Endothelial function is impaired in women who had pre-eclampsia

Christian Delles, Catriona E Brown, Joanne Flynn, David M Carty

Institute of Cardiovascular and Medical Sciences
University of Glasgow
United Kingdom

Pre-eclampsia

Hypertension
Proteinuria
> 20 weeks gestation
Without pre-existing hypertension

Maternal

- Oedema
- Headaches / blurred vision / seizures
- Renal Failure
- Coagulation problems
- HELLP syndrome

Foetal

- Intra-uterine growth restriction
- Preterm delivery
- Death

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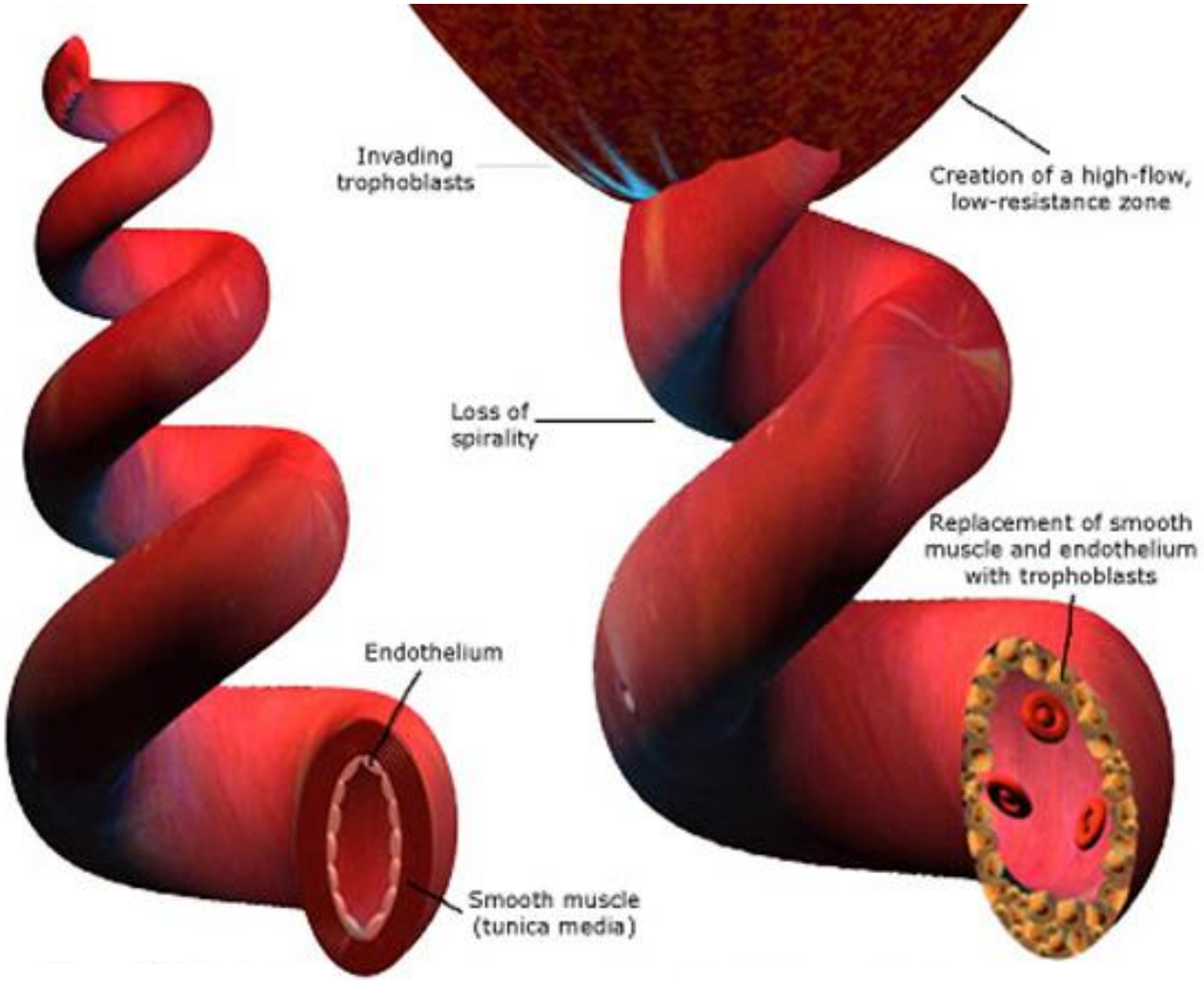
Pre-eclampsia



Unmodified artery **Trophoblast-modified artery**

The process of spiral artery remodelling following implantation

http://www.rcdrg.sgul.ac.uk/research/trophoblasts

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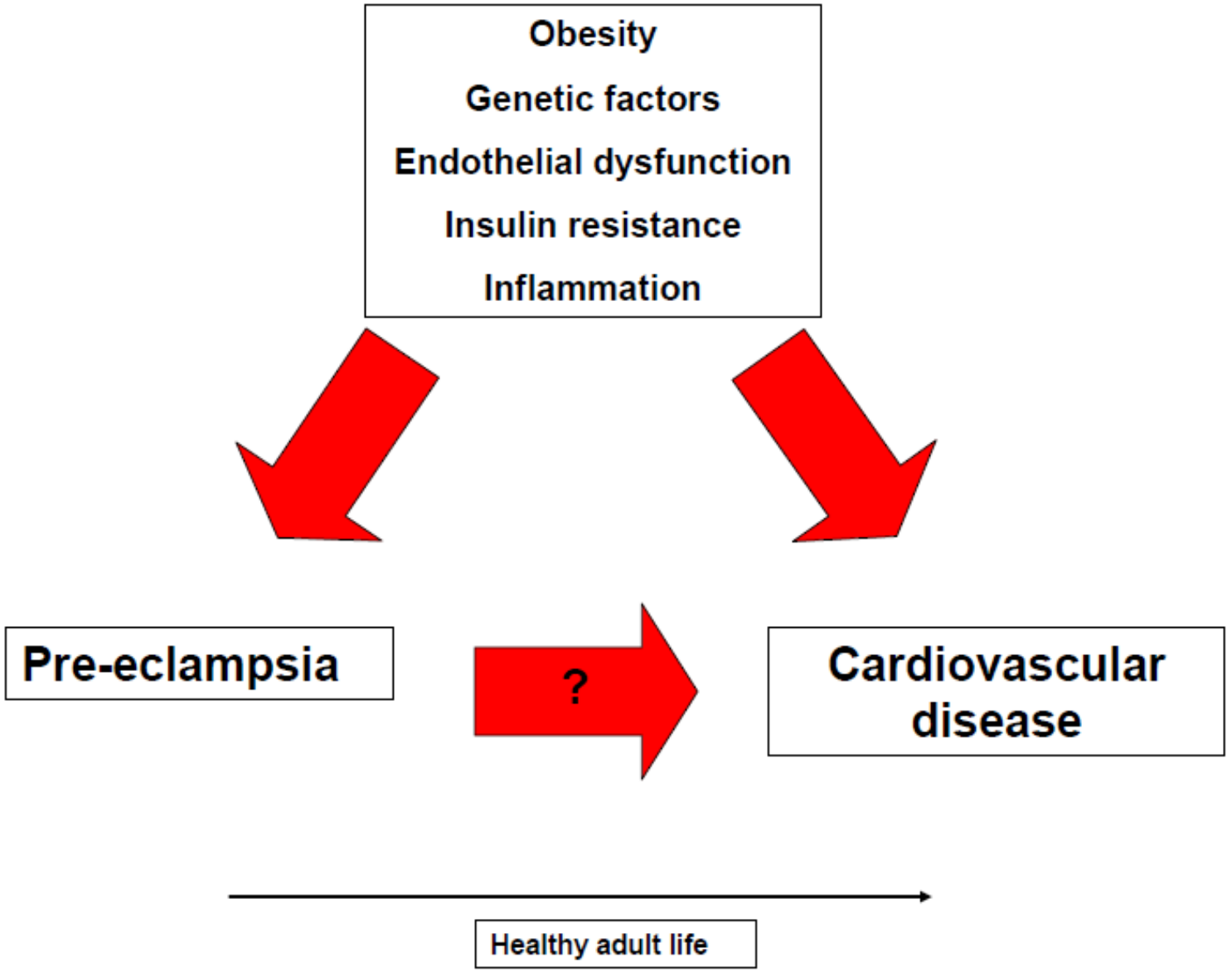
LONG-TERM EFFECT OF PRE-ECLAMPSIA ON BLOOD-PRESSURE

ELEANOR M. ADAMS
M.A. Cantab., M.D. Aberd., D.Obst.
MEDICAL RESEARCH COUNCIL RESEARCH OFFICER *

IAN MACGILLIVRAY
M.D. Glasg., F.R.C.O.G.
SENIOR LECTURER,
DEPARTMENT OF MIDWIFERY, UNIVERSITY OF ABERDEEN †

THOUGH much has been written on the subject, the later effects of pre-eclampsia are still uncertain. Difficulties arise because definitions and concepts are variable and often vague. Is pre-eclampsia the first expression of an underlying hypertensive tendency; or is it a cause of hypertension in middle age? Though pre-eclampsia and hypertension may overlap, should they perhaps be regarded as separate conditions, different in ætiology and prognosis? If so, how are they to be distinguished?

Pre-eclampsia and Cardiovascular Risk



Carty DM et al. J Hypertens 2010

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Aim

To study the mechanisms of the relationship between pre-eclampsia and cardiovascular risk

Here: to examine cardiovascular phenotypes and markers of subclinical cardiovascular organ damage in women with a history of pre-eclampsia and matched controls

Study Design

Cardiovascular Consequences of Pre-eclampsia Study (COPS)

Generation Scotland

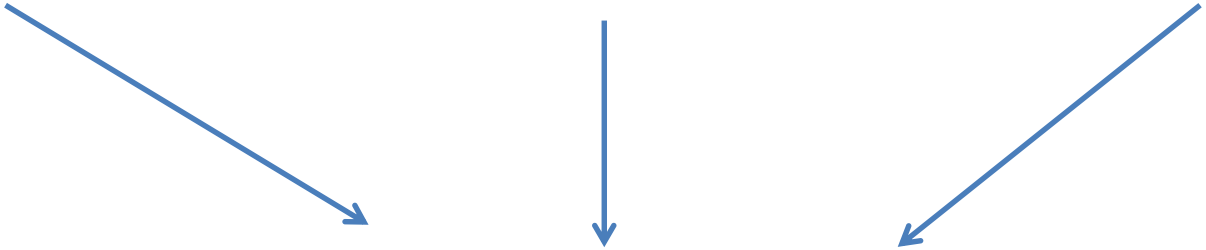
Women with history of preeclampsia 10-30 yrs ago
&
Women with history of normotensive pregnancy 10-30 yrs ago

PIP Study

Women with history of preeclampsia 3-5 yrs ago
&
Women with history of normotensive pregnancy 3-5 yrs ago

BP Clinics

Women with history of preeclampsia 1-30 yrs ago
&
Women with history of normotensive pregnancy 1-30 yrs ago

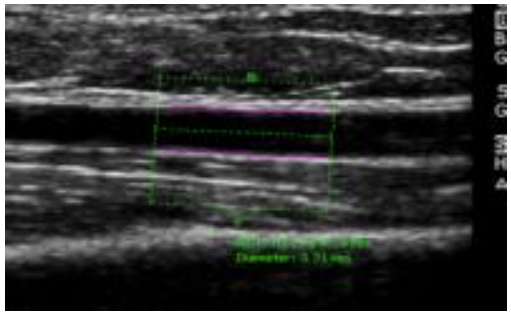


Vascular function studies

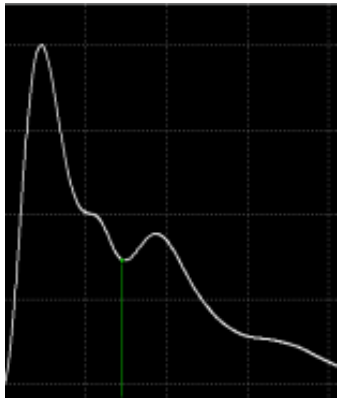
Blood and urine for biomarker studies

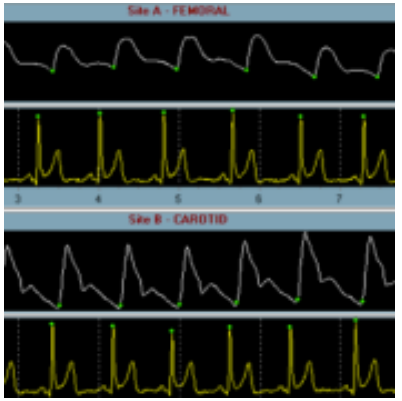
COPS - Vascular Studies

Endothelial function (ultrasound)
Flow-mediated dilatation

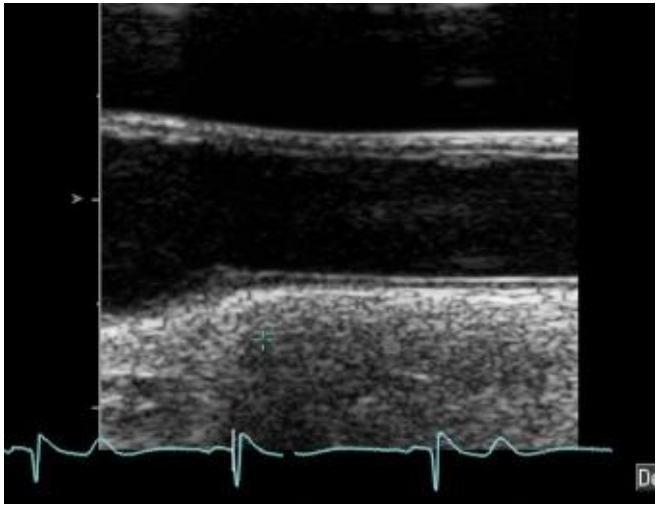


Vascular stiffness (SphygmoCor)
Pulse wave analysis
Pulse wave velocity





Early atherosclerosis (ultrasound)
Carotid intima-media thickness



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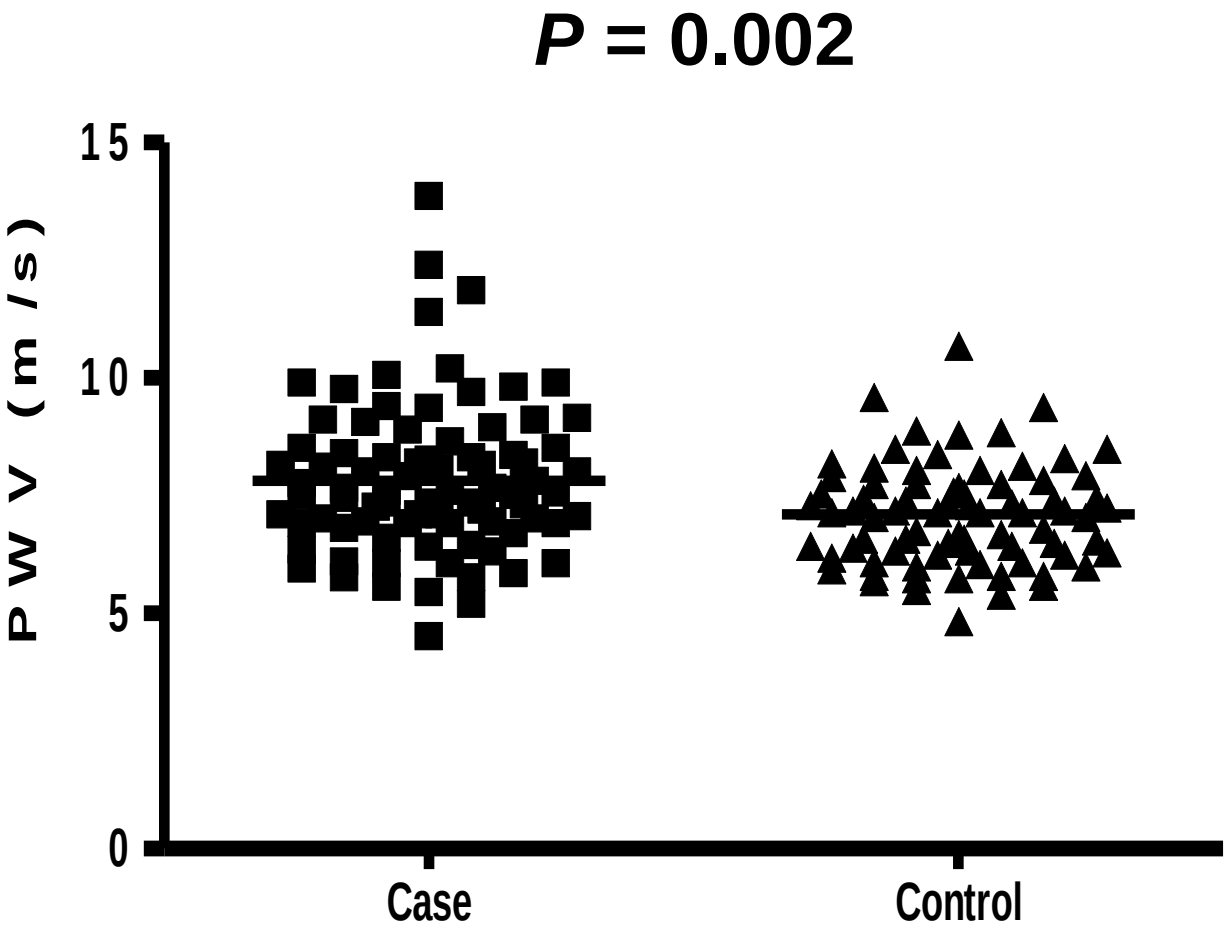
Clinical Characteristics

	Cases N = 86	Controls N= 80	P-value
Age (yrs)	47.6 ± 10.1	48.8 ± 8.5	0.601
Height (cm)	159.6 ± 18.5	162.7 ± 6.7	0.193
Weight (kg)	76.4 ± 15.0	70.1 ± 11.2	**0.004**
BMI (kg/m^2)	29.4 ± 6.1	26.6 ± 4.5	**0.002**
Heart rate (bpm)	73 ± 10	70 ± 9	0.175
Sitting SBP (mmHg)	130 ± 14	122 ± 10	**<0.001**
Sitting DBP (mmHg)	82 ± 9	78 ± 7	**0.001**
Lying SBP (mmHg)	126 ± 15	118 ± 10	**<0.001**
Lying DBP (mmHg)	77 ± 9	74 ± 7	**0.010**
Chol (mmol/L)	5.3 ± 1.0	5.4 ± 1.0	0.538
HDL (mmol/L)	1.5 ± 0.3	1.5 ± 0.3	0.737
Chol/HDL ratio	3.8 ± 1.1	3.7 ± 1.0	0.833
Trig (mmol/L)	1.4 ± 0.7	1.4 ± 0.7	0.941

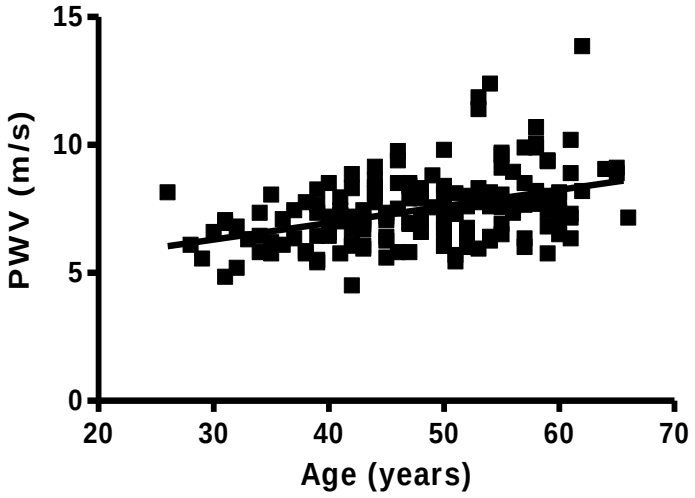
BMI, body mass index; SBP, systolic blood pressure; DBP, diastolic blood pressure; HDL, high density lipoprotein.

Results: Pulse Wave Velocity

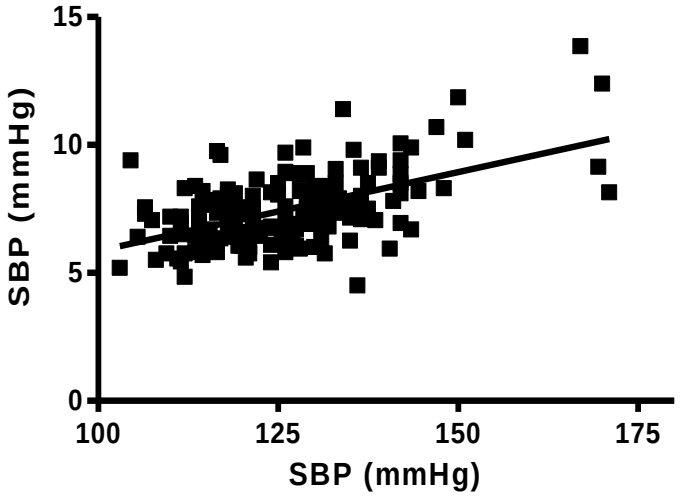


Results: Pulse Wave Velocity

Age vs PWV



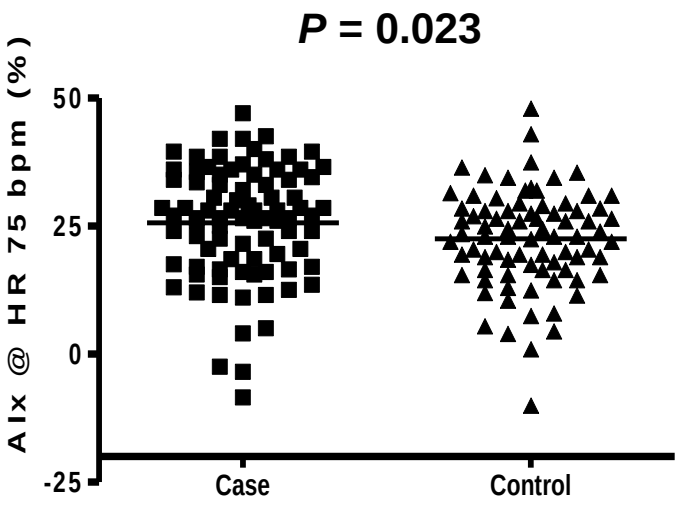
SBP vs PWV



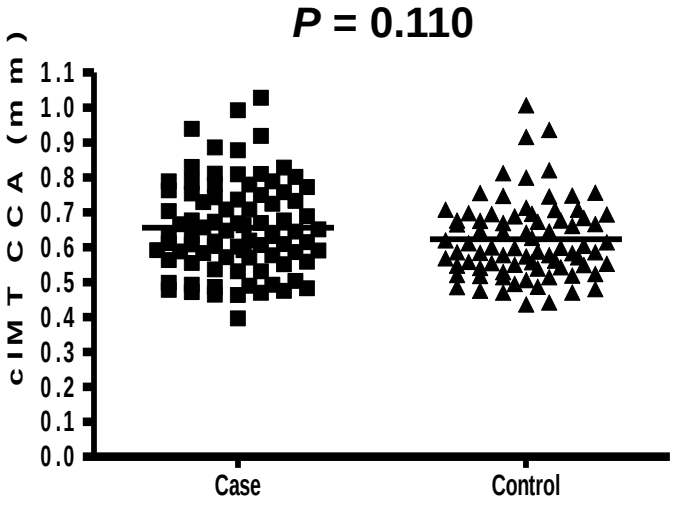
After adjustment for SBP there was no significant difference in pulse wave velocity between cases and controls.

Results: AIx and cIMT

Augmentation Index



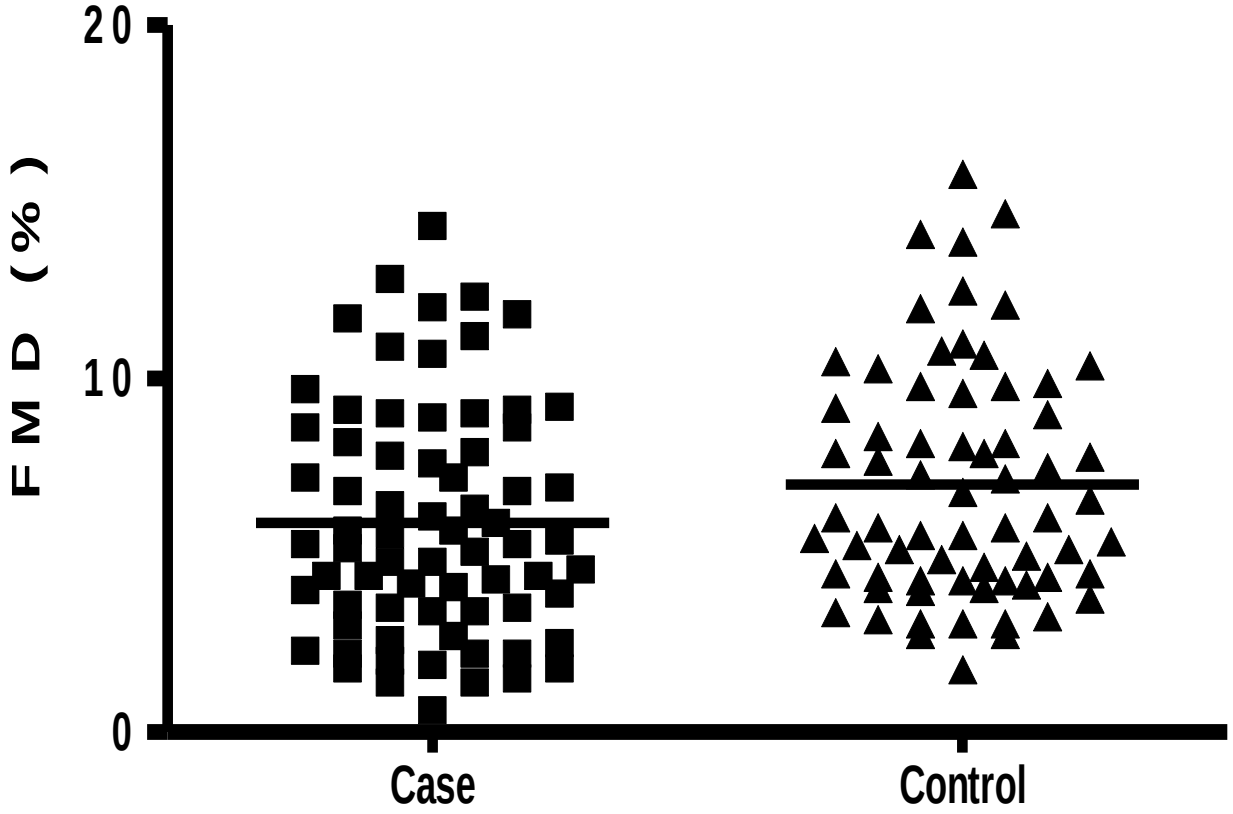
Common Carotid IMT



There were no statistically significant differences in aortic augmentation index and carotid intima-media thickness between cases and controls after adjustment for SBP.

Results: Flow Mediated Dilatation

$P = 0.043$



The difference in FMD between cases and controls remained statistically significant ($P = 0.030$) after adjustment for SBP.

Vascular Data: Summary

	Cases N = 86	Controls N= 80	P-value*
FMD (%)	5.9 ± 3.3	7.0 ± 3.3	**0.030**
AIx@HR75 (PWA) (%)	25.7 ± 11.0	22.5 ± 9.6	n.s.
PWV (m/s)	7.8 ± 1.6	7.1 ± 1.1	n.s.
cIMT CCA (mm)	0.655 ± 0.132	0.622 ± 0.112	n.s.
cIMT bulb (mm)	0.676 ± 0.148	0.679 ± 0.146	n.s.
cIMT ICA (mm)	0.552 ± 0.125	0.553 ± 0.135	n.s.

AIx, augmentation index; PWA, pulse wave analysis; AIx@HR75, augmentation index adjusted to a heart rate of 75 bpm; PWV, pulse wave velocity; cIMT, carotid intima-media thickness; CCA, common carotid artery; ICA, internal carotid artery.

*** Adjusted for SBP**

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Summary

- Women who had pre-eclampsia have higher blood pressure and BMI compared to women at similar age who had normotensive pregnancies.

- Women with a history of pre-eclampsia have impaired vascular endothelial function.

- In our study we found no differences between cases and controls in markers of more advanced vascular damage between cases and controls.

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Limitations

- Cohort of women with no major health problems
- These women were younger than women in previous studies
- No end-stage renal disease or death
- Our study focussed on vascular phenotypes and did not look into cardiac or cerebral phenotypes