Renal Cell Carcinoma in Children and Young Adults

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Pediatric types of tumors (WHO 2016)

- Nephroblastic and cystic tumors occurring mainly in children
  - Nephrogenic rests
  - Nephroblastoma
  - Cystic partially differentiated nephroblastoma
  - Pediatric cystic nephroma
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- Nephroblastic and cystic tumors occurring mainly in children
  - Nephrogenic rests
  - Nephroblastoma
  - Cystic partially differentiated nephroblastoma
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- Mesenchymal tumors occurring mainly in children
  - Clear cell sarcoma
  - Rhabdoid tumor
  - Congenital mesoblastic nephroma
  - Ossifying renal tumor of infancy
Spectrum of RCC in children or young adults

• **Carcao et al** (Medical and Pediatric Oncology 1998): Pathology showed papillary RCC in five patients (31%). Nonpapillary tumors were present in 11 (69%), of which nine were clear-cell type (56%), one was chromophobe-cell type (6%), and one was granular-cell type (6%). (In 2 tumors, normal karyotypes (45,XX or 45,XY) were found. In 1 case there were translocations: t(X;1), t(X;2), and t(6;14). In 1 case, analysis revealed 46,XX/46,X,t(X;17)(p11.2;q25),t(1;12).)

• **Renshaw et al** (AJSP 1999): 19 PRCC type (??), 4 CCRCC

• **Bruder et al** (AJSP 2004): 6 clear cell (15%), 9 papillary (22%), 2 chromophobe, and 2 collecting duct carcinomas. 8 carcinomas showed translocation carcinoma morphology (20%). (1 carcinoma occurred 4 years after a neuroblastoma. 13 tumors could not be assigned to types specified by the new WHO classification)
Spectrum of RCC in children or young adults

• Wu et al (Histopathol 2008): 6/13 patients (46%) Xp11.2 translocation-associated RCC, 5/13 patients (38%) clear cell RCC, 1/13 patient papillary and 1/13 patient unclassified RCC.
The numbers: MitF

- **Xp11 (TFE3) RCC**: 20-75% of RCC in children (Sukov, Calio)
- 1-4% of adults (???????)

- **t6;11 (TFEB) RCC**: Majority in children?? Mean age 34 years, age range 3-77 years (Calio et al)
- %....below 1-2% in adults (???)

- **Prognosis**: Xp11.2
  - TFEB
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> Given the relatively low incidence of this entity and the relatively few cases reported in the literature, one may only conclude that the majority of Xp11.2 translocation RCCs occur with metastatic disease; however, it may be too early to conclude clinical outcomes.

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TFEB association with **TFEB status-amplification**

The numbers: Papillary RCC

- Two large pediatric series provide the outcome of 32 patients with papillary RCC. 75% (24/32) presented with disease limited to the kidney, and 22/24 were free of disease; death from disease occurred in 1 case T2N0MX tumor and the other died from other causes. (Perlman 2006, Selle 2006)

- Types of PRCC????
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It is very difficult to compare results of older papers with recent papers: TSC associated RCC, TFE3 with unusual fusion partners, etc
The most frequent types of RCC in pediatric patients

- TFE3 translocation renal cell carcinoma
The most frequent types of RCC in pediatric patients

• TFE3 translocation renal cell carcinoma

Sampling
TFE3 IHC
FISH confirmation (TFE3 break)
NGS for fusion partner
The most frequent types of RCC in pediatric patients

- TFE3 translocation renal cell carcinoma
- t6;11 translocation (TFEB) renal cell carcinoma
The most frequent types of RCC in pediatric patients

- t6;11 translocation (TFEB) renal cell carcinoma

Sampling
HMB45, Melan A, TFE3- IHC
FISH for TFEB break
TFEB amplification
Our series

• Patients (20 cases) up to 18 years: 7 papillary RCC type 1 and NOS, 3 chromophobe RCC, 6 translocation RCC (TFE3 and TFEB), and 4 unclassified RCC

• Patients (9 cases) 19 to 25 years: 2 clear cell RCCs, 4 translocation RCCs (TFE3 and TFEB), 2 chromophobe RCCs, and 1 papillary RCC NOS were found.
t6;11 translocation RCC (TFEB), no amplification
t6;11 translocation RCC (TFEB) no amplification
Papillary RCC, type 1
PRCC NOS- translocation-like morphology
Papillary RCC NOS
• Adult types of RCC can occur in pediatric and young adult age group.
• In our series, the percentage of particular subtypes of RCC is different from adult patients, however our series is too small for general statements.
• Adult types of RCCs have tendency to occur in unusual types/variants
Recommendation

• Generous sampling

• Consider potential familiar genetic trait (SDH def RCC, FH def RCC, TS, etc)

• Consider translocation RCC- can occur in highly unusual morphs
Thank you for your attention!!

Sian Kaan, Yucatan
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