

More than just IQ

—

specific neurocognitive difficulties in children with chronic renal failure and kidney transplantation

This work was supported by a grant
from the German Federal Ministry of Education and Research
(reference number: 01EO1302)

...50 years ago



...30-35 years ago

Works by Fennel et al. showing reduced performance on tasks of:

- verbal ability
- visual perception
- memory and
- visual motor skills

“Because cognitive development and learning occur most rapidly during childhood and early adolescence, it may be of value to study conditions that might negatively affect this process.”

- PubMed Search for:

Child*
+ kidney / renal transplant*
+ cognit*

-> 45 publications

Cross-sectional studies
10-137 participants



- **CO**-mplications & **RE**-habilitation



H. Hartmann C. Müller W. Wulff J. Prüfe*

M_HH

Hannover Medical School

SF
Zu

*see Career plan

Opportunities for life in paediatric organ transplant recipients



- Neurological sequelae
- Neuropsychological & cognitive impacts
- Social & emotional consequences
- Quality of life throughout the disease trajectory
- Adherence

- Inclusion criteria:
 - patients at Hannover Medical School
 - age: 0-17
 - with dialysis-dependent CKD or being on call

- visits:
 - T1: positive evaluation for ET-listing
or start of dialysis (pre-Tx)
 - T2: 1 year post Tx

- Standardised neuropaediatric assessment
- Developmental psychology
 - a) standardised assessment
 - 0 – 3,5 y.: Bayley Scales III
 - 3,5 – 6 y.: WPPSI-III
 - 6 – 16 y.: WISC-IV
 - >16 y.: WAIS-IV
 - others: SON 2,5-7; SON-R 6-40 (language-free testing)
 - extra: various methods to assess executive functioning, functional vision & fine motor coordination
 - b) qualitative assessment
 - observation / behaviour
 - diagnostic interview

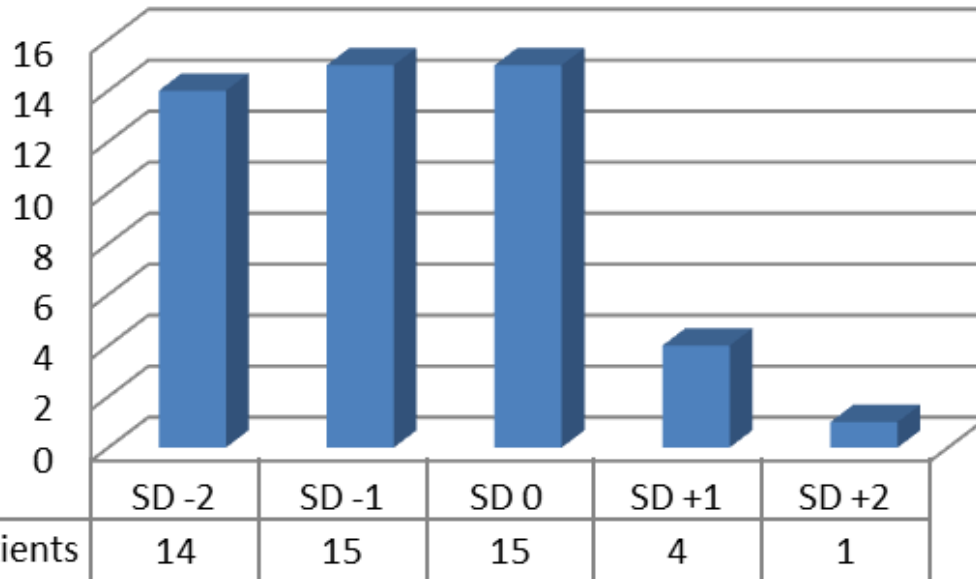
Preliminary Results

- 80 patients on call between 06/2012 and 01/2017
 - > 31 patients not eligible
 - 12 external patients
 - 10 older than 17 or due to transfer
 - 9 refused participation
 - > 49 patients assessed

Preliminary Results

49 assessments for full scale IQ
Mean-IQ 88,57 (range 50-132; SD 22,38)

patients' full scale IQ by SD of mean



Preliminary Results

- Heterogeneous profiles:

Verbal compr. \geq perceptual reasoning $>$ working memory $>$ processing speed

➔ About 50% of the participants with IQ >70

score less than $-1SD$ in the indices „processing speed“ and „working memory“ as compared to the normative population.

!EXECUTIVE FUNCTIONS!

What about the babies & infants?

- 7 children started dialysis before their 1st birthday
- 2 children needed CVVH (one age 7 weeks; one age 8 months)
- Dialysis: all showed global developmental delay, most severe delay in motor function
- Transplantation (concerns 5 children): good catch-up within one year after transplantation

Follow up ?

.... Sorry, not yet

- Followed up: 14 patients
- Assessment scheduled: 10 patients

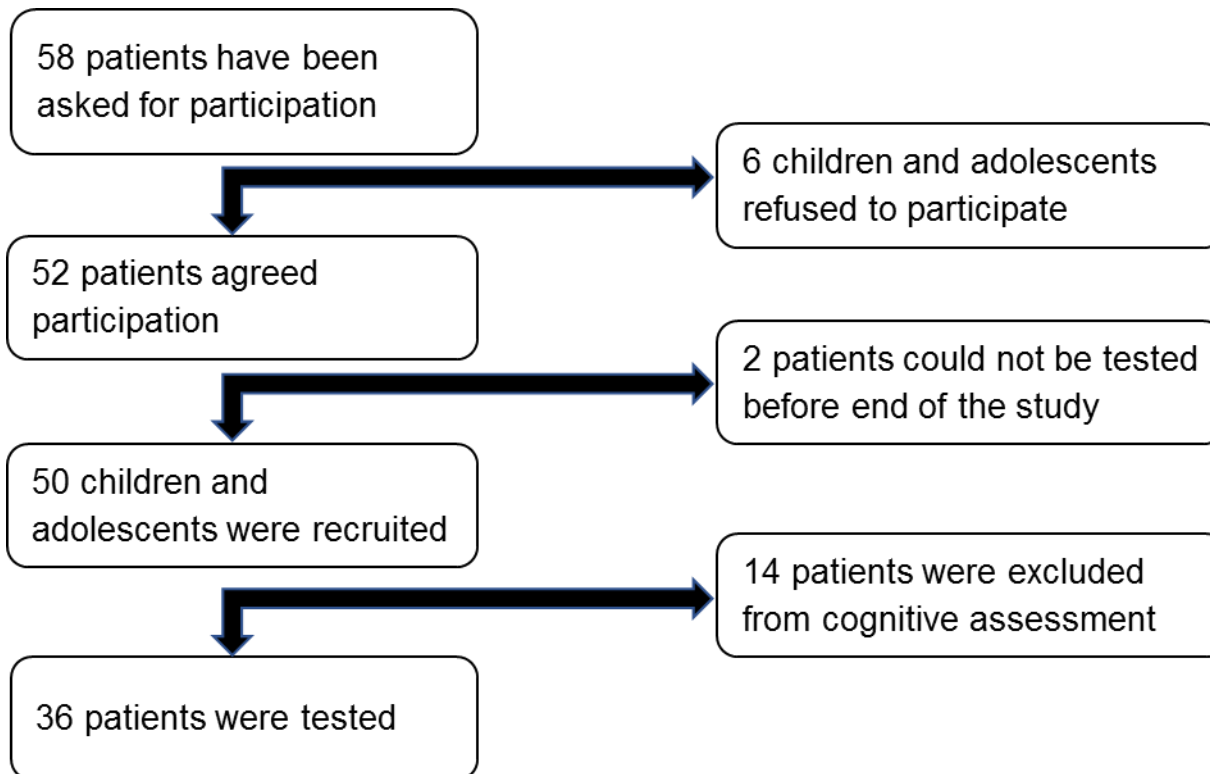
...What about the others?

Most are still on call



Cross-sectional study on EF

Inclusion: patients age 9-18 years with a functioning kidney allograft



Cross-sectional study on EF

- Attention (d2-R)
- working memory (WISC Digit span)
- cognitive flexibility (Wisconsin Card Sorting Test)

-> scores within the normal range but significantly below the normative population by comparison of the means

Correlating factors

- age at commencement of dialysis/ age at transplantation
- duration of dialysis
- time since transplantation
- immunosuppression other than standard of care
- ongoing maintenance steroids
- increasing number of antihypertensive medication

Consequences

Processing speed & working memory as „higher order cognitive functions“ have major influence on learning and may be the underlying reason for what appears as reduced full-scale IQ

Deficits in these functions impair learning as well as the reproduction of the already learnt

This results in a risk for multiple disadvantages in everyday life, especially with regards to schooling and cognitive development but may also have effects on self-efficacy and adherence!

Looking 50 years ahead:

Vision: 3D-organ printing will solve all problems from uremia and dialysis to immunosuppression and vasculopathy



More likely: we at least understand the impact of renal disease on the developing central nervous system and the person as a whole to offer more individualised treatment and care

Thank you for your attention

Any questions?

