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Histopathological remodelling of small arteries isolated from patients with essential hypertension

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Background. Essential hypertension is a chronic multifactorial disease that arises from combined actions among polygenic/environmental/behavioral factors (diet, physical activity, obesity) [1] and aging. It is associated with cardiovascular, cerebrovascular and renal complications [2], which are causes of mortality in hypertensive patients. Surprisingly, to date detailed morphological studies on the histopathological wall rearrangement of the resistance vessels in essential hypertension are lacking and, therefore, are highly expected.

Aim. To analyze the morphological remodeling of the wall of small arteries from young (<30 years) to old (>60 years) normotensive subjects (NT) and hypertensive patients (HT) and to connect the hypertensive effect on age-related vascular changes.

Methods. Formalin fixed and paraffin embedded small arteries (150-300 μm diameter) were isolated from the subcutaneous tissue of the region undergoing abdominal surgery; cross-sectioned samples were examined to evaluate the histopathological vessels architecture and detect collagen by double histochemical staining Sirius Red/Fast Green. Confocal laser scanning microscopy highlighted the production of reactive superoxide anion (ROS) by dihydroethidium fluorescent staining in frozen section. Morphometric parameters were obtained from fresh small arteries mounted in a pressurized myograph.

Results and Conclusions. In small arteries morphological and functional remodeling was found. Deposition of collagen fibers, ROS generation along with values of the media/lumen ratio and media transversal area in the vascular wall were increased with aging and, even more, with HT. Taken together these data suggest that in normotensive subjects the physiological aging of small resistance arteries entails eutrophic and, only late, hypertrofic remodeling. On the contrary, in HT the vascular fibrotic/hypertrofic remodeling occurs precociously, suggesting an early vascular aging in this pathological condition.

References

[1] Folkow B. (1999) J Cardiovasc Pharmacol, 22: S1-6
[2] Messerli et al. (2007) Lancet, 370:591-603

Key words

Hypertension, remodeling, aging, fibrosis, resistance vessels.