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

Patricia Pawson[2], Ian Gibson[1], Fiona J. Dowell[1]. [1]*Division of Cell Sciences,* Institute of Comparative Medicine, University of Glasgow Veterinary School, Bearsden Road, Glasgow G61 1QH, United Kingdom, [2]Division 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% O_2/5% CO_2, 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: 10µM 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±161g/g vs. -21.7±5.2g/g in control vessels, p = 0.0289). When compared to control responses, single inhibitors did not significantly alter PE E_{max} or Log EC_{50}. However the combination of all three classes of inhibitor significantly decreased the Log EC_{50} -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.