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

**THESIS**

Submitted for partial fulfillment of MD degree in Radiodiagnosis

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**Ain Shams University 2013**

# Acknowledgement

First and foremost, thanks to **ALLAH** the most merciful for granting me the ability to accomplish this work.

I would like to express my deepest gratitude and sincere appreciation to **Prof. Dr. Mamdouh Ghoneim**, Professor of Radiodiagnosis, Ain-Shams university for his constructive advices and valuable support.

My deep thanks go to **Prof. Dr. Sameh Abdel Wahab**, Professor of radiodiagnosis,Ain-Shams university for his sincere guidance and continuous cooperation.

Also my best thanks and appreciation are for **Prof. Dr. Rania Maarouf** ,Assisstant Professor of radiodiagnosis,Ain-Shams university for her encouragement and meticulous supervision to help bring this work to reality.

Last but not least, my appreciation goes to my colleagues and professors at armed forces hospitals for their guidance and infinite help and my family for this tolerance and support.

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| | |
|---|---|
| 2D | Two dimensional |
| 3D | Three Dimenshional |
| 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 themodality of choice for assessment of tumor extension due to its highaccuracy. The evolution of CT technology and the introduction of multidetector computed tomography (MDCT) have provided higherspatial resolution and faster acquisition. Three-dimensional reformattingtechniques enable easy performance of multiplanar reconstructions, which improves the staging capabilities for RCC. Tumor stage is themost important factor affecting the prognosis and survival of patients,and has an important bearing on planning treatment**(Türkvatan 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

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 besymptomatic or one of the increasing number ofincidental findings detected as more CTs are beingperformed. Multiphase imaging in a patient with renalmass 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. Simplecysts 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).**

Renal cell carcinoma is the most common primary tumor of thekidneyaccounting for 85–90% of all malignant renal tumors in adults. With the widespread use of cross-sectionalimaging, many tumors are discovered incidentallyand 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 ofthe 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.**