Neurodevelopmental Outcome of Pediatric Kidney Transplant Recipients

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Background

• In school-aged children cognitive performance in the low average to average range have been noted (Falger et al, 2008; Fennel et al, 1984; Lawry et al, 1994; Qvist et al, 2002)

• Falger et al (2008) noted specific neurocognitive impairment in
  – Motor performance (Falger, 2008)
  – Performance IQ (Falger, 2008)
We wanted to evaluate the effects of chronic kidney disease and consequent kidney transplantation on both general cognitive level and specific neurocognitive areas among children.
Methods

• Inclusion criteria:
  – Kidney or kidney-liver transplantation at the Helsinki University Central Hospital at least 1 year prior to assessment
  – 6.0-16.5 years of age
  – Finnish or Swedish as first language
• N = 49 (21 girls and 28 boys)
• A control group was chosen from the NEPSY-II standardization sample
Measures

• Wechsler Intelligence Scale for Children – Third Edition (Wechsler, 1999)

• NEPSY – II (Korkman, Kirk & Kemp, 2008)
Background Characteristics

- The kidney transplanted children were assessed on average 6.9 years postoperatively (SD = 3.7; range 1.0-14.1 years). Mean age at the time of assessment was 11.2 years (SD = 3.2; range 6.3-16.4 years).

- Mean age for the control group was 11.1 years (SD = 3.0; range 6.2-15.3 years).
# Results

<table>
<thead>
<tr>
<th></th>
<th>M (SD)</th>
<th>t</th>
<th>p</th>
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</thead>
<tbody>
<tr>
<td>Verbal IQ</td>
<td>87.2 (21.6)</td>
<td>-4.1</td>
<td>&lt;.001</td>
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<tr>
<td>Performance IQ</td>
<td>80.0 (23.1)</td>
<td>-6.0</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Full-Scale IQ</td>
<td>83.2 (19.4)</td>
<td>-6.0</td>
<td>&lt;.001</td>
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IQ has a mean of 100 (SD = 15) in the normal population.

**Table 1.** Mean (M) Intelligent Quotients and Standard Deviations (SD) of the Kidney Transplanted Children in the Wechsler Intelligence Scale for Children Compared to Test Norms (n = 48)
Table 2. Distributions of IQ values in the Kidney Transplants Recipients (n = 44) in the Wechsler Intelligence Scale for Children.

<table>
<thead>
<tr>
<th>Full-Scale IQ</th>
<th>N (%)</th>
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<tbody>
<tr>
<td>&lt; 70</td>
<td>9 (19)</td>
</tr>
<tr>
<td>70-84</td>
<td>13 (27)</td>
</tr>
<tr>
<td>85-115</td>
<td>26 (54)</td>
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<tr>
<td>&gt; 115</td>
<td>0 (0)</td>
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</tbody>
</table>
Figure 1. Profiles of mean subtest scores and error bars of the mean in NEPSY-II for the kidney transplanted children (Kidney Tx Group) and the control group. The horizontal line indicates the mean 10 ($SD = 3$; range 1-19) in the normal population.
Figure 2. Profiles of mean subtest scores in NEPSY-II for the kidney transplanted children (Kidney Tx Group), kidney transplanted children with FSIQ>70, and the control group.
Discussion

• Mean global intelligence in the borderline range.
• Impaired performance in visuomotor and visuoconstructive skills, social perception, and language.
• Even with an adequate cognitive level, there may be risk for impairment in these neurocognitive areas.
Conclusions

• Individual neuropsychological evaluation is recommended so that educational needs can be addressed.