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Can target organ damage develop in normotensive children with or without type 1 diabetes?

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Background and aim of the study

- Recent studies suggest significant cardiovascular problems in youth with T1D

(Kavey R-E W, Circulation 2006;;Maahs D, Circulation 2014)

- Preliminary data suggests that target organ damage (TOD) may occur in children with normal or mildly elevated blood pressure levels even below the 95th percentile

(Urbina EM et al. 2017 , Abstract 17-HBPR-A-376-AHA)

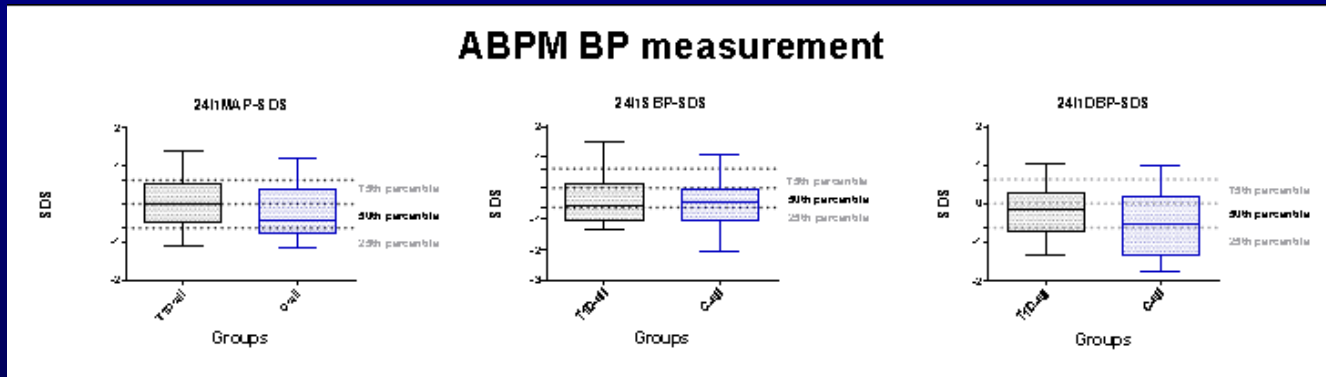
- **The aim of our study** was to analyse TOD in normotensive children with type 1 diabetes (T1D) in comparison to normotensive controls (C).

Patients and methods

- Prospective study
- 25 normotensive T1D children
age = 13.9 ± 2.6 yrs, T1D duration = 5.1 ± 2.9 yrs
- 22 normotensive controls (C) aged 14.0 ± 3.4 yrs
- Normotension = 24h, day- and night- time MAP, SBP and DBP <95th percentile (=1.645 SDS) on ABPM
- Measured TOD markers:
 - carotido-femoral pulse wave velocity (PWV), expressed in SDS
 - left ventricular mass index (LVMI), expressed as LVMI ratio
 - estimated glomerular filtration rate (eGFR)
 - urinary albumin/creatinine ratio (ACR)

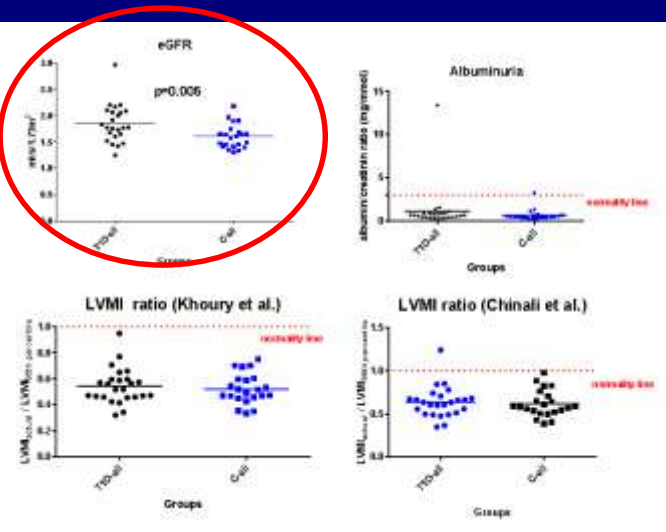
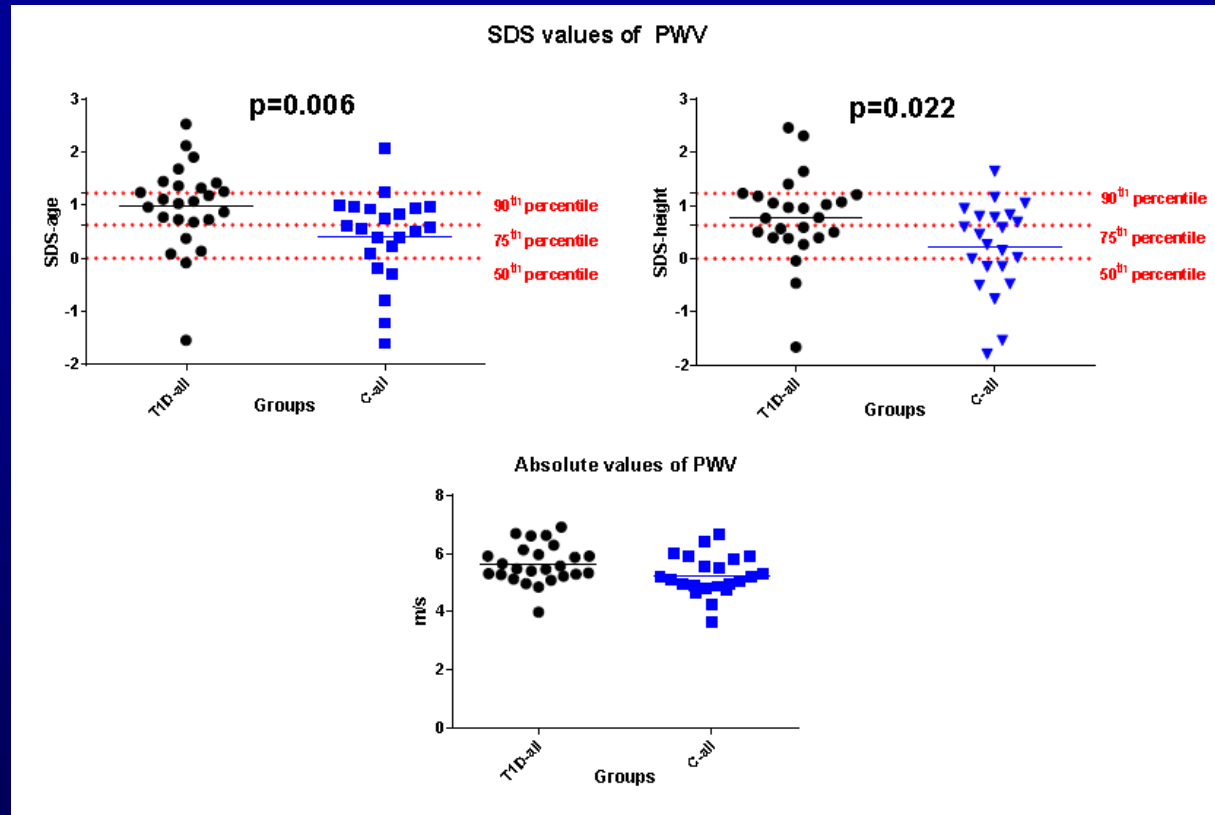
Results 1

	Female/ Male	Age	Height-SDS	Weight- SDS	BMI-SDS	Cholesterol	LDL
T1D	13/12	13.9±2.6	-0.3±0.9	0.3±1.3	0.4(-0.3,1.5)	4.4±0.8	2.6±0.5
C	10/12	14.0±3.4	-0.02±1.3	-0.1±1.0	-0.2(-1.0,0.6)	4.3±0.6	2.7±0.4
P=	NS	NS	NS	NS	NS	NS	NS



	BP status NT/WCH	Dipping status
T1D	13/15	14/16
C	12/7	11/6
P=	NS	NS

Results 2



Reusz GS et al., Hypertension 2010

Maahs D et al., Circulation 2014,
 Khoury PR et al., JAS Echocardiography 2009,
 Chinali M et al., J Pediatr 2015

Conclusion

- Normotensive children with T1D show signs of functional alterations (increased arterial stiffness, increased eGFR) in the absence of structural changes (normal left ventricular mass, no albuminuria).
- This suggests that functional vascular changes develop even at normal blood pressure levels and precede the development of structural TOD.

Results 3

- Multivariate linear regression analysis

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. regress avrgPWV Age weight BSA BMI Diabetes SBP
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Source	SS	df	MS	Number of obs = 47	
Model	9.99676958	6	1.66612826	F(6, 40) =	5.19
Residual	12.8340707	40	.320851769	Prob > F =	0.0005
Total	22.8308403	46	.496322616	R-squared =	0.4379
				Adj R-squared =	0.3535
				Root MSE =	.56644

avrgPWV	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Age	.102115	.0446969	2.28	0.028	.0117791	.1924509
weight	-.0868787	.04981	-1.74	0.089	-.1875484	.013791
BSA	3.085763	1.954697	1.58	0.122	-.8648265	7.036352
BMI	.1534466	.0947292	1.62	0.113	-.0380083	.3449015
Diabetes	.329226	.1781781	1.85	0.072	-.0308853	.6893373
SBP	.0338791	.0162069	2.09	0.043	.0011238	.0666345
_cons	-3.101698	2.879524	-1.08	0.288	-8.921434	2.718038