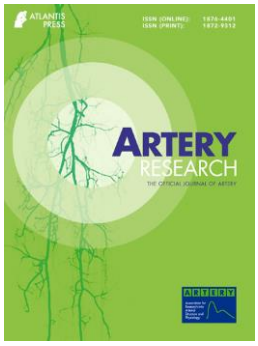

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WHAT IS THE BEST METHOD TO EVALUATE RETINAL MICROCIRCULATION?

Joanna Harazny

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ARTERY 2015: Invited lecture abstracts

CD1
VASCULAR ADAPTATION TO EXTREME CONDITIONS: THE ROLE OF HYPOXIA

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Abstract
The study of vascular adaptation to extreme conditions, and in particular to hypoxia, represents a unique opportunity in cardiovascular physiology, with relevant translational implications. First, it has crucial clinical consequences for about 140 million people worldwide living at high altitude and chronically exposed to hypobaric hypoxia. Second, an increasing number of lowlanders are exposed to high altitude for recreational or working purposes, including aged, diseased individuals: in these cases, hypoxia could be a trigger for acute cardiovascular events. Finally, hypoxia plays a major role in the pathogenesis of many diseases and chronic conditions, as respiratory (i.e. chronic obstructive pulmonary disease and obstructive sleep apnea syndrome) and cardiovascular disorders (i.e. heart failure, ischemic heart disease and cerebrovascular disease). Thus, results from field studies at high altitude might be important for a deeper understanding of their pathophysiology. This review is aimed at summarizing the main findings in the field of chronic and acute vascular adaptation to hypoxia, focusing on the role of nitric oxide (NO) and endothelial function, as well as large artery behavior.

CD2
CIRCADIAN BLOOD PRESSURE PROFILE AND TARGET ORGAN DAMAGE

Agnieszka Bednarek
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Abstract
The 24-hour brachial ambulatory blood pressure measurement (ABPM) has the unique ability to provide information on 24-hour averaged blood pressure (BP), on nocturnal BP and day–night BP changes, as well as on 24-hour BP variability, which all provide independent prognostic information over that provided by office BP measurements. The clinical relevance of ABPM is clearly established in both treated and untreated hypertensive individuals. ABPM shows a stronger correlation with subclinical organ damage than office BP and is a significantly better predictor of cardiovascular events.
In the last two decades, several devices have been made available that aim at estimating noninvasively central systolic blood pressure, that is, pressure in the ascending aorta. Nowadays, due to new techniques development, it is also possible to perform 24-hour central ABPM. In our study, we presented the circadian central systolic BP profile and showed that central pressure values differ significantly from peripheral pressure values, not only in standard, office conditions but also during regular daytime activity as well as during nighttime hours. Moreover, systolic pressure amplification (i.e. the difference between systolic peripheral and central BP) appears to vary over a 24-hour period, and the main factor leading to a lower systolic pressure amplification at night is a nocturnal drop in the heart rate. Furthermore, we demonstrated that 24-central SBP is related to specific target organ damage, such as left ventricle mass index, left ventricle diastolic function, left atrial volume and intima-media thickness.

CD3
ALDOSTERONISM, HEART AND VESSELS

Aleksander Prejbisz
Warsaw, Poland

It has been documented that absolute aldosterone excess in patients with primary aldosteronism (PA) has been associated with higher risk of heart, vascular and kidney damage independent on blood pressure and resulting in increased total cardiovascular risk. Structural (left ventricular hypertrophy) and functional (diastolic dysfunction) changes of the heart have been documented in patients with PA. We have shown that patients with resistant hypertension and PA are characterized by higher prevalence of left ventricular hypertrophy than patients with resistant hypertension without PA. Moreover this relationship was influenced by coexistence of obstructive sleep apnoea, being related to the pattern of left ventricular hypertrophy. In patients with PA the mechanisms by which elevated aldosterone exerts its deleterious effect lead to functional and/or structural abnormalities of the blood vessel wall being more pronounced than in patients with essential hypertension. Studies performed so far documented that patients with PA as compared with patients with essential hypertension are characterized by hypertrophy and fibrosis of small resistance arteries evaluated ex vivo, increased intima media thickness and more pronounced aortic stiffness. Our preliminary results from the ongoing study showed also for the first time that patients with PA are characterized by hypertrophic vascular remodelling of retinal arterioles evaluated in vivo by scanning laser Doppler flowmetry. In summary, current evidence convincingly demonstrates that patients with PA are characterized by more pronounced damage of heart, small and large arteries and kidneys than those with essential hypertension. These findings correspond to the high cardiovascular risk of patients with PA.

Focus
WHAT IS THE BEST METHOD TO EVALUATE RETINAL MICROCIRCULATION?

Joanna Harazny

The microvasculature of retinal ganglion cell layer, which is the part of central nervous system, can be investigated non-invasively in human. For clinical routine the fluorescence angiography is used to test patency and leak of retinal or choroid vessels, and to determine the blood passage time through the capillaries, but not to measure microperfusion. The first non-mydriatic Heidelberg Retina Flowmetry with Scanning Laser Doppler Flowmetry (SLDF) technology using perfusion image analysis software AFFPIA has enabled simultaneously reliable examination of retinal microperfusion (RCF) and arteriolar morphology (inner and outer vessel diameters) with calculation of wall-thickness, wall-to-lumen-ratio (WLR), mean distance between vessels with 10-20μm diameter, calculation of retinal microperfusion resistance coefficient by RCF and mean arterial pressure, and the estimation

of changes of the parameters depends on heart pulsation. Retinal arterioles morphology can be measure by adaptive optics technology. In real time correlating to heart beat retinal microperfusion was illustrated by Laser Speckle Flowgraphy. Perfusion in retinal arterioles and venules was studied using dual beam Fourier-domain Doppler optical coherence tomography. Non-mydriatic cameras and scanning laser ophthalmoscopy enable quantification of arteriole-to-venule diameter ratio (AVR) or oxygen saturation in retinal vessels. In studies exploring retinal microperfusion the crucial parameters can be obtained using SLDF.

Focus

RETINAL ARTERIOLAR STRUCTURE IN PRIMARY HYPERTENSION — REVIEW OF THE DATA

Andrzej Januszewicz

Vascular dysfunction and remodelling due to elevated blood pressure constitutes an early step in the pathogenesis of atherosclerotic disease. Microvascular remodelling reduces tissue perfusion and impedes blood-tissue exchange. These processes could lead to inadequate perfusion and tissue hypoxia in situations of high metabolic demand. Impaired tissue perfusion may be involved in target-organ damage and complications that involve several vascular beds.

Of all of these organs, the retina represents an open and easily accessible window for the in vivo study of human microcirculation. Recently a new approach focused on retinal-arteriolar structural parameters by using scanning laser Doppler flowmetry (SLDF) with automatic full-field perfusion imaging analyses has been introduced. By means of SLDF it is possible to reliable assess the structural parameters of the retinal arterioles.

In studies based on SLDF technique it has been shown that blood pressure is an independent determinant of wall-to-lumen ratio of retinal arterioles. It was also demonstrated that wall-to-lumen ratio correlates with urinary albumin excretion. It was shown that patients with better blood pressure control had significantly lower wall-to-lumen ratio than patients with worse blood pressure control. Recently it has been also shown that Our data indicate treatment with aliskiren, direct renin inhibitor, improves altered vascular remodelling of retinal arterioles in hypertensive patients.

In summary, evaluation of retinal arteriolar structure, enables not only to assess early organ damage in patients with hypertension but also to assess the effect of hypertension treatment on small arteries remodelling in vivo.

Invited lecture

SODIUM INTAKE IN RELATION TO CARDIOVASCULAR OUTCOME

Katarzyna Stolarz-Skrzypek

Abstract

The data associating blood pressure to salt intake in humans comes from randomized clinical trials of interventions on dietary salt intake and population studies. Generally, estimates from meta-analyses are similar to those derived from prospective population studies (1.7 mm Hg change in systolic blood pressure per 100 mmol change in 24-hour urinary sodium). This observation, however, does not translate into a higher risk of incidence rate of hypertension in individuals consuming a high-salt diet. On the other hand, prospective studies relating cardiovascular outcomes to 24-h urinary sodium excretion produced inconsistent conclusions. Thus, available evidence does not support current recommendations of an indiscriminate and generalized reduction of salt intake in the general population.