Abdominal Adiposity in Early-Onset and Aggressive Clear Cell Renal Cell Carcinoma and Health Disparities

Preliminary Report

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Background: Disparities in Hispanic Americans (HAs) and American Indians (AIs) in Arizona

HAs and AIs are more likely to have
- Higher kidney cancer incidence and mortality
- Earlier age of diagnosis
- Predominantly clear cell subtype
- Advanced stage diagnosis
- More invasive treatment
  - Radical rather than partial nephrectomy among Stage I RCC patients
- Higher rate of obesity and diabetes

Data Source
- Banner University Medical Center Tucson (BUMCT)
- Arizona Cancer Registry
- National Cancer Database (NCDB)
Neighborhood Socioeconomic Challenges and RCC Patients (BUMCT)

Mean BMI in RCC patients stratified by SDI quartile

SDI and AI associated with higher BMI

<table>
<thead>
<tr>
<th></th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI ≥30 vs. &lt;30</td>
<td></td>
</tr>
<tr>
<td>SDI 10% increment</td>
<td>1.05 (0.97-1.14)</td>
</tr>
<tr>
<td>AI vs. NHW</td>
<td>3.38 (1.12-2.56)</td>
</tr>
<tr>
<td>BMI ≥35 vs. &lt;30</td>
<td></td>
</tr>
<tr>
<td>SDI 10% increment</td>
<td>1.10 (1.01-1.21)</td>
</tr>
<tr>
<td>AI vs. NHW</td>
<td>4.31 (1.18-15.74)</td>
</tr>
</tbody>
</table>

Patient’s zip code linked Social Deprivation Index (SDI) calculated from American Community Survey
### Adiposity and Heterogeneity of RCC?

Yellow – Visceral adipose tissue (VAT)
Green – Subcutaneous adipose tissue (SAT)
Orange – Skeletal muscle

<table>
<thead>
<tr>
<th>Age</th>
<th>40</th>
<th>69</th>
<th>43</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Male</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td>HA</td>
<td>NHW</td>
<td>NHW</td>
</tr>
<tr>
<td>BMI</td>
<td>36</td>
<td>23</td>
<td>24</td>
</tr>
<tr>
<td>Visceral Adipose Tissue (cm²)</td>
<td>227.1</td>
<td>214.4</td>
<td>74.7</td>
</tr>
<tr>
<td>Total Fat Area (cm²)</td>
<td>493.7</td>
<td>351.6</td>
<td>286.7</td>
</tr>
<tr>
<td>Tumor Grade</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>TNM Stage</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>VHL Somatic Mutation</td>
<td>No mutation</td>
<td>Synonymous</td>
<td>Deletion/frameshift</td>
</tr>
</tbody>
</table>
Body Composition Difference between HA and NHW RCC Patients Stratified by Sex

VAT/Height Ratio

p = NS

p = 0.002

SAT/Height Ratio

p = 0.01

Total Muscle/Height Ratio

p = NS

19 HA males and 15 HA females,
18 NHW males and 5 NHW females

HA vs. NHW

- NHW
- Hispanic

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Body Composition and Clinical Characteristics (n=71)

Correlation between age and SAT/height ratio

Higher VAT/height ratio in patients with hypertension and diabetes

Spearman's correlation efficient -0.255

\[ p = 0.03 \]

\[ p = 0.002 \]

\[ p = 0.07 \]

Mean VAT (cm²)

Hypertension

183.9

272.3

Diabetes

226.6

27635

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Clear cell RCC Molecular Subtype (ccA/ccB)

Higher Frequency of ccA in Hispanics

<table>
<thead>
<tr>
<th></th>
<th>ccA</th>
<th>ccB</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUMC Hispanics</td>
<td>60%</td>
<td>40%</td>
</tr>
<tr>
<td>TCGA NHWs</td>
<td>70%</td>
<td>30%</td>
</tr>
<tr>
<td>BUMC NHWs</td>
<td>80%</td>
<td>20%</td>
</tr>
<tr>
<td>TCGA NHBs</td>
<td>90%</td>
<td>10%</td>
</tr>
</tbody>
</table>

Odds of having ccA subtype (HAs vs. NHWs)

- OR 3.34 (95% CI: 1.17-9.52, p=0.02)
- Adjusting for age, sex, hypertension, diabetes, and BMI

ccB associated with higher mortality

- ccB vs. ccA - HR 4.87; 95% CI: 1.37-17.31
- n=96

Subtype

CumSurvival

Follow-Up Time (Days)

p=0.01
Urine and Plasma Metabolomic Differences between Hispanics and NHWs

Plasma – Lipids (n=128)

Urine - Hydrophilic interaction liquid chromatography (n=73)

Urine – Reverse phase liquid chromatography (n=73)

64 HAs and 64 NHWs

28 HAs and 45 NHWs

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