

MAGNESIUM SULFATE EVOKES ENDOTHELIUM-INDEPENDENT RELAXATION IN THE CHICKEN DUCTUS ARTERIOSUS

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Background and aims: Magnesium sulfate (MgSO_4) is widely used as tocolytic agent and for the prophylaxis of seizures in pre-eclampsia. Antenatal exposure to MgSO_4 has been associated with a higher risk of patent DA in preterm infants. MgSO_4 is a vasodilator and thus may exert a direct relaxant effect in the DA. Here we aimed to investigate the possible vasoactive effects of MgSO_4 in the chicken DA.

Design/methods: Isolated rings of the DA from 15-d (E15) and 19-d (E19) chicken embryos (total incubation: 21-d) were mounted in a wire myograph for isometric tension recordings. Rings were precontracted with 21% O_2 , norepinephrine (NE, 1 μM) or KCl (62.5 mM).

Results: MgSO_4 (2.4-7.2 mM) elicited a concentration-dependent relaxation (mean maximal relaxation: 56.7%, SD 41.8; EC_{50} : 2.9 mM, SD 0.3) of O_2 -induced active tone in E19 DA rings. MgSO_4 also relaxed NE-contracted (with similar efficacy but lower potency than O_2 -contracted) and KCl-contracted (with lower efficacy and potency) E19 DA rings. MgSO_4 -induced relaxation of KCl-contracted DA rings was not significantly different between E15 and E19. Endothelium removal or the presence of the NO synthase inhibitor L-NAME, the soluble guanylate cyclase inhibitor ODQ, the cyclooxygenase inhibitor indomethacin, or the sarcoplasmic reticulum Ca^{2+} -ATPase inhibitor thapsigargin did not significantly modify MgSO_4 -induced relaxation. The relaxant effect of MgSO_4 was reversed by increasing the extracellular Ca^{2+} concentration.

Conclusions: MgSO_4 , at clinically relevant concentrations, induces endothelium-independent relaxation of chicken DA. This relaxant effect may be due to inhibition of Ca^{2+} entry from extracellular space.