Conference Abstract

P.17 Reduced Isometric Contractility and Isobaric Compliance of the ex vivo Thoracic Aorta of Hypertensive APP23+/− overexpressing Mice due to Serum Corticosterone Levels

Jhana O. Hendrickx1*, Sofie De Moudt1, Debby Van Dam2,3, Guido R.Y. De Meyer1, Paul Fransen1

1Laboratory of Pharmacophysiology, University of Antwerp
2Laboratory of Neurochemistry and Behaviour, Institute Born-Bunge, University of Antwerp
3Department of Neurology and Alzheimer Research Center, University of Groningen and University Medical Center Groningen

Keywords
Dementia
stress
vascular disease

ABSTRACT

Objective: Alzheimer’s disease (AD) is characterized by noticeable neuropsychiatric symptoms and cognitive decline [1]. In addition, cardiovascular disease (CVD) is a known etiological hallmark of AD pathogenesis [2]. Recent epidemiological evidence suggests an interplay between arterial stiffness (AS) and AD [3]. Therefore, we aimed for an in-depth vascular characterization of the APP23+− overexpressing AD mouse model (APP23+−).

Methods: Blood pressure (BP, CODA) and aortic pulse wave velocity (aPWV, VEVO2100) were measured in vivo, whereas isometric vascular reactivity (organ chambers), isobaric AS (Peterson modulus (Ep)) and compliance (Rodent Oscillatory Tension Set-up for Arterial Compliance) were determined ex vivo in thoracic aorta segments of APP23+− mice (male, n = 10) vs. C57BL/6 mice (male, n = 18) at the age of 6 months. Corticosterone levels were analysed on blood serum by means of ELISA. The data are given as mean ± SEM.

Results: APP23+− mice showed elevated corticosterone levels (Figure 1A) associated with increased peripheral systolic BP (Figure 1B) and aPWV in vivo (Figure 1C), and decreased isometric adrenoreceptor-dependent contractions ex vivo upon phenylephrine stimulation (Figure 1D). Ex vivo isobaric AS measurements at baseline disclosed a smaller aortic diameter of APP23+− mice (Figure 2A) resulting in reduced compliance (Figure 2B), with no Ep differences (Figure 2C). Upon phenylephrine treatment, a smaller effect on aortic constriction (Figure 2D), compliance (Figure 2E) and Ep (Figure 2F) was observed for APP23+− animals, corresponding to reduced isometric contractions (Figure 1D).

Conclusion: APP23+− mice have increased corticosterone levels leading to increased BP, aPWV and reduced isometric contractility, resulting in decreased isobaric compliance, but with unchanged arterial wall biomechanics.

Figure 1  Significantly increased serum corticosterone levels (A), systolic blood pressure (SBP) (B), abdominal pulse wave velocity (aPWV) (C) and decreased isometric force (D) upon phenylephrine contraction in 6 months old APP23+− vs. C57BL/6 mice.

*Corresponding author. Email: jhana.hendrickx@uantwerpen.be
REFERENCES


© 2020 Association for Research into Arterial Structure and Physiology. Publishing services by Atlantis Press International B.V. This is an open access article distributed under the CC BY-NC 4.0 license (http://creativecommons.org/licenses/by-nc/4.0/).

Figure 2  Significant smaller aortic diameter (A) and compliance (B) in baseline Krebs-Ringer solution for APP23/−/− mice vs. C57BL/6 mice, without differences in Ep (C). Limited aortic constriction (D), compliance (E) and Ep (F) upon phenylephrine (2 μM) stimulation for APP23/−/− mice vs. C57BL/6 mice.