Pediatric Renal Tumors: Update for 2014

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Renal Tumors of Childhood

- 6th Most Common Group of Tumors
- Most Occur in 1st Decade of Life
- Diverse Group of Tumors
  - Benign Mesoblastic Nephroma to Aggressive and Often Fatal Rhabdoid Tumor
  - Most Common Tumor - Wilms Tumor
Other Renal Tumors

- Anaplastic Sarcoma of Kidney
- Primitive Neuroectodermal Tumor (PNET/EWS)
- Desmoplastic Small Round Cell Tumor
- Rhabdomyosarcoma
- Synovial Sarcoma
- Primary Neuroblastoma
- Oncocytoid Post-Neuroblastoma Carcinoma
- “Others”
### Pediatric Renal Tumors: Prevalence

<table>
<thead>
<tr>
<th>Tumor Type</th>
<th>Prevalence</th>
<th>Age Range</th>
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<tbody>
<tr>
<td>FHWT</td>
<td>80%</td>
<td>1-6 years</td>
</tr>
<tr>
<td>Anaplasia</td>
<td>5%</td>
<td>2-6 years</td>
</tr>
<tr>
<td>CMN</td>
<td>4%</td>
<td>0-2 years</td>
</tr>
<tr>
<td>CCSK</td>
<td>4%</td>
<td>1-3 years</td>
</tr>
<tr>
<td>Rhabdoid</td>
<td>2%</td>
<td>0-2 years</td>
</tr>
<tr>
<td>Other</td>
<td>5%</td>
<td>&gt; 5 years</td>
</tr>
</tbody>
</table>
NEPHROBLASTOMA (WILMS TUMOR)
PERILOBAR NEPHROGENIC RESTS

- Located at periphery
- Usually numerous
- Margins well defined
- No nephrons within rest
- Composed of blastema and tubules; stroma scanty or sclerotic
“Adenomatous” Change Within Hyperplastic Perilobar Nephroblastomatosis

Nodules with Cells Composed of Pale Eosinophilic Cytoplasm

Often With Papillary Architecture

Confused With Renal Cell Carcinoma & Metanephric Adenoma

Wilms Tumor Arising in Perilobar Nephrogenic Rest
INTRALOBAR NEPHROGENIC RESTS

- RANDOM LOCATION
- OFTEN SINGLE
- ILL-DEFINED MARGINS
- DISPERSED BETWEEN NORMAL KIDNEY
- COMPOSED OF TUBULES, BLASTEMA AND CYSTS; STROMA USUALLY PREDOMINATES
SYNDROMES AND CONGENITAL DISORDERS ASSOCIATED WITH NEPHROGENIC RESTS* - (10% of WT)

Wilms tumor, aniridia, genitourinary anomalies, retardation (WAGR)
Beckwith-Wiedemann syndrome (complete and incomplete)
Perlsma syndrome
Denys-Drash syndrome
Klippel-Trenaunay syndrome
Brachmann-De Lange syndrome
Renal dysplasia and obstructive uropathy
Trisomy 13
Trisomy 18
Congenital heart disease
Spleenic agenesis with liver malformations
Bilateral radial aplasia and other skeletal abnormalities
CONDITIONS ASSOCIATED WITH NEPHROBLASTOMA

Syndromes Associated with Highest Risk of Nephroblastoma
- Wilms-aniridia-genital anomaly-retardation (WAGR) syndrome (WT1, 11p13)
- Beckwith-Wiedemann syndrome (WT2, 11p15)
- Hemihypertrophy
- Denys-Drash syndrome (WT1, 11p13)
- Familial nephroblastoma (FWT1, 17q12-21; FWT2, 19q13.3-13.4)

Conditions Also Associated with Nephroblastoma
- Frasier's syndrome (WT1, 11p13)
- Simpson-Golabi-Behmel syndrome (GPC3, Xq26)
- Renal or genital malformations
- Cutaneous nevi, angiomas
- Trisomy 18
- Klippel-Trenaunay syndrome
- Neurofibromatosis
- Bloom's syndrome
- Perlman's syndrome
- Sotos' syndrome
- Cerebral gigantism
Anaplasia & Outcome

<table>
<thead>
<tr>
<th>Histology</th>
<th>Stage</th>
<th>10-year RFS (%)</th>
<th>10-year OS (%)</th>
</tr>
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<tbody>
<tr>
<td>Favorable</td>
<td>I</td>
<td>91</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td>II</td>
<td>85</td>
<td>93</td>
</tr>
<tr>
<td></td>
<td>III</td>
<td>84</td>
<td>89</td>
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<tr>
<td></td>
<td>IV</td>
<td>75</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>V</td>
<td>65</td>
<td>78</td>
</tr>
<tr>
<td>Anaplastic</td>
<td>I</td>
<td>69</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td>II–III</td>
<td>43</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>IV</td>
<td>18</td>
<td>18</td>
</tr>
</tbody>
</table>

OS, overall survival; RFS, relapse-free survival.
Anaplastic Wilms Tumor

- NWTS-4: stage I focal and diffuse anaplasia behaved similarly to FHWT
- NWTS-5: decreased survival for stage I patients with focal and diffuse anaplasia
- Treatment for stage 1 anaplasia now more aggressive in new protocols (FA=DA)

Focal anaplasia has very specific criteria; tumors not meeting the criteria must be classified as diffuse

ANAPLASIA
- Polypoid, Multipolar Mitotic Figures
- Nuclear Enlargement (≥3 times) with Hyperchromasia
- Epithelial, Blastemal or Stromal Elements with Anaplasia
- Note: Skeletal Muscle May Have Nuclear Enlargement, Pleomorphism and Hyperchromasia Representing Regenerative Features & Not Anaplasia

FOCAL ANAPLASIA
- Circumscribed & Perimeter Completely Examined (requires mapping of anaplastic area that extends to tissue section edges)
- Confined to Renal Parenchyma (Vascular Invasion Precludes Focal Anaplasia)
- Absence of Severe Nuclear Pleomorphism and Hyperchromasia in Non-Anaplastic Tumor (severe “nuclear unrest”)
Processing of Renal Tumors

- Avoid frozen sections of biopsies for diagnosis
  - Beware nephrogenic rests

- Ink prior to bivalving
  - tumor displacement during grossing procedure

- Search carefully for lymph nodes

Take Most Sections From Periphery

- **Demonstrate Tumor Relationship To:**
  - Renal capsule
  - Renal sinus
  - Normal Kidney

- **Critical for Accurate**
  - Staging
  - Rest determination
  - Diagnosis