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Predictive quantitative MDCT models for characterization of renal cell carcinoma subtypes and differentiation from renal oncocytoma: Three phase Nomogram approach analysis

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Objective: Our objective is to develop an approach using algorithmic predictive models to discriminate between common solid renal masses, including RCC subtypes and Renal Oncocytoma [RO], using multiphase Computed Tomography [CT].

Methods: We retrospectively analyzed a group of solid renal masses between January 2011 and December 2021 regarding the CT attenuation values using a CT scanner with 64 parallel detector rows and clinical parameters. Inclusion criteria included patients who had four phases of CT with a partial or radical nephrectomy. Exclusion criteria were patients with biphasic or one-phase CT, poor imaging quality, patients under surveillance, radiofrequency ablation, or indeterminate pathology findings as oncocytic tumor variant.

Results: Our results revealed a total number of 467 cases, including 195 masses of Clear RCC [CRCC], 81 masses of RO, 124 masses of Chromophobe RCC [ChRCC], and 67 masses proved to be papillary RCC [PRCC]. There is a significant difference between hypervascular [CRCC and RO] and hypovascular [ChRCC and PRCC] masses, and AUC= 0.95. The predictive model for differentiation between CRCC from RO showed AUC=0.79. At the same time, the discrimination of ChRCC from PRCC showed AUC= 0.94. Nomogram was developed for each phase of analysis.

Conclusion: Using the largest sample to our knowledge, we developed a three-phase nomogram analytical approach to initiate a practical method to discriminate between different solid renal masses that can be used in daily clinical practice.

Recent Publications

1. Shebel, Haytham & Farg, Hashim & Kolokythas, Orpheus & El-Diasty, Tarek. (2013). Cysts of the Lower Male Genitourinary Tract: Embryologic and Anatomic Considerations and Differential Diagnosis. Radiographics : a review publication of the Radiological Society of North America, Inc. 33. 1125-1143. 10.1148/rg.334125129.
2. Grant, Kinzya & Lindenberg, Liza & Shebel, Haytham & Pang, Yuxi & Agarwal, Harsh & Bernardo, Marcelino & Kurdziel, Karen & Turkbey, Baris & Choyke, Peter. (2013). Functional and molecular imaging of localized and recurrent prostate cancer. European journal of nuclear medicine and molecular imaging. 40. 10.1007/s00259-013-2419-6.
3. Shebel, Haytham & Elsayes, Khaled & Abou El Atta, Heba & Elguindy, Yehia & El-Diasty, Tarek. (2012). Genitourinary Schistosomiasis: Life Cycle and Radiologic-Pathologic Findings. Radiographics : a review publication of the Radiological Society of North America, Inc. 32. 1031-46. 10.1148/rg.324115162.

Biography

Haytham Shebel is a radiologist who is interested in body and oncology Imaging and he have special experiences in GU and prostate cancer Imaging and MP-MRI technique. Also, he was certified as International Clinical Researcher from Harvard Medical School in medical research and biostatistics.

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