American College of Radiology

O-RADS™ MRI Risk Stratification and Management System

O-RADS MRI Score	Risk Category	Positive Predictive Value for Malignancy^	Lexicon Description
0	Incomplete Evaluation	N/A	N/A
1	Normal Ovaries	N/A	No ovarian lesion
			Follicle defined as simple cyst ≤ 3 cm in a premenopausal woman
			Hemorrhagic cyst ≤ 3 cm in a premenopausal woman
			Corpus luteum +/- hemorrhage ≤ 3 cm in a premenopausal woman
2	Almost Certainly Benign	<0.5%^	Cyst: Unilocular- any type of fluid content ▪ No wall enhancement ▪ No enhancing solid tissue*
			Cyst: Unilocular – simple or endometriotic fluid content ▪ Smooth enhancing wall ▪ No enhancing solid tissue
			Lesion with lipid content** ▪ No enhancing solid tissue
			Lesion with "dark T2/dark DWI" solid tissue ▪ Homogeneously hypointense on T2 and DWI
			Dilated fallopian tube - simple fluid content ▪ Thin, smooth wall/endosalpingeal folds with enhancement ▪ No enhancing solid tissue
			Para-ovarian cyst – any type of fluid ▪ Thin, smooth wall +/- enhancement ▪ No enhancing solid tissue
3	Low Risk	~5%^	Cyst: Unilocular – proteinaceous, hemorrhagic or mucinous fluid content*** ▪ Smooth enhancing wall ▪ No enhancing solid tissue
			Cyst: Multilocular - Any type of fluid, no lipid content ▪ Smooth septae and wall with enhancement ▪ No enhancing solid tissue
			Lesion with solid tissue (excluding T2 dark/DWI dark) ▪ Low risk time intensity curve on DCE MRI
			Dilated fallopian tube – ▪ Non-simple fluid: Thin wall /folds ▪ Simple fluid: Thick, smooth wall/ folds ▪ No enhancing solid tissue
4	Intermediate Risk	~50%^	Lesion with solid tissue (excluding T2 dark/DWI dark) ▪ Intermediate risk time intensity curve on DCE MRI ▪ Any lesion with solid tissue enhancing ≤ myometrium at 30-40s on non-DCE MRI*****
			Lesion with lipid content ▪ Large volume enhancing solid tissue
5	High Risk	~90%^	Lesion with solid tissue (excluding T2 dark/DWI dark) ▪ High risk time intensity curve on DCE MRI ▪ Any lesion with solid tissue enhancing > myometrium at 30-40s on non-DCE MRI
			Peritoneal, mesenteric or omental nodularity or irregular thickening with or without ascites

^Approximate PPV based on data from Thomassin-Naggara, et al. O-RADS MRI Score for Risk Stratification of Sonographically Indeterminate Adnexal Masses. JAMA Network Open. 2020;3(1):e1919896. Please note that the PPV provided applies to the score category overall and not to individual characteristics. Definitive PPV are not currently available for individual characteristics. The PPV values for malignancy include both borderline tumors and invasive cancers.

* Solid tissue is defined as a lesion component that enhances and conforms to one of these morphologies: papillary projection, mural nodule, irregular septation/wall or other larger solid portions.

** Minimal enhancement of Rokitansky nodules in lesion containing lipid does not change to O-RADS MRI 4.

*** Hemorrhagic cyst ≤3cm in pre-menopausal woman is O-RADS MRI 1.

****Decreased accuracy of O-RADS MRI score when DCE is not utilized

DCE = dynamic contrast enhancement with a time resolution of 15 seconds or less

DWI = diffusion weighted images

MRI = magnetic resonance imaging

O-RADS™ MRI Risk Score Governing Concepts

Revised: May 2024

1. O-RADS MRI assumes an average risk patient with <u>no acute symptoms</u>. Clinical management directed by the treating physician would supersede management recommendations based on imaging alone.

2. Categorize patient as pre- or postmenopausal (defined as ≥ 1 year amenorrhea).

3. In case of multiple or bilateral lesions, each lesion should be separately characterized, and management will be driven by lesion with highest score.

4. Benign mature teratomas (dermoids): Characteristic benign mature teratoma (cystic lesions that contain fat) may be scored as O-RADS MRI 2, due to the very low risk of malignancy. Characteristic benign mature teratomas may contain septations or minimal enhancement of Rokitansky nodules and these findings ***do not*** upgrade the lesion to O-RADS MRI Score 4. However, fatty adnexal lesions that contain a large amount of enhancing soft tissue are classified as O-RADS MRI Score 4 due to risk of immature teratoma or other malignant tissue.

5. Some characteristic lesions can be confidently diagnosed on MRI regardless of the O-RADS MRI Score category. In these cases, the final radiological diagnosis can be reported (e.g. dysgerminoma, granulosa cell tumor, lymphoma, papillary serous tumors, peritoneal pseudocyst, etc.).

6. <u>In order to obtain the listed positive predictive values for malignancy</u> seen in the O-RADS MRI Risk Score table, the MRI protocol should contain the *minimum technical requirements* listed below. MRI scanning parameters should be adjusted for optimum image quality based on vendor and scanner type. Field of view should be adjusted to assure complete coverage of the lesion. Deviations from the recommended minimum requirements listed below may result in differences in diagnostic performance of the O-RADS MRI risk score. Dynamic contrast enhancement (DCE) with perfusion time intensity curves are preferred over non-dynamic DCE post-contrast imaging for risk assessment. DCE time resolution should be of 15 seconds or less.

Sequences	Plane*	Slice thickness*	Additional requirements
T2-weighted without fat sat	Sagittal or coronal	4 mm	
T2-weighted without fat sat	Axial	3 mm	
T1-weighted in- and opposed- phase gradient echo or Dixon T1-weighted	Axial	3-4 mm	− Can use the in/out phase images from the 3D T1 WI pre-contrast if using the Dixon technique, however these should be 3mm
Diffusion weighted	Axial	4-5 mm	− Low B-values: 0 or 50 − High B-value: 1000 – 1200 − If 4mm, skip 2mm; if 5mm, skip 1mm
Dynamic contrast enhanced (DCE) T1-weighted (Pre- and Post-contrast in same series)	Axial	3 mm	− Pre- and Post-contrast in a single series are required to perform the subtraction series − Minimal temporal resolution < 15 seconds − Continuous acquisition, starting with the pre-contrast phase, injection of contrast after the pre-contrast phase is acquired and continuing for a total of 3 minutes
Non-dynamic 3D T1WI with fat sat (Pre- and Post-contrast in separate series)	Axial	3 mm	− Obtain one series pre-contrast − If not acquiring a DCE MRI, obtain, one phase scanned at 30-40 seconds after the end of the contrast injection − If acquiring a DCE MRI, obtain a post-contrast series after the DCE is completed

*For very large lesion changes in plane and slice thickness adjustments may be needed to assure coverage of the entire lesion, however small papillary projections may be missed.