

# **Role of Multislice CT in the Diagnosis and Characterization of Renal Masses**

**THESIS**

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## **LIST OF ABBREVIATIONS**

2D	Two dimensional
3D	Three Dimensional
AML	Angiomyolipoma
ADPKD	Autosomal dominant polycystic kidney disease
CMP	Corticomedullary phase
CTA	CT angiography
CTU	CT urography
DP	Delayed phase
EP	Excretory phase
EU	Excretory urography
HU	Hounsfield unit
IVC	Inferior vena cava
IVP	Intra venous pyelography
IVU	Intra venous urography
LN (s)	Lymph node (s)
MDCT	Multi detector row CT
MIP	Maximum intensity projection
MPR	Multiplanar reformat
MR/MRI	Magnetic resonance imaging
MSCT	Multislice CT
NP	Nephrographic phase
PACS	Picture archiving and communication System
RCC (s)	Renal cell carcinoma (s)
ROI	Region of interest
RV	Renal vein

SSD	Surface shaded display
STD	Standard deviation
TCC	Transitional cell carcinoma
US	Ultrasound
XGP	Xanthogranulomatous Pyelonephritis
UPJ	Ureteropelvic junction
VR	volume rendering

## **INTRODUCTION**

The great majority of renal masses are found incidentally as a result of the use of computed tomography, ultrasonography, and magnetic resonance imaging. Fortunately, most of these are simple renal cysts that can be easily diagnosed and do not require treatment. However, solid and complex cystic renal masses are also discovered, many of which are clearly malignant and need to be surgically removed, while others may not require surgical intervention. Therefore, the proper characterization of these masses is essential so that appropriate management is instituted (**Israel and Bosniak, 2005**).

For many years, spiral computed tomography (CT) represented the modality of choice for assessment of tumor extension due to its high accuracy. The evolution of CT technology and the introduction of multidetector computed tomography (MDCT) have provided higher spatial resolution and faster acquisition. Three-dimensional reformatting techniques enable easy performance of multiplanar reconstructions, which improves the staging capabilities for RCC. Tumor stage is the most important factor affecting the prognosis and survival of patients, and has an important bearing on planning treatment (**Türkvan et al, 2009**).

Multidetector—(also known as multislice, multichannel, or multisection) — CT (MDCT) is the most recent advance in CT technology. It uses a multiple row detector array instead of the single-row detector array used in helical CT. These new CT scanners allow 2 to 25 times faster scan times than helical CT with the same or better image quality. These faster scan times result in decreased breath-hold times with reduced motion artifact and better diagnostic images. Increased

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volume coverage is combined with thinner slice thickness to obtain better quality volume data sets for workstation analysis, either in 2-D axial, multiplanar reformation (MPR), or three-dimensional (3-D) imaging. The main advantages of MDCT are faster scanning time, increased volume coverage, and improved spatial and temporal resolution (**Napoli et al, 2004**).

Moreover, by using MDCT, different image thickness can be obtained from the same acquisition data set. MDCT allows images to be obtained in multiple phases of renal parenchymal enhancement and excretion in the collecting system after administration of a single bolus of intravenous (IV) contrast material. Therefore, detection and characterization of small renal masses, display of the arterial and venous supply of the kidney similar to conventional angiography, and demonstration of the collecting system's abnormalities using different 3-D display techniques are possible with MDCT (**Kocakoc et al, 2005**).

The most common nonemergent indication for renal CT involves evaluation or staging of a renal mass. The mass may be asymptomatic or one of the increasing number of incidental findings detected as more CTs are being performed. Multiphase imaging in a patient with renal mass can serve one of two broad purposes: characterization of the renal lesion, or staging and detection of metastatic disease (**Lockhart and Smith, 2003**).

Renal masses frequently manifest with hematuria. Characterization of a renal mass as a simple cyst, a complex cyst, or a solid mass is essential. Simple cysts are benign and do not warrant further evaluation. Solid masses, with the exception of angiomyolipomas, are presumed to be malignant and usually require surgery (**Joffe et al, 2003**).

## Introduction& Aim of work

Renal cell carcinoma is the most common primary tumor of the kidney accounting for 85–90% of all malignant renal tumors in adults. With the widespread use of cross-sectional imaging, many tumors are discovered incidentally and most of them are small, early-stage lesions **(Sheth et al, 2001)** **(Catalano et al, 2003)**.

The accurate diagnosis of a renal mass is dependent on many factors, a high-quality imaging examination, which is under the control of the radiologist, is essential **(Israel and Bosniak, 2005)**.

## Aim of work

**The aim of this work is the assessment and highlighting of the role of multislice CT in the diagnosis and characterization of different renal masses.**