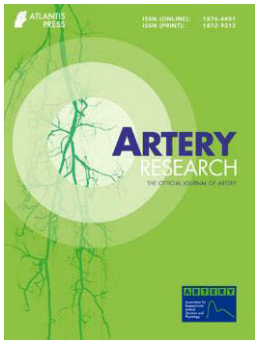

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5.4: AGE-INDUCED INCREASE IN THE ENERGY TRANSMITTED TOWARDS THE CEREBRAL CIRCULATION AS A CONTRIBUTOR TO IMPAIRED BRAIN FUNCTION

Stamatia Pagoulatou, Jonathan Mynard, Vasiliki Bikia, Julio Chirinos, Nikolaos Stergiopulos, Patrick Segers

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Results: In total, 6.9% (n = 484) of the participants had incident depressive symptoms at 4 or 6 years of follow-up. Greater carotid stiffness was associated with a higher incidence of depressive symptoms (Figure). Results were qualitatively similar when GEE was used instead of logistic regression.
Conclusions: Greater carotid artery stiffness is associated with a higher incidence of depressive symptoms. This study supports the hypothesis that carotid artery stiffness contributes to the development of late-life depression.

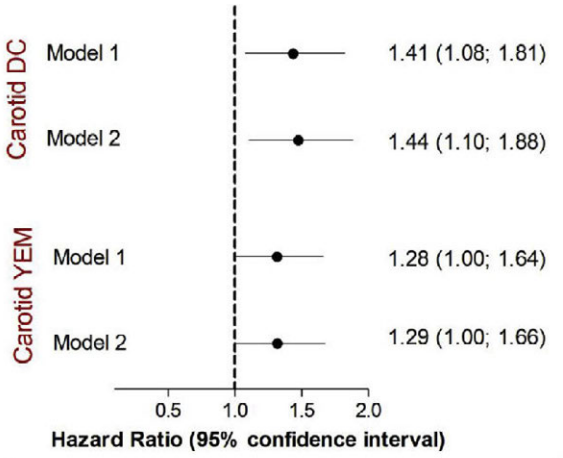

Figure. Association between carotid distensibility coefficient (DC) (tertile 1 vs. tertile 3) and Young's elastic modulus (YEM) (tertile 3 vs. tertile 1) and incident depressive symptoms. Model 1: adjusted for age, sex, living alone, education, smoking, systolic BP, HR, DM2, prior CVD, BMI, physical activity and antihypertensive and lipid-modifying medication. Model 2: model 1 plus baseline Q2DA score.

5.4
AGE-INDUCED INCREASE IN THE ENERGY TRANSMITTED TOWARDS THE CEREBRAL CIRCULATION AS A CONTRIBUTOR TO IMPAIRED BRAIN FUNCTION

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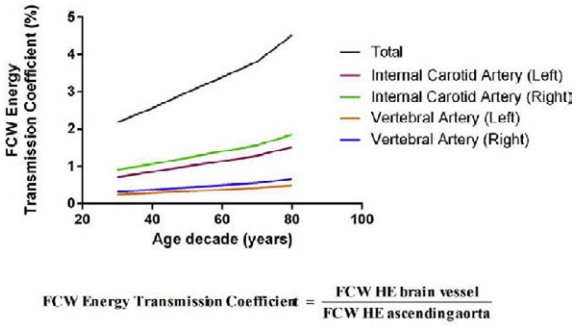
Background and Aims: The increase in arterial stiffness and pressure pulsatility with age is identified as a key contributor to cognitive impairment; nevertheless, the underlying hemodynamic mechanisms remain unclear. A hypothesis, proposed by (1), suggests that the preferential stiffening of the central arteries as compared to the periphery changes the impedance distribution of the arterial network and exposes the cerebral circulation to the deleterious effects of excessive pulsatile energy. The aim of the present study was to test this hypothesis using a previously developed mathematical model of the ageing cardiovascular system (2).
Methods: For each decade of age, forward and backward components of wave and hydraulic power and energy were calculated (3) at the ascending aorta as well as at the cerebral blood supply vessels, i.e. the vertebral and internal carotid arteries. Subsequently, we isolated the component of hydraulic energy (HE) related to the initial forward compression wave (FCW) by restricting the analysis to early systole (0—0.2 sec) and calculated the respective energy transmission coefficients.
Results: Ageing was associated with an increase in proximal aortic FCW wave power (dictated by the augmented ventricular contractility) and a slight increase in total hydraulic energy. The FCW energy transmission coefficients were almost doubled for all brain vessels as shown in Fig. 1.
Conclusion: Our findings support the hypothesis that age-related central arterial stiffening leads to an enhanced energy transmission of the early systolic forward wave towards brain vessels, potentially contributing to impaired brain function with increasing age.



$$\text{FCW Energy Transmission Coefficient} = \frac{\text{FCW HE brain vessel}}{\text{FCW HE ascending aorta}}$$

Fig1. Energy transmission towards cerebral vessels during ageing.

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5.5
MEDIATOR EFFECT OF CARDIORESPIRATORY FITNESS ON THE RELATIONSHIP BETWEEN ARTERIAL STIFFNESS AND COGNITIVE FUNCTION

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Objective: The study aims to investigate the role of cardiorespiratory fitness as a mediator of the relationship between arterial stiffness and cognitive function in apparently healthy seniors.
Methods: This is a cross-sectional study comprising 155 participants (75.5 ± 6.5 years; 69.7% female). Arterial stiffness and cognitive function were assessed with carotid-femoral pulse wave velocity (cfPWV) (SphygmoCor, AtCor Medical, Australia), and Montreal Cognitive Assessment (MoCA), respectively. Cardiorespiratory fitness was calculated using the 6-minute walk test. Simple mediation analysis with bootstrapped procedures was calculated with Hayes's PROCESS macro for SPSS.
Results: After adjustments for gender and age, cardiorespiratory fitness significantly mediated the relationship between arterial stiffness and cognitive function (Indirect effect= −0.229 [95% CI, −0.455 to −0.046]).
Conclusion: The present findings suggest that cardiorespiratory fitness, independently of gender and age, is a mediator of the relationship between arterial stiffness and cognitive function.