

**Multi-System
Microvascular
Dysfunction
7TH Annual
COVADIS summit
Juan-Carlos Kaski**

MICROVASCULAR DISEASE – A MULTISYSTEMIC CONDITION?

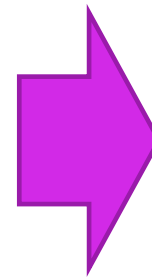
- Microvascular disease may be a multi-system condition with potential links between coronary microvascular dysfunction and small vessel disease of the kidney, retina, systemic circulation, and cerebral white matter.

Mohandas R, ..., Pepine C. PLoS One 2015; Liew G et al. Circ Cardiovasc Imaging 2008; Parrinello R et al. Cardiology 2014; Ford TJ et al. Eur Heart J 2018; Sun S-S et al. J Neuroimaging 2001; Berry C et al. J Am Heart Assoc 2019.

**Hypertension
Diabetes
Kidney disease
HFpEF
Pre-eclampsia
LVH
Dementia
Stroke**



**Microvascular
dysfunction and /or
structural
microvascular
abnormalities**



**Inflammatory conditions
Oestrogen deficiency
Obesity
Metabolic syndrome
Takotsubo syndrome
Heart transplantation**



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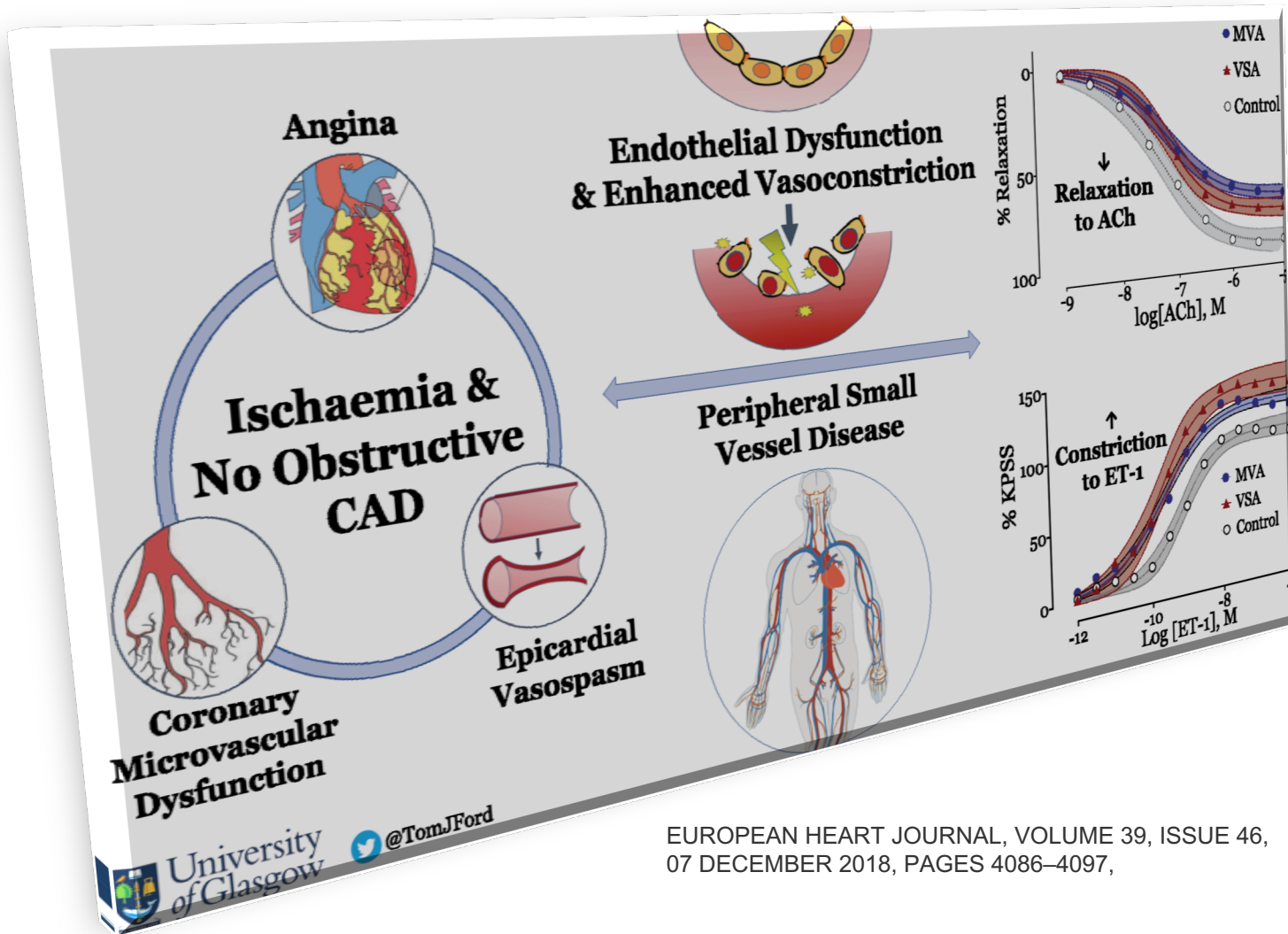
FASTTRACK CLINICAL RESEARCH
Coronary artery disease

Systemic microvascular dysfunction in microvascular and vasospastic angina

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“Coronary microvascular dysfunction and/or vasospasm are potential causes of ischaemia in patients with no obstructive coronary artery disease (INOCA). We tested the hypothesis that these patients also have functional abnormalities in peripheral small arteries.”

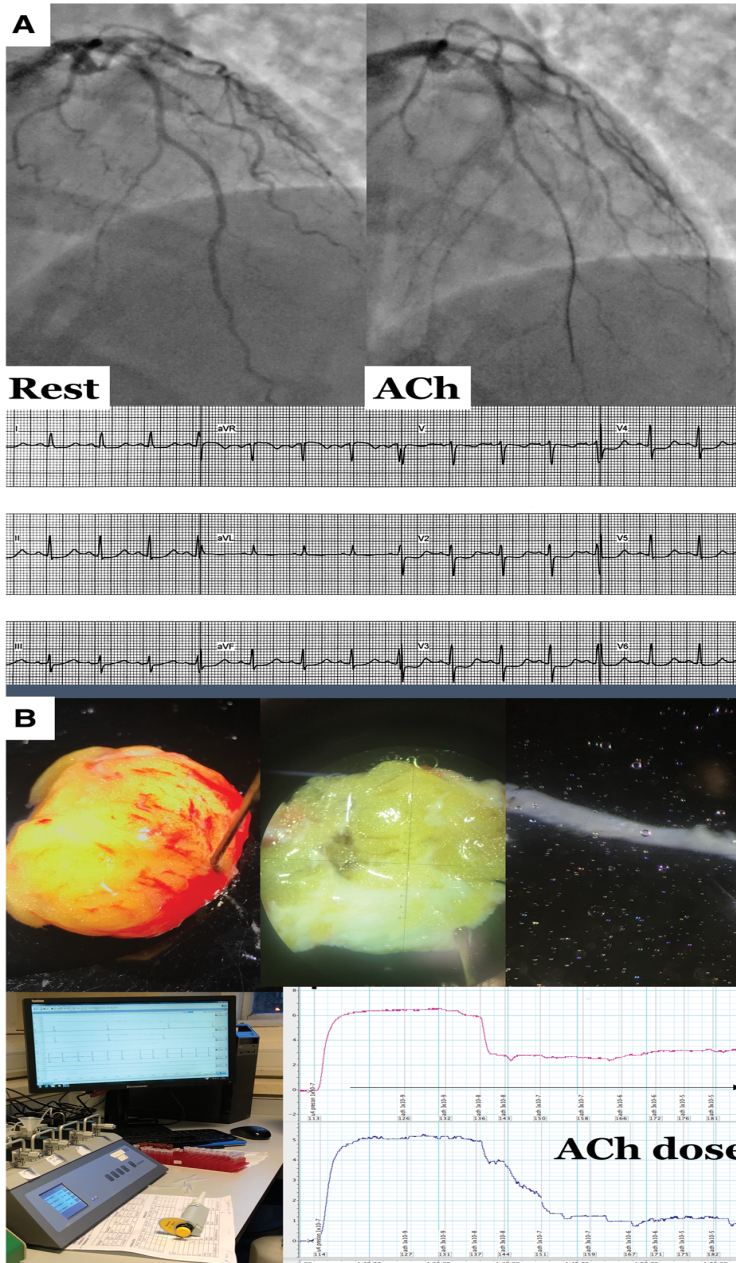
Patients with MVA, VSA and controls were prospectively enrolled. Gluteal biopsies of subcutaneous fat were performed in 81 subjects (62 years, 69% female, 59 MVA, 11 VSA, and 11 controls). Resistance arteries were dissected and vasomotor responses assessed using wire myography.



Maximum relaxation to ACh was reduced in MVA vs. controls but endothelium-independent relaxation [sodium nitroprusside (SNP)] was similar between all groups.

Patients with VSA had similar abnormal patterns of peripheral vascular reactivity.

In all groups, resistance arteries were ≈ 50 -fold more sensitive to the constrictor effects of ET-1 compared with U46619.



ILLUSTRATIVE CASE OF MICROVASCULAR ANGINA. GLUTEAL BIOPSY PROCEDURE, DISSECTION OF RESISTANCE ARTERY- FORD ET AL. EUR HEART J 2018;39: 4086–4097

Systemic microvascular abnormalities are common in patients with MVA and VSA. These mechanisms may involve ET-I and were characterized by endothelial dysfunction and enhanced vasoconstriction.

MULTI-SYSTEM MICROVASCULAR DYSFUNCTION

- Hypertension
and
associated
conditions
- HFpEF



CEREBRAL SMALL VESSEL DISEASE – FUNCTIONAL MECHANISMS

Cerebral small vessel diseases (CSVD) i.e. white matter lesions, lacunar infarcts and cerebral microbleeds are known to cause cognitive impairment, dementia and disability. Patients with CSVD have a high risk of stroke recurrence and poor clinical outcomes.

The pathological substrate of CSVD includes arteriosclerosis, fibrinoid necrosis and lipohyalinosis leading to ischaemic and hemorrhagic cerebral parenchymal damage

CSVD is associated with endothelial dysfunction and inflammation that leads to chronic hypoperfusion and damage to the blood–brain barrier (*The Cardiovascular Health Study. Stroke 2008*)

Systemic endothelial dysfunction is associated with the severity of CSVD (*Nezu T,...Matsumoto M. Hypertension Research 2015*)

Cerebral and peripheral endothelial function are present in patients with lacunar stroke. (*Stevenson SF et al. Stroke 2010*)