Characterisation of the Endothelium Dependent Relaxant Profile of the Canine Saphenous Artery

Patricia Pawson, Ian Gibson, Fiona J. Dowell. 1Division of Cell Sciences, Institute of Comparative Medicine, University of Glasgow Veterinary School, Bearsden Road, Glasgow G61 1QH, United Kingdom, 2Division of Companion Animal Sciences, Institute of Comparative Medicine, University of Glasgow Veterinary School, Bearsden Road, Glasgow G61 1QH, United Kingdom.

A variety of endothelium-derived mediators including nitric oxide (NO), prostaglandins and endothelium-derived hyperpolarising factors (EDHF) are known to modulate vascular tone. It is important to characterise the relaxant profile in specific vessels/species before the study of other vasoactive influences on a vessel. Thus the aim of this study was to characterise the relaxant profile of the canine saphenous artery.

Endothelium-intact rings of saphenous artery (obtained with owner consent from euthanased pet dogs) were mounted under 1 g of tension in Krebs’ solution (95% O2/5% CO2, 37°C). Cumulative concentration response curves to phenylephrine (PE; 1-100,000nM) and acetylcholine (ACh; 1-10,000nM) were determined in the presence and absence of inhibitors of endothelium-dependent relaxation (L-NAME: 100 µM and/or indomethacin: 10 µM and/or charybdotoxin plus apamin: both 100nM). Responses to PE are expressed in g/g tension and ACh as % relaxation of PE-induced tone. Data are mean ± s.e.mean, n ≥ 5. Data are analysed by ANOVA (Tukey post-test).

Incubation with all 3 classes of inhibitor significantly increased basal tension (285 ± 161 g/g vs. -21.7 ± 5.2 g/g in control vessels, p = 0.0289). When compared to control responses, single inhibitors did not significantly alter PE Emax or Log EC50. However the combination of all three classes of inhibitor significantly decreased the Log EC50 -6.91 ± 0.23 vs. -5.92 ± 0.07 in control vessels (p<0.0001). Compared with controls (98.3 ± 5.4%) maximum ACh-induced relaxation was significantly reduced by incubation with L-NAME (p<0.0001), either alone (41.1 ± 10.5%), in combination with indomethacin (41.7 ± 8.1%), with charybdotoxin plus apamin (3.9 ± 7.0%) or with indomethacin and charybdotoxin plus apamin (11.4 ± 8.7%).

These data demonstrate that NO is the principle mediator of ACh-induced relaxation in the canine saphenous artery. However EDHFs appear to be more important in modulating PE-induced contraction although this effect is only evident when alternative vasodilators such as nitric oxide are concurrently inhibited. Thus it would appear that multiple vasodilators have a role in modulating vascular tone in the canine saphenous artery.

This work was funded by the Clinical Research Fund of the FVM, Glasgow University.