an adnexal lesion.