Radiology & Imaging Sciences

GRAND ROUNDS

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Molecular Imaging of Renal Masses for Improved Risk Stratification

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Abstract

Numerous benign, indolent, and frankly malignant types of renal masses have been described. Conventional anatomic imaging with multi-phase cross-sectional modalities has generally failed to adequately risk stratify patients with renal masses, leading to thousands of unnecessary nephrectomies and partial nephrectomies each year for lesions that are ultimately deemede indeterminate. Although such modalities remain a cornerstone of the initial evaluation of renal masses, particularly in the era of multi-parametric magnetic resonance imaging and contrast-enhanced ultrasound, molecular imaging offers an opportunity to more deeply interrogate the underlying biology and aggressiveness of renal masses.

Emerging prospective trial evidence and evolving guidelines have focused on two primary molecular imaging pathways for renal mass characterization. The first of those is the use of carbonic anhydrase IX (CAIX)-targeted agents, most notably 89Zr-girentuximab – a monoclonal antibody that generates high-contrast images of clear cell renal cell carcinoma based on the constitutive and near-universal expression of CAIX on those tumors. The second is the use of 99mTc-sestamibi, a lipophilic small-molecule cation that localizes to regions of high mitochondrial content, such as can be found in many benign and indolent renal masses. Algorithms utilizing both of those types of molecular imaging may ultimately gain traction to allow maximal risk stratification of patients with indeterminate renal masses.

Bio

Dr. Rowe completed his medical degree and a PhD in chemistry at University of Michigan. He trained in diagnostic radiology and nuclear medicine at Johns Hopkins, joining the faculty in 2016. He is the immediate past Division Chief of Molecular Imaging and Therapeutics at University of North Carolina.

He is currently a Professor of Radiology at University of Texas Southwestern Medical Center and serves as the Chief Radiology Officer of Clements University Hospital and Clinics. He has authored and co-authored more than 500 publications on topics ranging from prostate cancer theranostics to renal mass characterization and artificial intelligence. His current research focuses on genitourinary molecular imaging.

Objectives

- Discuss the wide variety of renal mass histologies and difficulties in non-invasive risk stratification
- Describe the potential role of carbonic anhydrase IX-targeted imaging agents in renal mass risk stratification
- Understand the emerging role of renal sestamibi scans in renal mass risk stratification

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