

CARDIOVASCULAR REGULATION AND VASCULAR
STRUCTURE IN PREHYPERTENSION AND
CORONARY HEART DISEASE

Akademisk avhandling

Som för avläggande av medicine doktorsexamen vid Sahlgrenska akademien vid Göteborgs universitet kommer att offentligen försvaras i hörsal Arvid Carlsson, Medicinaregatan 3, Göteborg, fredagen den 23 oktober 2009 kl. 13.00

av

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Avhandlingen baseras på följande delarbeten:

I. Myredal A, Gao S, Friberg P, Jensen G, Larsson L, Johansson M

Increased myocardial repolarization lability and reduced cardiac baroreflex sensitivity in individuals with high-normal blood pressure.

J Hypertens. 2005 Sep;23(9):1751-6.

II. Myredal A, Gan LM, Osika W, Friberg P, Johansson M

Increased intima thickness of the radial artery in individuals with prehypertension and hypertension

Atherosclerosis, accepted for publication

III. Myredal A, Friberg P, Johansson M

Elevated myocardial repolarisation lability and arterial baroreflex dysfunction in individuals with non-dipping blood pressure pattern

Submitted

IV. Myredal A, Karlsson AK, Johansson M.

Elevated temporal lability of myocardial repolarization after coronary artery bypass grafting.

J Electrocardiol. 2008 Nov-Dec;41(6):698-702.

Cardiovascular regulation and vascular structure in prehypertension and coronary heart disease

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Abstract

A report of high blood pressure in the US defined individuals with a systolic blood pressure of 120–139 mmHg or a diastolic blood pressure of 80–89 mmHg as prehypertensives. With these definitions, about 60% of all adults in western world have hypertension or prehypertension.

The aim was to characterize vascular structure and different aspects of cardiovascular regulation in otherwise healthy subjects with slightly elevated blood pressure and compare to healthy subjects with normotension and also investigate patients with established hypertension and coronary heart disease. Altered cardiac repolarization and arterial baroreflex function has been associated with adverse prognosis and increased risk for ventricular arrhythmias.

We used the sequence method to measure the baroreflex sensitivity (BRS) and the baroreflex effectiveness index (BEI). BEI is an index of the numbers of times the arterial baroreflex is being active in controlling the heart rate. The myocardial repolarization was assessed using the QT variability index (QTVI), which is a measurement of subtle beat to beat fluctuations of the QT interval. A novel very high frequency (55MHz) ultrasound technique was used to measure the vessel wall and separate the intima media (IMT) complex into measurements of intima and media thickness .

Increased lability of myocardial repolarization and impaired baroreflex function were seen in subjects with prehypertension and in otherwise healthy subjects with an attenuated reduction in blood pressure during night (non-dippers) compared to healthy subjects. Patients with renovascular hypertension and patients with coronary heart disease, who underwent coronary artery by-pass grafting (CABG) showed increased lability of myocardial repolarization. The alterations of myocardial repolarization after CABG improved during rehabilitation. Subjects with prehypertension showed increased radial artery intimal wall thickness compared to healthy subjects. Subjects who report low physical activity had increased intima thickness.

In conclusion, subjects with prehypertension show increased lability of myocardial repolarization, impaired baroreflex function and increased intimal wall thickness. Healthy individuals with a non-dipping blood pressure pattern had increased myocardial repolarization lability and impaired baroreflex function. The current findings contribute to the increased risk for cardiovascular mortality and morbidity previously reported in the studied populations.

Key words: Prehypertension, repolarization, baroreflex, CABG, intima thickness, non-dippers

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