

Online-Only Supplemental Material to Pulkkinen et al Motivational Interview to Improve Vascular Health in Adolescents with Poorly Controlled Type 1 Diabetes (MIAD): A Randomized Controlled Trial.

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## Description of the historical healthy control group

The historical control group included in this study was obtained from a population of 135 Caucasian non-obese healthy children without disease history or current medication recruited by one of the authors (TS) 2009-2010 from local public schools and a hospital low-risk cardiac assessment clinic (murmur clinic) in Toronto (Canada) after exclusion of cardiovascular disease by clinical examination and echocardiography. None of the study subjects received any medication, admitted smoking, or reported significant health problems or recent infections. Seventeen subjects were potentially exposed to daily parental smoking, and 8 subjects had a first-generation family history of diabetes mellitus, lipid disorder, or systemic hypertension requiring medication. The historical control group for this manuscript (N=40) was handpicked from this Toronto database to generate a comparable group matched for age and body surface area of healthy controls. Body surface area is a known strong predictor of cardiovascular dimensions. Z-scores were not used for vascular health data in this manuscript.

## Ultrasound methods

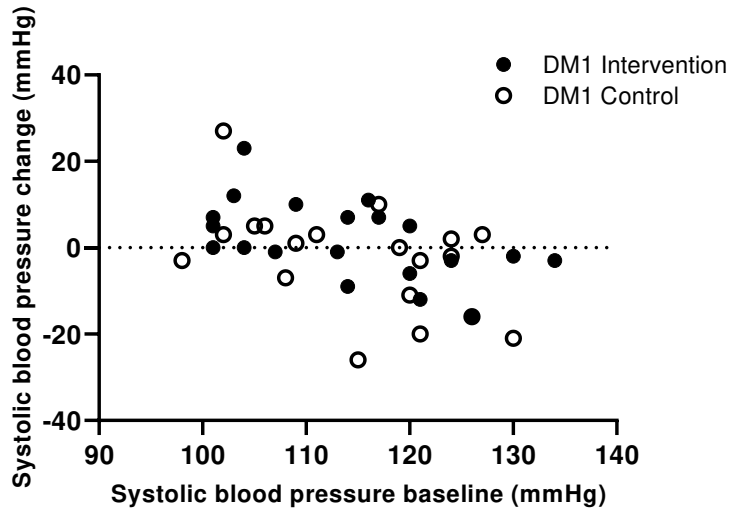
Very-high resolution ultrasound images were obtained (TS) with Vevo 770 and, due to breakdown of the equipment beyond repair, with Vevo MD (VisualSonics, Toronto, Canada) for the last 10 baseline assessments and for all but 3 follow-up assessments. The Vevo 770 was equipped with mechanical RMV-710B, RMV-712, and RMV-708 transducers with center frequencies 25, 35 and 55MHz, respectively. The Vevo MD was equipped with electronic UHF22, UHF48 and UHF70 transducers, with 15, 30 and 50MHz center frequencies, respectively. Measurements were obtained as described (23). Measurement obtained with the two ultrasound systems are equivalent due to similar ultrasound frequencies. Images were acquired bilaterally from common carotid and femoral arteries, from right brachial artery, and right radial artery. Images were analyzed as previously described (23). The average of right and left sided measurements were used in analyses. Intra-observer coefficients of variations (CV) ranged 1.2-2.9% for lumen diameter (LD), 6.9-9.1% for intima-media thickness (IMT), 3.4-4.8% for intima-media-adventitia thickness (IMAT) and 7.6-12.5% for adventitial thickness (AT) and inter-observer CV ranged 1.5-4.6% for LD, 6.0-8.2% for IMT, 3.5-5.7% for IMAT and 5.9-12.4% for AT for the different arteries (N=10).

Carotid artery beta-stiffness index (CBSI) and carotid artery distensibility coefficient (CDC) were calculated using the formulas  $CDC=1000 \times ((CCALAS-CCALAD) \div CCALAD) / (BPS-BPD)$  and  $CBSI = \ln(BPS/BPD) / ((CCALDS-CCALDD) / CCALDD)$ , where CCALAS and CCALAD is common carotid artery lumen area in systole and diastole respectively, CCALDS and CCALDD is common

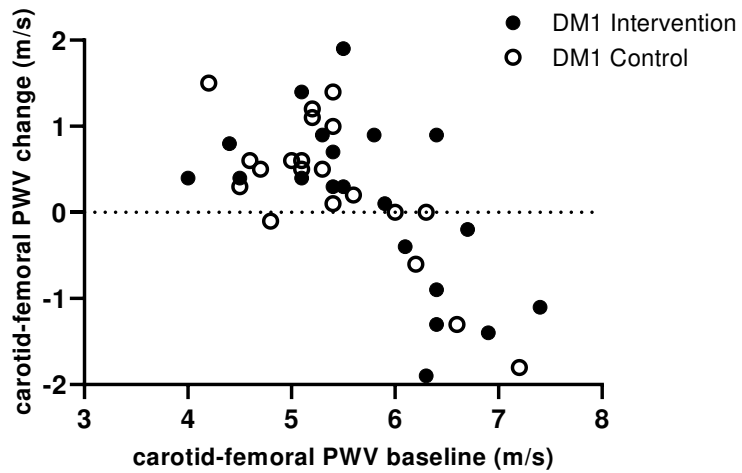
carotid artery lumen diameter in systole and diastole respectively, and BPS and BPD is systolic and diastolic BP. Intra-observer CV was 5.4% for CDC and 5.9% for CBSI, and inter-observer CV was 11.9% for CDC and 12.8% for CBSI (N=10).

Historical controls were assessed by TS with the Vevo 770 system using identical imaging protocols including transducers, anatomical locations, cardiac cycle, and offline measurement criteria.

Supplemental Figure 1. Systolic blood pressure change negatively associated with baseline



Supplemental Figure 2. Central (carotid-femoral) arterial stiffness change negatively associated with baseline.



Supplemental Table 1. Univariate Pearson correlations between background and vascular health variables at baseline.

Variable	Male Sex	Age	CLBM	BMI z-score	CBF%	WH-ratio	Systolic BP z-score
Carotid-femoral PWV	-0.20 (0.26)	0.106	0.190	0.162	0.144	-0.169	0.367**
Carotid-radial PWV	-0.40 (0.28)	0.030	-0.012	0.007	0.081	-0.214	0.176
Carotid IMT	0.020 (0.012)	-0.001	0.144	0.015	-0.107	0.097	0.351**
Carotid compliance	-0.028 (0.173)	0.024	-0.266	-0.208	-0.138	-0.355	-0.604**
Carotid stiffness	0.21 (0.22)	-0.062	0.208	0.172	0.067	0.280	0.264*
Femoral IMT	-0.015 (0.013)	0.383**	0.015	-0.022	0.025	-0.075	0.120
Femoral IMAT	-0.045 (0.021)	0.335**	-0.009	0.012	0.139	-0.079	0.117
Radial IMT	0.016 (0.005)	0.118	0.446**	0.102	-0.243	0.085*	0.208*
Radial IMAT	0.019 (0.007)	0.022	0.361**	0.141	-0.160	-0.127	0.174
Brachial IMT	0.008 (0.005)	0.282*	0.314**	-0.019	-0.219	-0.145	0.208
Brachial IMAT	0.010 (0.010)	0.164	0.224*	-0.054	-0.185	-0.174	0.198

Mean difference (SE) is reported for male sex in comparison with females. \* and \*\* denotes p-values <0.05 and <0.01, respectively. BP, blood pressure; CLBM, calculated lean body mass, CBF%, calculated body fat percentage (weight-LBM)/Weight; IMT, intima-media thickness; IMAT, intima-media-adventitia thickness; PWV, pulse wave velocity; WH-ratio, waist to height –ratio (available for Type 1 diabetes patients only).

Supplemental Table 2. Bivariate Pearson correlations between variables of glycemic control and vascular health at baseline.

Variable	T1D Duration	HbA1c	15-AG	Glucose Mean	Glucose SD	Glucose CV	Glucose TIR
Carotid-femoral PWV	0.373* (P=0.018)	0.069	-0.129	-0.037	0.209	0.262	0.034
Carotid-radial PWV	0.240	0.092	-0.218	-0.057	0.192	0.223	-0.118
Systolic BP z-score	-0.199	0.261	-0.062	0.106	0.323	0.264	-0.121
Diastolic BP z-score	-0.307	0.255	-0.298	0.118	0.188	0.056	-0.127
Pulse pressure	0.028	0.107	0.152	0.043	0.202	0.229	-0.059
Carotid IMT	-0.014	0.198	-0.139	-0.025	0.440* (P=0.017)	0.409* (P=0.028)	-0.131
Carotid compliance	0.176	-0.203	-0.118	-0.028	0.089	0.044	0.289
Carotid stiffness	-0.089	0.140	0.265	0.064	-0.173	-0.151	-0.306
Femoral IMT	-0.051	0.089	-0.234	0.401* (P=0.035)	0.377* (P=0.048)	0.079	-0.155
Femoral IMAT	-0.187	-0.041	-0.267	0.182	0.292	0.151	0.005
Radial IMT	0.430** (P=0.007)	0.064	0.164	-0.123	-0.151	-0.057	0.040
Radial IMAT	0.412* (P=0.010)	-0.010	0.217	-0.109	0.082	0.004	0.115
Brachial IMT	0.111	0.118	-0.046	0.162	0.387* (P=0.038)	0.305	0.021
Brachial IMAT	0.093	-0.046	0.007	0.036	0.315	0.322	0.039

15-AG, 15-Anhydroglucitol; IMT, intima-media thickness; IMAT, intima-media-adventitia thickness; Continuous glucose monitoring (CGM) data available for 29 T1D patients (18 T1D control and 11 T1D intervention) at baseline, Glucose Mean is CGM mean glucose, Glucose SD is standard deviation of glucose variability, Glucose CV is coefficient of variation (SD/mean), and Glucose TIR (time-in-range) is proportion of time glucose between 3.9 and 10.0 mmol/l during continuous glucose monitoring. BP, blood pressure; PWV, pulse wave velocity; T1D Duration, duration of Type 1 diabetes (T1D). \* and \*\* denotes p-values <0.05 and <0.01, respectively.

Supplemental Table 3. Bivariate correlations between blood lipids, markers of inflammation and vascular health at baseline.

Variable	Total cholesterol	LDL cholesterol	HDL cholesterol	Triglycerides	hs-CRP
Carotid-femoral PWV	-0.107	-0.116	-0.021	0.162	-0.306 (p=0.055)
Carotid-radial PWV	0.111	0.165	-0.138	0.132	-0.209
Systolic BP z-score	0.076	0.038	-0.131	0.133	0.381* (p=0.015)
Diastolic BP z-score	0.247	0.208	-0.142	0.208	0.094
Pulse pressure	-0.180	-0.176	-0.112	-0.027	0.279 (p=0.081)
Carotid IMT	0.079	0.020	-0.048	0.137	0.228
Carotid compliance	0.024	-0.031	0.188	-0.157	-0.106
Carotid stiffness	-0.064	0.003	-0.140	0.171	0.051
Femoral IMT	0.238	0.140	-0.029	0.082	0.072
Femoral IMAT	0.278	0.125	0.190	0.033	0.139
Radial IMT	-0.350* (p=0.029)	-0.339* (p=0.035)	-0.094	-0.120	-0.132
Radial IMAT	-0.379* (p=0.017)	-0.374* (p=0.019)	-0.064	-0.099	-0.035
Brachial IMT	-0.047	-0.048	-0.173	0.130	-0.071
Brachial IMAT	-0.125	-0.183	0.028	-0.084	-0.137

PWV, pulse wave velocity; IMT, intima-media thickness; IMAT, intima-media-adventitia thickness; BP, blood pressure. Pearson correlations are reported for cholesterol and Spearman correlations for triglycerides and high-sensitive C-reactive protein (hs-CRP). \* and \*\* denotes p-values <0.05 and <0.01, respectively.