CIRCULATION

Vascular hypertrophy demonstrated in type 2 diabetes

Readability	✓✓✓
Applicability to practice	✓✓
WOW! factor	✓✓✓✓✓

1 The aim of this study was to examine vascular morphology and function in patients with type 2 diabetes.

2 Venous blood samples were taken for testing from 22 patients with type 2 diabetes, 22 patients with type 2 diabetes and hypertension, 22 patients with hypertension but no diabetes and 18 healthy control subjects. Small arteries were dissected from a gluteal fat biopsy from each subject.

3 Artery wall thickness and lumen diameter were recorded and then vessels were subjected to pressure myography to measure vascular morphology, mechanics and myogenic responsiveness.

4 Vessels from hypertensive patients without diabetes showed eutrophic inward remodelling and an increased distensibility.

5 Vessels from subjects with type 2 diabetes showed hypertrophy, a further increase in distensibility and a highly significant loss of myogenic responsiveness.

6 Vasoconstrictor function to norepinephrine was normal in all patients, while endothelium-dependent dilation was abnormal in subjects with type 2 diabetes.

7 Vascular hypertrophy was shown to be present in the small arteries from patients with type 2 diabetes. This may be due to impaired myogenic responsiveness.

Schofield I, Malik R, Izzard A et al (2002) Vascular structural and functional changes in type 2 diabetes mellitus. *Circulation* 106: 3037–43

Pressure myography study of small arteries

Mark Kearney, Cardiologist, Kings College Hospital, London

The paper by Schofield et al explores the structural and functional features of small arteries of people with type 2 diabetes with and without hypertension and of hypertensive patients without diabetes.

Small arteries determine blood pressure and organ perfusion and are central to some of the patho-physiological features of type 2 diabetes and hypertension. It is a very impressive achievement to study in such detail small artery function in more than 80 middle-aged subjects.

The study used pressure myography to study vessel function in vitro. This enables the effect of changes in pressure on vessel function i.e. myogenic responsiveness, to be assessed. Abnormalities of myogenic responsiveness or the constrictor response of small arteries when exposed to changes in pressure give an indication of vascular autoregulatory function.

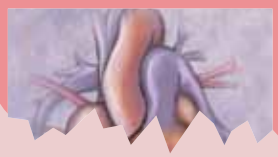
Blood pressure was similar in hypertensive patients with and without diabetes. Small arteries from subjects with diabetes had a significantly greater wall-to-lumen ratio and an increased medial cross-sectional area, indicative of an exaggerated or abnormal growth response.

In type 2 diabetes patients the myogenic response was severely impaired, suggesting that diabetes leads to an inability of small vessels to respond to abnormal increases in perfusion pressure. This may act as a signal for the abnormal vascular growth seen in the vessels of patients with type 2 diabetes and could precede the morphological changes demonstrated.

There was no difference between groups in the constrictor response to norepinephrine or vasorelaxant response to endothelial-independent vasodilator. The vasorelaxant response to an endothelial-dependent vasodilator, acetylcholine, was blunted in patients with type 2 diabetes, demonstrating small artery endothelial cell dysfunction in this group. Total cholesterol was closely related to endothelial function, but was thought not to account for all of the variability in endothelial function.

This excellent study reports some key findings regarding the additional effect of type 2 diabetes on changes in small artery structure and function compared with healthy subjects and essential hypertensive subjects. These abnormalities in vivo may have important effects on vascular regulation in type 2 diabetes. The authors conclude that patients with type 2 diabetes have vessel wall hypertrophy, endothelial dysfunction and substantial blunting of myogenic reactivity. In concert, these abnormalities may allow unchecked high-pressure blood flow to target organs including the kidney and eye, so contributing to end-organ damage. Small vessel function should be a target for therapeutic intervention. These data support the need for further research into the determinants of small vessel structure and function in type 2 diabetes.

CIRCULATION



Left ventricular hypertrophy greater in women

Readability	✓✓✓
Applicability to practice	✓✓
WOW! factor	✓✓

1 Previous studies of the role of insulin resistance in the pathogenesis of left ventricular (LV) hypertrophy have yielded inconsistent results.

2 This study examined the association between glucose tolerance status and insulin resistance in subjects without diabetes, and its relation to LV hypertrophy.

3 Subjects (n=2623) were from the Framingham Study. Of these, 1514 were women. All were free of myocardial infarction and heart failure.

4 LV mass increased with worsening glucose tolerance and was more evident in women ($P<0.001$) than in men ($P=0.054$).

5 In subjects with normal and abnormal glucose tolerance, LV mass and LV wall thickness increased with increasing insulin resistance in women ($P<0.001$), but not in men.

6 LV mass and wall thickness increased with worsening glucose tolerance, particularly in women, and increased LV mass was associated with insulin resistance in women alone – this effect was largely accounted for by obesity.

Rutter MK, Parise H, Benjamin EJ et al (2003) Impact of glucose intolerance and insulin resistance on cardiac structure and function. *Circulation* 107: 448–54

'After one month oral ascorbic acid reduced blood pressure and improved arterial stiffness in patients with type 2 diabetes.'

HYPERTENSION

Ascorbic acid lowers blood pressure and arterial stiffness

Readability	✓✓✓
Applicability to practice	✓✓
WOW! factor	✓✓✓✓

1 This randomised, double-blind placebo-controlled study investigated whether chronic administration of ascorbic acid helps reduce systemic arterial stiffness in type 2 diabetes.

2 Thirty patients aged 45–70 with type 2 diabetes received either 500 mg ascorbic acid or placebo daily.

3 After 4 weeks ascorbic acid, brachial blood pressure and the central aortic augmentation index decreased, and time to wave reflection increased. Placebo had no effect.

4 After 1 month, therefore, oral ascorbic acid reduced blood pressure and improved arterial stiffness in patients with type 2 diabetes.

Mullan BA, Young IS, Fee H, McCance DR (2002) Ascorbic acid reduces blood pressure and arterial stiffness in type 2 diabetes. *Hypertension* 40: 804–9

ARCHIVES OF INTERNAL MEDICINE

Low-grade systemic inflammation may predict diabetes

Readability	✓✓✓
Applicability to practice	✓✓
WOW! factor	✓✓

1 Previous studies have shown increased levels of C-reactive protein (CRP) in patients with type 2 diabetes.

2 To investigate the link between CRP and type 2 diabetes, 2052 men initially without diabetes, aged 45–74, were followed up for 7.2 years, and diabetes incidence and CRP levels were assessed.

3 There were 101 cases of diabetes. Men with the highest CRP levels were 2.7 times more likely to develop diabetes than those with the lowest levels. After adjustment for other factors, this was not significant.

4 Low-grade systemic inflammation is associated with a risk of type 2 diabetes.

Thorand B, Lowel H, Schneider A et al (2003) C-reactive protein as a predictor for incident diabetes mellitus among middle-aged men. *Archives of Internal Medicine* 163: 93–9

ARCHIVES OF INTERNAL MEDICINE

Management of coronary risk factors in type 2 diabetes

Readability	✓✓✓
Applicability to practice	✓✓✓✓✓
WOW! factor	✓✓

1 This article reviews recent clinical trials that manage coronary risk factors and suggests that more stringent preventive goals of therapy should be set for patients with diabetes.

2 Obesity accounts for a large proportion of type 2 diabetes. Strict dietary recommendations should be followed and patients should be advised to avoid smoking and excessive alcohol consumption.

3 Hyperglycaemia should be avoided by tight glycaemic control, which would decrease mortality, particularly for critically ill and high-risk patients.

4 Hypertriglyceridaemia and low high-density lipoprotein cholesterol are common in people with diabetes. Management should target all lipid abnormalities. Cholesterol reduction with statin therapy is valuable in CHD risk reduction. Fibrates also have a therapeutic role.

5 Hypertension is a major concern for people with diabetes and should be controlled with antihypertensives.

6 More research is needed into antioxidant supplementation and antiplatelet therapy.

7 Novel risk factors include microalbuminuria, high C-reactive protein, lipoprotein(a) and plasma homocysteine levels. It is plausible that prophylactic treatment of these factors may help reduce coronary risk factors in patients with diabetes.

Arshag D, Mooradian MD (2003) Cardiovascular disease in type 2 diabetes mellitus. Current management guidelines. *Archives of Internal Medicine* 163: 33–40

'It is plausible that prophylactic treatment of novel risk factors may help reduce coronary risk factors in patients with diabetes.'

JOURNAL OF CLINICAL EPIDEMIOLOGY

Women with diabetes at higher risk of acute MI

Readability	✓✓
Applicability to practice	✓✓
WOW! factor	✓✓

1 To study the risk of non-fatal acute myocardial infarction (AMI) in relation to diabetes and other risk factors, data from three case-control studies (1737 cases with non-fatal AMI and 2317 controls with other acute diseases) were analysed.

2 The multivariate odds ratio (MOR) of AMI for diabetes was 2.3; association with AMI risk was greater in patients with diabetes aged <40 years and in women.

3 Risk factors assessed were smoking, heavy coffee drinking, high body mass index, high cholesterol levels and a history of hyperlipidaemia, hypertension and obesity, and family history of AMI.

4 All risk factors showed a higher association with AMI in women with diabetes.

Tavani A, Bertuzzi M, Gallus S et al (2002) Diabetes mellitus as a contributor to the risk of acute myocardial infarction. *Journal of Clinical Epidemiology* 55: 1082–7