



Differences in cardiovascular physiology between Friesian horses and Warmblood horses

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For the common carotid artery, Friesians showed a significantly higher distensibility ($1.47 \times 10^{-3} \pm 0.65 \times 10^{-3}$ /mmHg versus $1.22 \times 10^{-3} \pm 0.65 \times 10^{-3}$ /mmHg; $p=0.011$) and compliance ($1.48 \times 10^{-2} \pm 0.66 \times 10^{-2}$ mm/mmHg versus $1.29 \times 10^{-2} \pm 0.70 \times 10^{-2}$ mm/mmHg; $p=0.047$) compared to Warmbloods, indicating a more elastic common carotid artery. For the external iliac artery, results were not significantly different.

Conclusion

Results indicate that the AWS differs between Friesians and Warmbloods. Friesians seem to have a stiffer aorta, in combination with a more compliant common carotid artery. These differences might be related to the higher incidence of aortic rupture in Friesians.

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Introduction

Aortic rupture is more common in Friesians compared to Warmbloods. Differences in arterial wall composition, especially collagen and elastin, determining the tissue strength and elasticity, might predispose this breed to aortic rupture. In this study, arterial wall stiffness (AWS) parameters were compared between Friesians and Warmbloods.

Material and methods

2D and pulsed wave Doppler ultrasound (Vivid IQ, GE Healthcare) was performed in 101 healthy Friesians (mean \pm SD age 12 ± 6 years, body weight 553 ± 42 kg) and 101 healthy Warmbloods (11 ± 5 years and 556 ± 33 kg) from aorta, common carotid artery and external iliac artery to define local AWS parameters such as distensibility and compliance. Regional aortic AWS was estimated from the aortic to external iliac artery pulse wave velocity (PWV_{Ao-E}). Non-invasive blood pressure (BP) and heart rate (HR) were recorded simultaneously.

Results

Mean BP (115 ± 15 mmHg) and pulse pressure (49 ± 9 mmHg) were significantly ($p < 0.001$) higher in Friesians compared to Warmbloods (106 ± 13 mmHg and 44 ± 9 mmHg, respectively) while no significant difference in HR was found (37 ± 5 bpm versus 36 ± 6 bpm; $p=0.139$). Compared to Warmbloods, Friesians had significantly lower aortic distensibility ($2.14 \times 10^{-3} \pm 1.01 \times 10^{-3}$ /mmHg versus $2.47 \times 10^{-3} \pm 1.01 \times 10^{-3}$ /mmHg; $p=0.026$) and compliance ($1.24 \times 10^{-1} \pm 0.56 \times 10^{-1}$ mm/mmHg versus $1.52 \times 10^{-1} \pm 0.64 \times 10^{-1}$ mm/mmHg; $p=0.002$), indicating a stiffer aorta. This could be confirmed by a higher PWV_{Ao-E} (6.52 ± 0.90 m/s versus 5.95 ± 0.94 m/s; $p < 0.001$) in Friesians.