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KI-RADS (Kidney Imaging Reporting and Data System): First Multiparametric MRI Classification of Renal Suspicious Lesions

Luigi Urciuoli MD*

Department of Interventional and Emergency Radiology, San Giuseppe Moscati Hospital, Avellino, Italy

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***Corresponding author:** Luigi Urciuoli, Department of Interventional and Emergency Radiology, San Giuseppe Moscati Hospital, Avellino, Italy, E-mail: luigiurciuoli@yahoo.it

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Short Communication

In our preliminary study we propose the first multiparametric MRI classification of renal suspicious lesions: KI-RADS (Kidney Imaging Reporting and Data System).

There are currently other RADS criteria used in clinical practice for other anatomic districts such as breast (BI-RADS-Breast Imaging Reporting and Data System), colon (C-RADS-Colon Imaging Reporting and Data System), liver (LI-RADS-Liver Imaging Reporting and Data System), lung (Lung-RADS-Lung Imaging Reporting and Data System), head and neck (NI-RADS-Head and Neck Imaging Reporting and Data System), adnexal (O-RADS-Adnexal Imaging Reporting and Data System), prostate (PI-RADS-Prostate Imaging Reporting and Data System), thyroid (TI-RADS- Thyroid Imaging Reporting and Data System) and coronary artery disease (CAD-RADS-Coronary Artery Disease Imaging Reporting And Data System).

Similar to the PI-RADS criteria our classification is based on multiparametric MRI.

Furthermore, our classification not only provides a standardized score on the severity of renal suspicious lesions, but offers a simple surgical score that communicates to urologists the preoperative planning in a rapid manner.

Our KI-RADS criteria integrate the existing Computed Tomography (CT) renal malignancy criteria as well as the

Bosniak criteria (for the evaluation of renal cystic complex lesions). In Resonance Magnetic Imaging (MRI) we consider a suspicious renal lesion based on the contemporary evaluation of these three parameters: T2 morphological sequences, diffusion (DWI/ADC) sequences and perfusion sequences (contrast enhancement).

Diagnosing kidney cancer through Imaging, especially in its early stages, is always a challenge. It is often identified incidentally when the patient undergoes a Computed Tomography (CT) or Magnetic Resonance Imaging (MRI) scan for other reasons. It usually becomes clinically evident very late. Furthermore, the nature of a renal lesion is often diagnosed only after surgery (nephrectomy or enucleoresection).

On Imaging renal cancer can present in various ways. It can be exophytic or intraparenchymal. There is no size criterion to predict malignancy. The margins of the lesion can be regular or irregular. It could present a solid or mixed solid-cystic structure. It can be highly or poorly vascularized. It can be a homogeneous or heterogeneous lesion (with internal necrotic areas). On MRI regardless of the size of the lesion, the regularity or irregularity of the margins and whether or not intralesional homogeneity is present (on T2 images) any suspicious renal lesion presents a T2 signal that is often intermediate compared to the renal cortex (often associated with irregular margin and intralesional inhomogeneity), diffusion positivity/restriction (high signal in DWI and low in ADC) and contrast enhancement (that is often not homogeneous). In T2 sequences we can exclude with certainty only the presence of a simple renal cyst. A renal lesion

is suspicious when it presents a solid component in T2 images (usually intermediate signal), positivity/restriction in diffusion (DWI/ADC) images and contrast enhancement in perfusion sequences. In this way, to consider a renal lesion suspicious, we simultaneously evaluate the morphology of the mass (or nodule) in the T2 sequence, the diffusion positivity and the presence of intralesional contrast enhancement.

Furthermore, T2 sequences have an excellent contrast resolution to perfectly differentiate the renal cortex (intermediate signal) from the renal pelvis (high signal). Starting from this assumption we consider as in [figure 1](#).

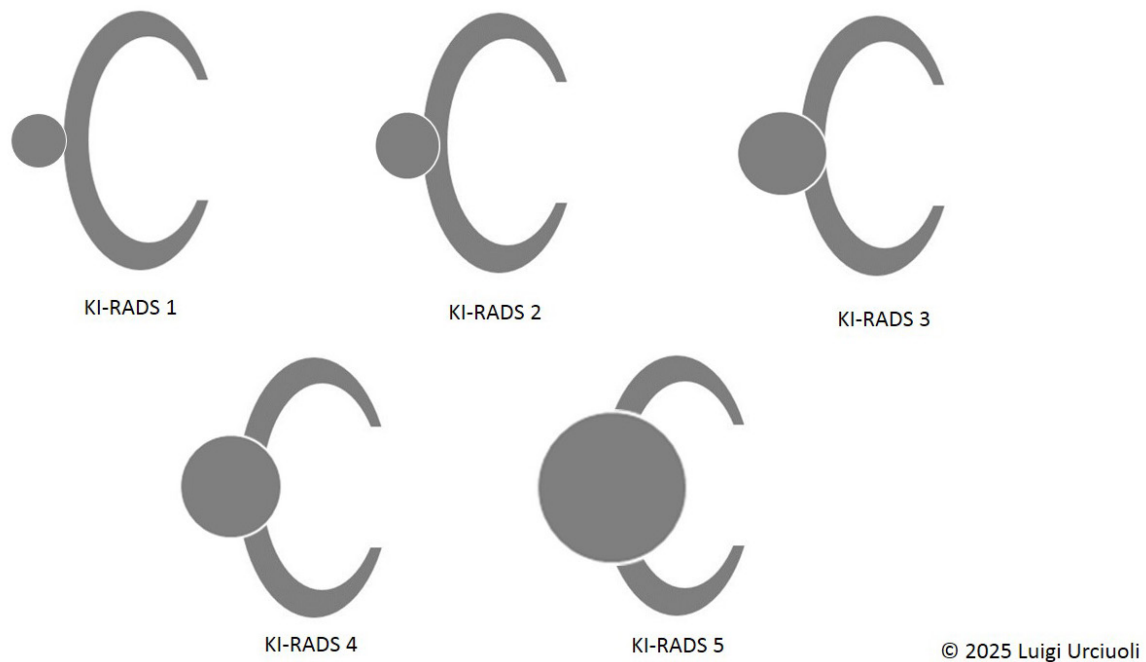


Figure 1: KI-RADS- Kidney Imaging Reporting and Data System assumption size as follows

KI-RADS 1: Any suspicious lesion in multiparametric assessment (of any size) with invasion of the renal cortex less than 5 mm

KI-RADS 2: Any suspicious lesion in multiparametric assessment (of any size) with invasion of the renal cortex more than 5 mm

KI-RADS 3: Any suspicious lesion in multiparametric assessment (of any size) borderline between cortical and renal pelvis

KI-RADS 4: Any suspicious lesion in multiparametric assessment (of any size) with invasion of the renal pelvis less than 5 mm

KI-RADS 5: Any suspicious lesion in multiparametric assessment (of any size) with invasion of the renal pelvis more than 5 mm

According to this classification, KI-RADS lesions 1 and 2 are suspicious lesions that usually undergo surgical enucleoresection (surgical technique), while KI-RADS lesions 3, 4 and 5 are suspicious lesions that undergo total nephrectomy.

Our preliminary study is still in its infancy and requires further data and future investigations. It is certainly an innovative, standardized and practical approach to interpreting the renal lesions. It certainly offers a preliminary advantage to urologists in the preoperative planning of renal masses. It is also well suited for surgical evaluation after chemotherapy and immunotherapy.