ARTERIAL STIFFNESS IS ASSOCIATED WITH CORONARY ATHEROSCLEROSIS IN ASYMPTOMATIC PATIENTS WITH TYPE 2 DIABETES AND AGE AND SEX-MATCHED CONTROLS: A LONGITUDINAL STUDY

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INTRODUCTION

Arterial stiffness is a strong predictor of cardiovascular disease in patients with type 2 diabetes and persons without diabetes. The pathophysiological mechanisms behind this observation is, however, undetermined.

AIM

To investigate the association between baseline arterial stiffness and plaque volumes after 5 years follow-up in asymptomatic patients with type 2 diabetes and healthy controls

METHODS

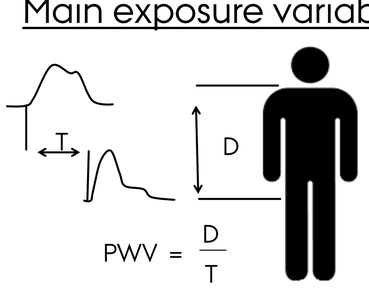
Inclusion criteria

- Age > 18 years
- Patients: diagnosis of type 2 diabetes within 5 years of inclusion
- Healthy persons: Type 2 diabetes excluded by oral glucose tolerance test

Exclusion criteria

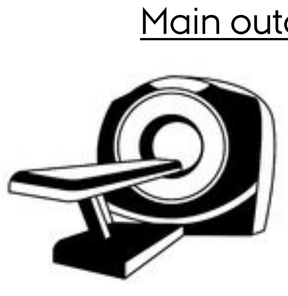
- Acute or chronic infectious disease
- End stage renal failure
- Prior or current cancer
- Contraindications to MRI (other purposes)

Main exposure variable

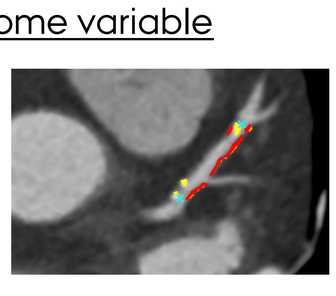


Arterial stiffness
Applanation tonometry, SphygmoCor® (carotid-femoral pulse wave velocity, PWV)

Main outcome variable



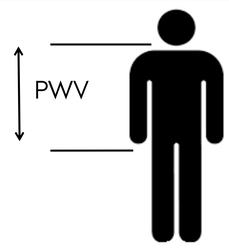
Coronary CT angiography



- Total plaque volume
- Calcified plaque volume
- Non-calcified plaque volume
- Low-density non-calcified plaque volume (lipid content)

Participant flow

100 patients with type 2 diabetes
100 age- and sex-matched controls → Baseline visit 2009-2011



Dropout
37 patients
28 controls

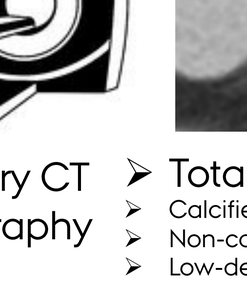
History of CAD
7 patients
1 controls

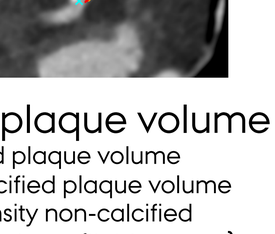
Not eligible for coronary CTA
8 patients
7 controls

Poor image quality
3 patients
3 controls

Missing baseline PWV
2 patients
6 controls

63 patients
72 controls → Follow-up visit 2014-16





Coronary CT angiography

Complete data
43 patients
55 controls

Study program

RESULTS

Participant characteristics		Diabetes (n=43)	Controls n=(55)	p-value
Male n (%)		21 (48)	25 (45)	0.84
Age years (%)	Follow-up	64.7±9.5	62.5±9.7	0.26
Diabetes duration (years)	Follow-up	7.8±1.5	-	-
Follow-up (years)		5.5±0.4	5.3±0.3	<0.01
BMI (kg/m2)	Baseline	28.6±4.4	25.7±3.1	<0.01
	Follow-up	28.3±3.9	26.3±3.4	<0.01
HbA1c (mmol/mol)	Baseline	48±8	38±3	<0.01
	Follow-up	51±10	38±4	<0.01
LDL (mmol/l)	Baseline	2.2±0.7	3.4±1.0	<0.01
	Follow-up	2.0±0.9	3.1±1.0	<0.01
24 h systolic blood pressure (mmHg)	Baseline	126±11	124±11	0.24
	Follow-up	122±12	124±13	0.55
Urin albumine creatinine ratio (mg/g) *	Baseline	0 (0-1)	0 (0-1)	0.09
	Follow-up	4 (0-9)	1 (0-3)	0.02
Antidiabetic medicine (oral and GLP-1-analogs) n(%)	Baseline	28 (64)	0 (0)	<0.01
	Follow-up	35 (81)	1 (2)	<0.01
Insulin n(%)	Baseline	5 (12)	0 (0)	0.01
	Follow-up	9 (21)	0 (0)	<0.01
Antihypertensiva n(%)	Baseline	25 (58)	12 (22)	<0.01
	Follow-up	29 (67)	16 (30)	<0.01
Statin n(%)	Baseline	32 (74)	8 (15)	<0.01
	Follow-up	36 (84)	11 (20)	<0.01
Aspirin n(%)	Baseline	27 (63)	1 (2)	<0.01
	Follow-up	33 (77)	10 (18)	<0.01
Current or former smoker n(%)	Baseline	24 (56)	29 (53)	0.84
	Follow-up	25 (58)	29 (53)	0.68
PWV (m/s)	Baseline	9.1±2.2	7.8±1.4	<0.01
	Follow-up	9.3±2.3	8.5±1.8	0.06

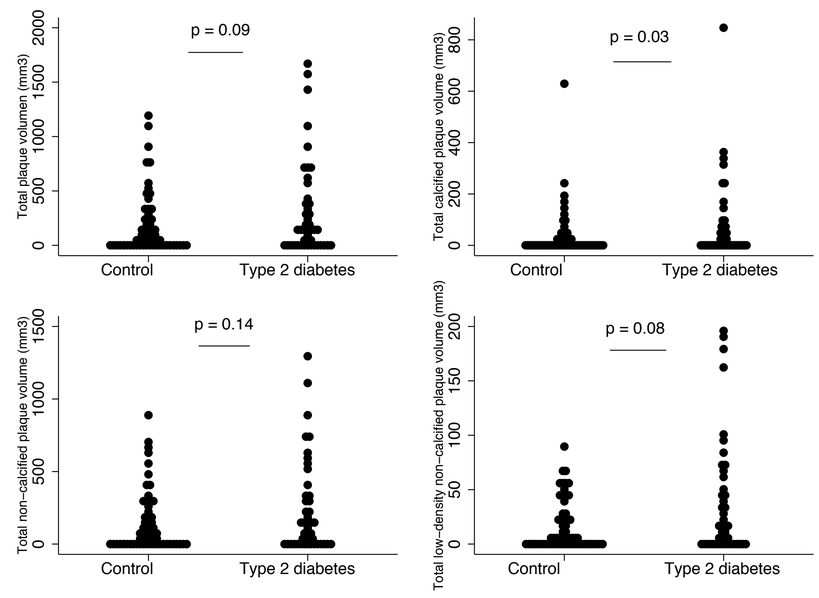


Figure 1:
Plaque volumes in patients with type 2 diabetes and controls.

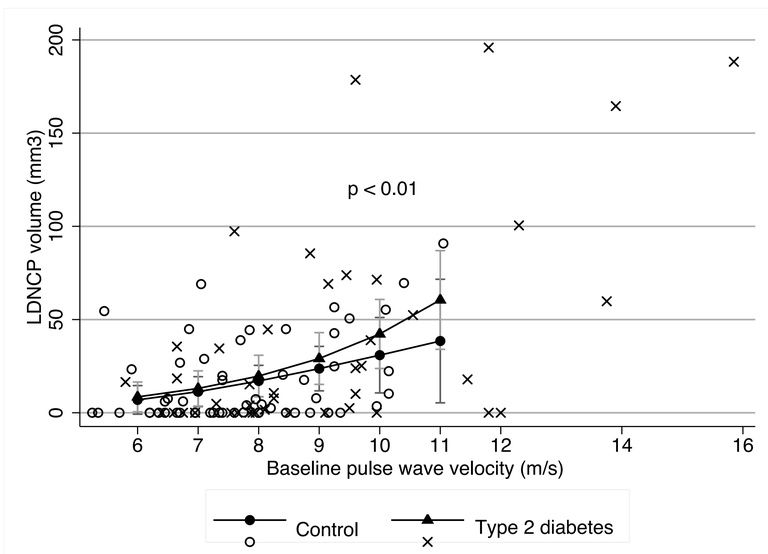


Figure 2:
Crude marginplot of the association between baseline PWV and low-density non-calcified plaque volume 5 years later.
Stratification by diabetes statues and scatter of actual values interpolated.

The association between PWV and low-density non-calcified plaque volume remained statistically **significant** after adjustment for age, sex and diabetes (p=0.03)

CONCLUSION

PWV is strongly associated with volumes of low-density non-calcified plaques, a lipid-rich and high-risk component of coronary plaques.

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