Radiogenomics of Clear Cell Renal Cell Carcinoma: Preliminary Findings of The Cancer Genome Atlas-Renal Cell Carcinoma (TCGA-RCC) Research Group (TCGA-KIRC-Radiogenomics)

Description

PURPOSE:

To investigate associations between imaging features and mutational status of clear cell renal cell carcinoma (ccRCC).

MATERIALS AND METHODS:

This multi-institutional, multi-reader study included 103 patients (77 men; median age 59 years, range 34-79) with ccRCC examined with CT in 81 patients, MRI in 19, and both CT and MRI in three; images were downloaded from The Cancer Imaging Archive, an NCI-funded project for genome-mapping and analyses. Imaging features [size (mm), margin (well-defined or ill-defined), composition (solid or cystic), necrosis (for solid tumors: 0%, 1%-33%, 34%-66% or >66%), growth pattern (endophytic, <50% exophytic, or 50% exophytic), and calcification (present, absent, or indeterminate)] were reviewed independently by three readers blinded to mutational data. The association of imaging features with mutational status (VHL, BAP1, PBRM1, SETD2, KDM5C, and MUC4) was assessed.

RESULTS:

Median tumor size was 49 mm (range 14-162 mm), 73 (71%) tumors had well-defined margins, 98 (95%) tumors were solid, 95 (92%) showed presence of necrosis, 46 (45%) had 50% exophytic component, and 18 (19.8%) had calcification. VHL (n = 52) and PBRM1 (n = 24) were the most common mutations. BAP1 mutation was associated with ill-defined margin and presence of calcification (p = 0.02 and 0.002, respectively, Pearson's x^2 test); MUC4 mutation was associated with an exophytic growth pattern (p = 0.002, Mann-Whitney U test).

CONCLUSIONS:

BAP1 mutation was associated with ill-defined tumor margins and presence of calcification; MUC4 mutation was associated with exophytic growth. Given the known prognostic implications of BAP1 and MUC4 mutations, these results support using radiogenomics to aid in prognostication and management.

Data Access
Data Access

Data Type	Download all or Query/Filter	License
Radiologist annotations, mutation status, and clinical variables (CSV, 17 kB)	*Download*	CC BY 3.0

Collections Used in this Third Party Analysis

Below is a list of the Collections used in these analyses:

Source Data Type	Download all or Query/Filter	License
Corresponding Original MR Images from TCGA-KIRC (DICOM, 103 subjects, 118 studies, 738 series, 49815 files, 21.11 GB)	*Download* (Download requires the NBIA Data Retriever)	CC BY 3.0

- TCGA-KIRC

Citations & Data Usage Policy
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ⓘ **Data Citation**

Shinagare AB, Vikram R, Jaffe C, Akin O, Kirby J, Huang E, Freymann J, Sainani NI, Sadow CA, Bathala TK, Rubin DL, Oto A, Heller MT, Surabhi VR, Katabathina V, Silverman SG. (2014). **Radiogenomics of Clear Cell Renal Cell Carcinoma: Preliminary Findings of The Cancer Genome Atlas-Renal Cell Carcinoma (TCGA-RCC) Research Group**. The Cancer Imaging Archive. http://doi.org/10.7937/K9/TCIA. 2014.K6M61GDW

ⓘ **TCIA Citation**

Clark K, Vendt B, Smith K, Freymann J, Kirby J, Koppel P, Moore S, Phillips S, Maffitt D, Pringle M, Tarbox L, Prior F. (2013) **The Cancer Imaging Archive (TCIA): Maintaining and Operating a Public Information Repository**, Journal of Digital Imaging, Volume 26, Number 6, pp 1045-1057. DOI: https://doi.org/10.1007/s10278-013-9622-7

In addition to the dataset citation above, please be sure to cite the following if you utilize these data in your research:

ⓘ **Publication Citation**

Shinagare, A. B., Vikram, R., Jaffe, C., Akin, O., Kirby, J., Huang, E., Freymann, J., Sainani, N. I., Sadow, C. A., Bathala, T. K., Rubin, D. L., Oto, A., Heller, M. T., Surabhi, V. R., Katabathina, V., & Silverman, S. G. (2015). **Radiogenomics of clear cell renal cell carcinoma: preliminary findings of The Cancer Genome Atlas–Renal Cell Carcinoma (TCGA–RCC) Imaging Research Group**. Abdominal Imaging, 40 (6), 1684–1692. https://doi.org/10.1007/s00261-015-0386-z

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Versions

Version 1 (Current): 2015/05/28

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