L-NMMA did not modify significantly arterial distensibility and AWV assessed during the ventricular ejection phase by the slope of the ascending loop. Cross-sectional distensibility and wall viscosity during the whole cardiac cycle by the calculation of arterial wall viscosity (AWV) was estimated from the synchronized and the pressure-diameter relationship were constructed at each cardiac cycle (Figure). Radial artery stiffness was investigated, few studies have focused on arterial wall viscosity (AWV) itself and its regulation in the endothelium in vivo. This is of particular importance since AWV is a major source of energy dissipation through the vascular system reducing the efficiency of cardiovascular coupling.

We simultaneously measured in 8 healthy volunteers (age: 22±1 years) radial artery diameter and arterial pressure (NIUS02) before and after 8 min local infusion of L-NMMA (8 mmol/min) as NO-synthase inhibitor, tetraethylammonium (TEA: 9 mmol/min), as blocker of calcium-activated potassium channels, the target of endothelium-derived hyperpolarizing factors (EDHF), and L-NMMA+TEA. Arterial pressure and diameter were carefully synchronized and the pressure-diameter relationship were constructed at each cardiac cycle. AWV was estimated from the ratio of the area of the hysteresis loop of the pressure-diameter relationship to the area representing the whole energy exchanged during each cardiac cycle (Figure). Radial artery stiffness was evaluated during the whole cardiac cycle by the calculation of cross-sectional distensibility and during the ventricular ejection period by the slope of the ascending loop.

L-NMMA did not modify significantly arterial distensibility and ascending slope but, paradoxically reduced AWV (from 29.5±0.7 to 24.9±0.7 %, P<0.05). Conversely, TEA reduced arterial distensibility (from 6.50±0.19 to 5.33±0.2 10⁻⁵ mm.Hg, P<0.002) and the ascending slope (from 1.03±0.01 to 0.86±0.03 mm.mm.Hg, P<0.001) and increased AWV (from 29.1±0.5 to 35.0±0.7 %, P<0.04). The combination of L-NMMA+TEA induced a more marked decrease in distensibility (from 6.86±0.24 to 4.85±0.17 10⁻⁵ mm.kPa, P<0.001) and ascending slope (from 1.06±0.04 to 0.69±0.03 mm.mm.Hg, P<0.001) and increase in AWV (from 29.0±0.9 to 43.0±0.7, P<0.04) as compared with TEA alone (all P<0.05).

These results demonstrate in vivo in humans that the vascular endothelium contributes, in addition to large artery elasticity, to the regulation of AWV through the release of NO and EDHF.

**Methods** — This study was performed in 169 French males over 60 years. Aortic stiffness was assessed by carotid/femoral pulse wave velocity (PWV). BMD and body composition were determined with a DEXA device in lumbar spine L1-L4, femoral neck and total body.

**Results** — Lean mass was positively correlated with the three T-scores accounting for 11.6 %, 26.6 % and 12.2 % of the variability in lumbar spine L1-L4, femoral neck and total body BMD T-scores respectively. Fat mass had no effect on BMD. However, fat mass was positively correlated with aortic PWV accounting for 9.8 % of its variability. Lean mass was not a determinant of PWV. Hypertension, diabetes and dyslipidemia were associated with higher PWV but had no effect on BMD.

**Conclusions** — In males from a general population over 60 years of age, bone and arterial aging are differentially influenced by lean and fat mass. Our results indicate that elderly men with high lean mass and low fat mass exhibit the best arterial and bone profile, with the lowest arterial stiffness and the highest BMD.

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**THE REGULATION OF LARGE ARTERY STIFFNESS BY THE VASCULAR ENDOTHELIUM INCLUDES THE CONTROL OF ARTERIAL WALL VISCOSITY**

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Although the viscoelasticity of large arteries has been extensively investigated, few studies have focused on arterial wall viscosity (AWV) itself and its regulation in the endothelium in vivo. This is of particular importance since AWV is a major source of energy dissipation through the vascular system reducing the efficiency of cardiovascular coupling.

We simultaneously measured in 8 healthy volunteers (age: 22±1 years) radial artery diameter and arterial pressure (NIUS02) before and after 8 min local infusion of L-NMMA (8 mmol/min) as NO-synthase inhibitor, tetraethylammonium (TEA: 9 mmol/min), as blocker of calcium-activated potassium channels, the target of endothelium-derived hyperpolarizing factors (EDHF), and L-NMMA+TEA. Arterial pressure and diameter were carefully synchronized and the pressure-diameter relationship were constructed at each cardiac cycle. AWV was estimated from the ratio of the area of the hysteresis loop of the pressure-diameter relationship to the area representing the whole energy exchanged during each cardiac cycle (Figure). Radial artery stiffness was evaluated during the whole cardiac cycle by the calculation of cross-sectional distensibility and during the ventricular ejection period by the slope of the ascending loop.

L-NMMA did not modify significantly arterial distensibility and ascending slope but, paradoxically reduced AWV (from 29.5±0.7 to 24.9±0.7 %, P<0.05). Conversely, TEA reduced arterial distensibility (from 6.50±0.19 to 5.33±0.2 10⁻⁵ mm.Hg, P<0.002) and the ascending slope (from 1.03±0.01 to 0.86±0.03 mm.mm.Hg, P<0.001) and increased AWV (from 29.1±0.5 to 35.0±0.7 %, P<0.04). The combination of L-NMMA+TEA induced a more marked decrease in distensibility (from 6.86±0.24 to 4.85±0.17 10⁻⁵ mm.kPa, P<0.001) and ascending slope (from 1.06±0.04 to 0.69±0.03 mm.mm.Hg, P<0.001) and increase in AWV (from 29.0±0.9 to 43.0±0.7, P<0.04) as compared with TEA alone (all P<0.05).

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**YOUNG SPONTANEOUSLY HYPERTENSIVE RATS (SHR) WITH CHRONIC INHIBITION OF NITRIC OXIDE EXHIBIT SIMILAR AORTIC STIFFNESS TO OLD SHR**

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The old spontaneously hypertensive rat (SHR) is known to be a good experimental model that is highly analogous to essential hypertension in man but is costly and time consuming. Chronic inhibition of nitric oxide (NO) production in young adult SHR is an experimental model of malignant hypertension and chronic renal disease, very similar to old SHR. Considering that acute or chronic decreases in NO production in normotensive rats increase arterial stiffness, we aimed to compare the aortic stiffness between SHR/L-NAME and old SHR.

Male SHR (18 weeks old) received N-Nitro-L-Arginine Methyl Ester (L-NAME) 6 mg/kg/d in drinking water (SHR/L-NAME) for 2 weeks and were compared to SHR and Wistar Kyoto rats (WKY). Moreover, two groups are composed of 55 weeks aged SHR (Old SHR) and WKY (Old WKY). Under anesthesia, two catheters were introduced in the left common carotid artery and the left femoral artery to measure central and peripheral blood pressure and assess aortic stiffness with pulse wave velocity (PWV=distance between the tips of the two catheters / transit time), β-index (2.11x(PWV²/Diastolic blood pressure)), amplification and pulse pressure (PP).

At 20 weeks, although SHR have higher central systolic blood pressure (SBP) than WKY (201±7 mmHg vs. 154±4 mmHg), no significant difference in PWV, PP, amplification and β-index was observed between these two groups. With age, old WKY have higher SBP (181±8 mmHg) and higher PWV (6.7±0.5 m/s) and β-index (0.70±0.08) than young WKY. Old SHR exhibit higher SBP (252±13 mmHg), PWV (9.3±0.7 m/s), PP (71±7 mmHg), β-index (1.08±0.16) than old WKY and young SHR (PWV=6.3±0.2 m/s, PP=39±3 mmHg and β-index=0.50±0.03). Young SHR, after 2 weeks of L-NAME administration, have higher SBP (238±10 mmHg) and aortic stiffness (PWV=8.6±0.6 m/s, PP=54±6 mmHg and β-index=0.89±0.14) than young SHR and possess the aortic stiffness observed in old SHR.