A model of chronic monoarthritis impairs EDHF but not NO activity in the saphenous artery of the rat.

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Insufficient blood flow to the knee may contribute to joint degradation in arthritis. Here we investigated endothelial cell (EC) relaxant function in isolated segments of saphenous artery (SA) taken from rats with Freund's complete adjuvant (FCA)-induced arthritis.

14 days following initiation of FCA-treatment in female Sprague Dawley rats (350-450g), ring segments of SA were mounted for tension recording. Untreated age-matched rats were used as controls. Relaxation induced by ACh (1nM-3μM) was assessed in pre-contracted vessels. The roles of NO and EDHF were determined by use of the inhibitors L-NAME (100μM) and apamin (AP, 100nM)/charybdotoxin (CTX, 100nM), respectively. Data are expressed as mean±s.e.m. of the % relaxation of pre-constriction, n≥5. Statistical comparisons were analysed by ANOVA.

At day 14 knee joint diameter had increased by 48.3±1.9% in FCA rats but SA diameter remained unchanged compared with controls (438±11 vs 449±10 μm, respectively, P>0.05). Relaxation induced by ACh was not different (P>0.05) in rings from FCA-treated rats compared with controls. In SA from control rats maximum ACh-induced relaxation (80.3±3.4%) was unaffected following incubation with AP/CTX (79.9±5.5%, P>0.05) although a small impairment to relaxation was observed following treatment with L-NAME (72.3±8.9%, P<0.05). However, a combined incubation of L-NAME and AP/CTX completely abolished ACh-induced relaxation (maximum 3.9±1.2%, P<0.001) suggesting that EC-dependent relaxation is mediated jointly by NO and EDHF, and each can fully compensate in the absence of each other. In rings from FCA-treated rats the maximum relaxation (85.6±3.8%) induced by ACh was unaffected following incubation with AP/CTX (82.5±6.6%, P>0.05). However, in contrast to findings in controls, incubation with L-NAME alone powerfully impaired ACh-induced relaxation (5.5±2.9%, P<0.001) suggesting that NO is the single mediator of ACh-induced relaxation in FCA-treated rats.

These results demonstrate that in this model of arthritis EDHF activity is abolished in isolated rings of SA, although overall EC-dependent relaxation is maintained by NO.

This work was supported by the Cunningham Trust.