

## **Introduction**

The great majority of renal masses are found incidentally as a result of the wide use of computed tomography (CT), ultrasonography (US) and magnetic resonance (MR) 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 (*Israel & Bosniak, 2005*).

The challenges of renal tumoral imaging include not only reliable differentiation between benign and malignant lesions but also accurate delineation of the extent of the disease to ensure optimal treatment planning (*Sheth et al., 2001*).

There was a time when renal cancer was just a solid enhancing mass in the kidney that required no further description and was removed with radical nephrectomy, since then, advances in our understanding and the treatment of renal cancer have occurred, that bring into question the validity of several aspects of this practice paradigm. One manifestation of the evolution of our knowledge of renal cancer is the discovery of an increasingly complex array of tumor subtypes, these tumor subtypes range from the common to almost unheard of (*Prasad et al., 2006*).

Multidetector computed tomography (MDCT), is the latest breakthrough in CT technology, thin sections can now be acquired as a routine basis in a

single breath hold with 3D isotropic reconstruction. This results in improving the lesion detection of benign as well as malignant abdominal tumors. The ability to scan through the entire abdomen in seconds allows multiphase acquisition, therefore precise timing and optimized contrast is of great importance (*Hammerstingl & Vogl, 2005*).

Multidetector spiral CT remains the single most effective imaging modality for the diagnosis and staging of renal cell carcinoma. In the majority of patients, it is the only imaging test needed prior to surgical management (*Sheth et al., 2001*).

Some histological subtypes of RCC have unique imaging findings, which may permit prediction of histology with its attendant implication for management and prognosis. Also, the tumor response to molecular therapeutics may be vastly different than the response to standard cytoreductive therapy (*Weiss, 2006*).

Accurate histological and imaging characterization of RCC is very important from prognostic and management perspectives (*Jones et al., 2005*). It is well established that clear cell RCC is associated with a less favorable prognosis compared with papillary and chromophobe carcinoma (*Cheville et al., 2003*) and (*Jones et al., 2005*). It is also well known that collecting duct carcinomas and renal medullary carcinomas are associated with aggressive clinical behavior and poor prognosis (*Eble et al., 2004*) and (*Prasad et al., 2005*). Precise classification of RCC also allows institution of tailored treatment protocols (*Prasad et al., 2006*).