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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

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Keywords

Dementia
stress
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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.

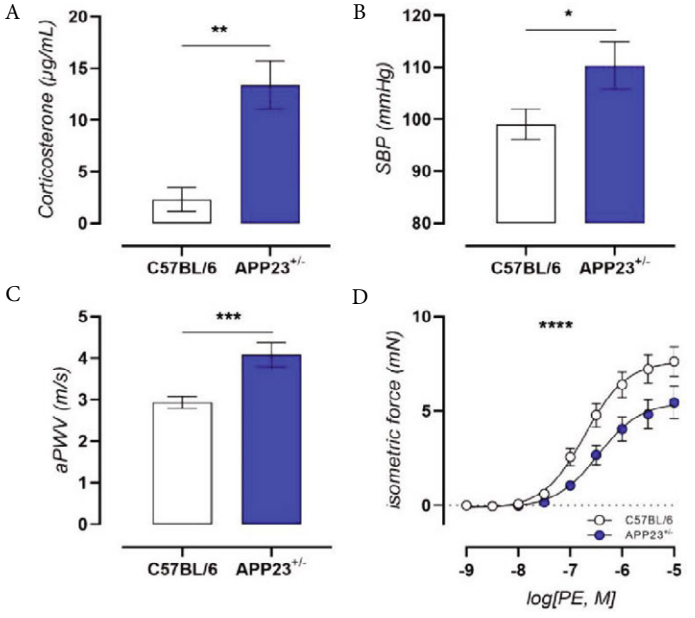

Figure 1 Significantly increased serum corticosterone levels (A), systolic blood pressure (SBP) (B), abdominal pulse wave velocity (aPWV) (C) and decreased isometric force (D) upon phenylephrine contraction in 6 months old APP23$^{+/-}$ vs. C57BL/6 mice.

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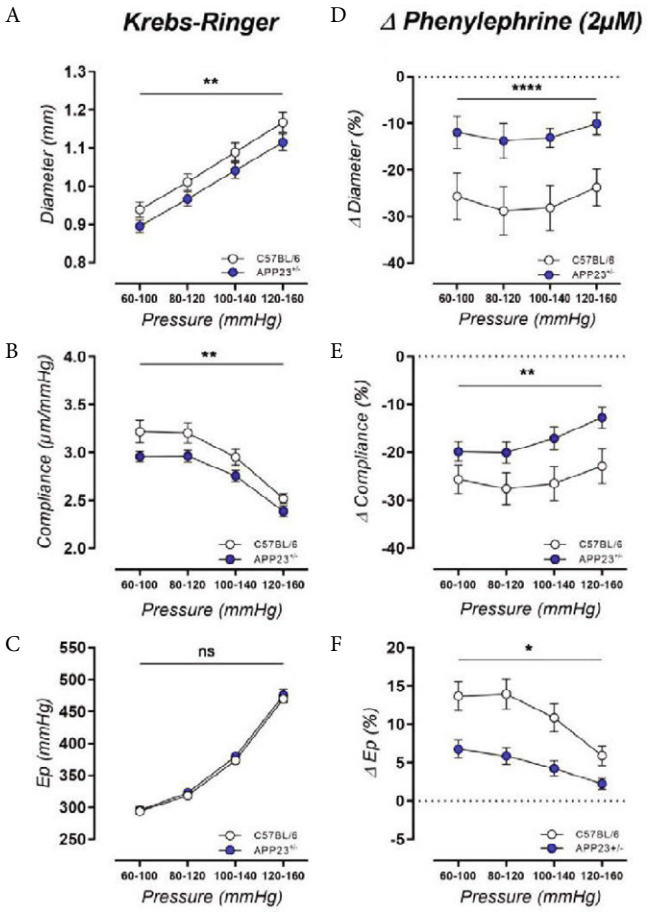

Figure 2 | Significant smaller aortic diameter (A) and compliance (B) in baseline Krebs-Ringer solution for APP23$^{+/-}$ mice vs. C57BL/6 mice, without differences in Ep (C). Limited aortic constriction (D), compliance (E) and Ep (F) upon phenylephrine (2 μM) stimulation for APP23$^{+/-}$ mice vs. C57BL/6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

REFERENCES

[1] Chen CT, Chang CC, Chang WN, Tsai NW, Huang CC, Chang YT, et al. Neuropsychiatric symptoms in Alzheimer's disease: associations with caregiver burden and treatment outcomes. QJM: Int J Med 2017;110:565–70.

[2] Tublin JM, Adelstein JM, del Monte F, Combs CK, Wold LE. Getting to the heart of Alzheimer disease. Circ Res 2019;124:142–9.

[3] Lilamand M, Vidal JS, Plichart M, De Jong LW, Duron E, Hanon O. Arterial stiffness and medial temporal lobe atrophy in elders with memory disorders. J Hypertens 2016;34:1331–7.