UniversitätsKlinikum Heidelberg

Risk Factors and Progression of Cardiovascular Disease in Children with Chronic Kidney Disease (Cardiovascular Comorbidity in Children with Chronic Kidney Disease Study)

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Objective

The **Cardiovascular Comorbidity in Children with CKD (4C) Study** prospectively explores the prevalence, severity and progression of **cardiovascular abnormalities** in children with CKD in 12 European countries.

Methods

Arterial Morphology and function was assessed in **508 children** with CKD stage III-V at baseline and after 1 year of follow-up

Cardiovascular Assessment consisted of

- **Pulse Wave Velocity (PWV)**
- **Intima Media Thickness (IMT)**
- **Left Ventricular Mass index (LVMI)**

Patient Characteristics (n=508)

male (n)	338 (66.5%)
	Mean ± Std
Age (years)	12.2 ± 3.3
eGFR (ml/min/1.73m²)	32.0 ± 10.9
Systolic BP (mmHg)	112.6 ± 15.1
Systolic BP SDS	0.8 ± 1.4
Diastolic BP (mmHg)	69.4 ± 12.5
Diastolic BP SDS	0.7 ± 1.1
S-Albumin (g/l)	38.8 ± 6.4
Albuminuria (mg/g)	1119.3 ± 2351.9
Calcium (mmol/l)	2.2 ± 0.23
Phosphate (mmol/l)	1.54 ± 0.38
iPTH (ng/l)	166.9 ± 166.2
Triglycerides (mg/dl)	146.6 ± 90.4
HDL (mg/dl)	46.7 ± 14.3
LDL (mg/dl)	98.0 ± 39.3
CRP (mg/dl)	4.0 ± 12.5

Results

Predictors of PWV at 1-Year Follow-up

	beta	Partial R2	Model R2	p
Baseline PWV	0.48	0.3	0.3	<0.0001
iPTH	0.0009	0.02	0.32	0.007
Systolic BP SDS	0.13	0.01	0.33	0.03
S-Albumin	-0.02	0.01	0.34	0.04
S-Triglycerides	-0.003	0.01	0.35	0.03

Predictors of cIMT at 1-Year Follow-up

	beta	Partial R2	Model R2	p
Baseline cIMT	0.27	0.126	0.126	<.0001
S-Calcium	-0.58	0.014	0.14	0.04

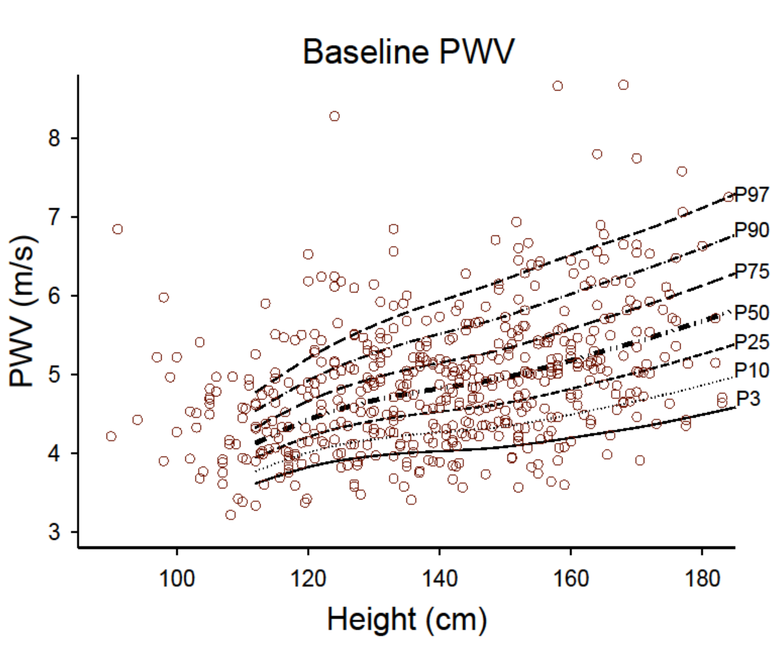
Predictors of LVMI at 1-Year Follow-up

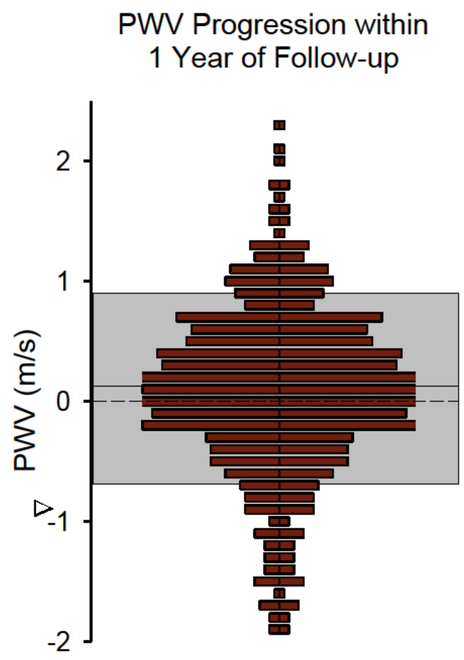
	beta	Partial R2	Model R2	p
Baseline LVMI	0.48	0.47	0.47	<0.0001
CKD Progression	0.0009	0.01	0.48	0.004
Triglycerides	0.13	0.01	0.49	0.02
iPTH	-0.02	0.01	0.50	0.02
CRP	-0.003	0.01	0.51	0.07

Conclusions

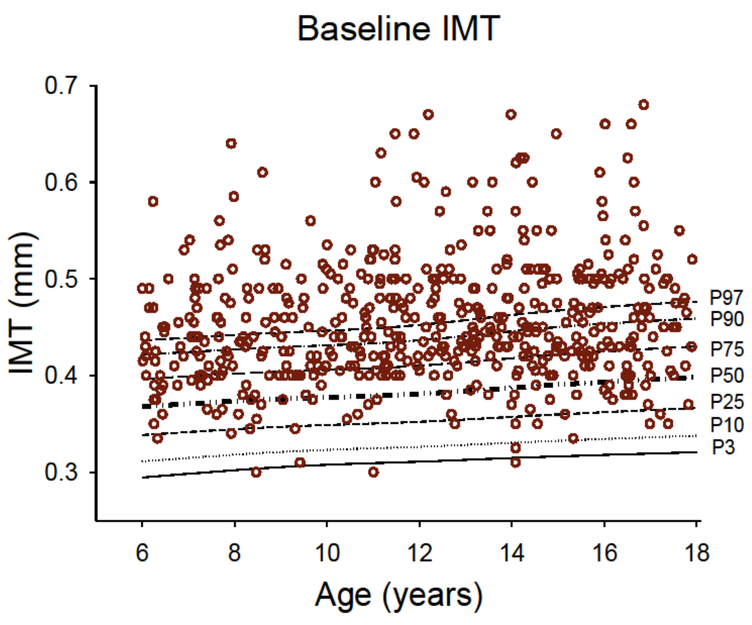
- **Cardiovascular alterations** are frequent and highly pronounced in children with CKD
- Significant **progression of abnormalities** can be detected after one year of follow-up
- Traditional **cardiovascular risk factors** like hyperparathyreoidism, high BP and lipid abnormalities **contribute to the progression rate**

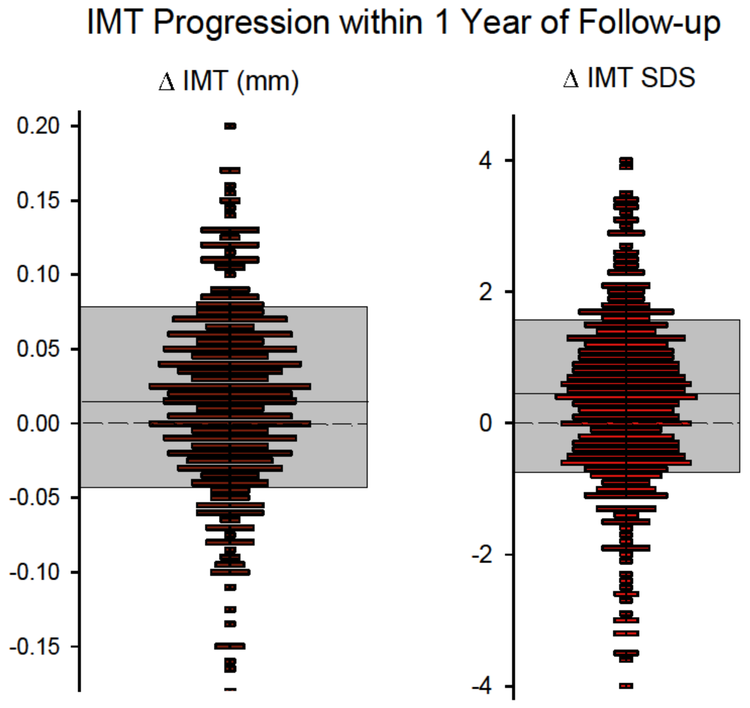
Pulse Wave Velocity (PWV)



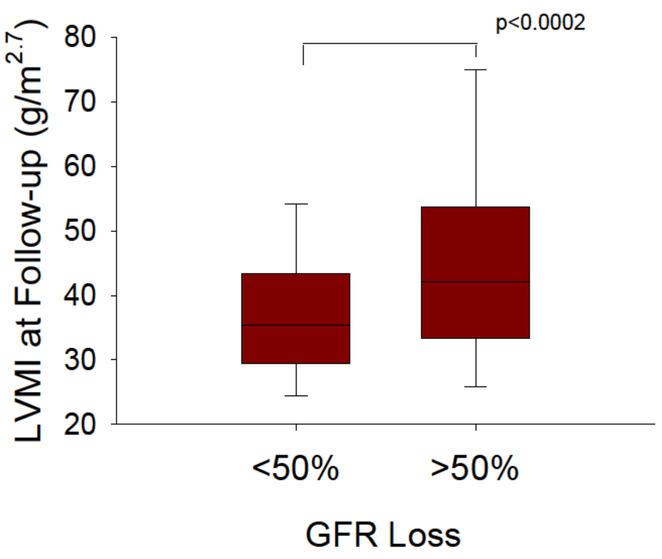


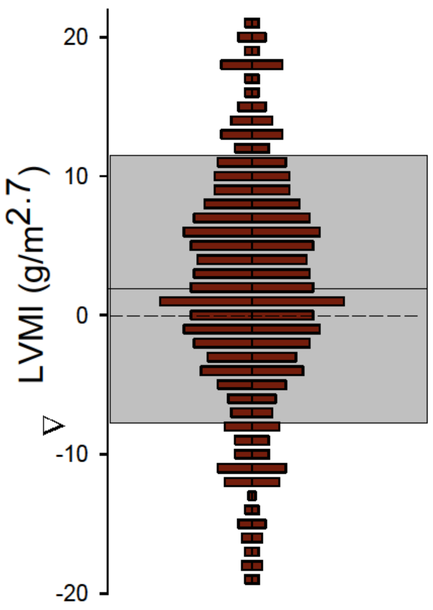
Intima-media Thickness (IMT)





Left Ventricular Mass Index (LVMI)





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