



Vasorelaxant effect of hydrogen sulphide is increased in db/db mice

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Introduction: Hydrogen sulphide (H₂S) is an endogenous gas that has potent relaxant effect on vascular smooth muscles. The mechanism behind this effect is not yet completely understood, but it might be related to the inhibition of phosphodiesterase (PDE). Vascular dysfunction is a frequent condition in diabetes and it is related to the decreased level of cGMP in vascular smooth muscles. Our previous studies indicated that endogenous production of H₂S has a role in the regulation of vascular tone of aortas derived from db/db mice. Thus, we aimed to investigate the direct effect of H₂S on the vascular tone of healthy and diabetic vessels.

Methods: Thoracic aortic vessel segments of 3 mm length were isolated from adult male db/db and non-diabetic control mice (n=4). We tested the effects of H₂S donor sodium hydrosulphide (NaHS) and of the NO donor sodium nitroprusside (SNP) after precontraction by phenylephrine 10⁻⁶ M in isometric condition in myographs. NaHS dependent relaxation was investigated at doses 10⁻⁵, 3x10⁻⁵, 10⁻⁴, 3x10⁻⁴ and 10⁻³ M, whereas SNP dependent relaxation was investigated at doses 10⁻¹⁰ - 10⁻⁵ M.

Results: At lower concentrations NaHS induced similar contractions in both db/db and control vessels (121.3±14.3% vs 127.3±11.7 at 3x10⁻⁵M, respectively) while at higher concentrations db/db vessels responded with more pronounced relaxations compared to control vessels (12.2±8.7% vs 47.6±26.6 at 3x10⁻⁴M, p<0.05). Low concentrations of SNP caused weaker relaxation in segments dissected from db/db mice (66.2±17.6% vs 52.2±14.2 at 10⁻⁸M, p<0.05).

Conclusions: Hydrogen sulphide caused a more pronounced relaxation in db/db mice. This increased sensitivity may suggest increased PDE activity in type 2 diabetes. This concept is supported by our observation that vessels derived from db/db animals were less sensitive to SNP induced relaxations. Our results may provide a novel approach to enhance vasorelaxation in diabetes by altering PDE activity via hydrogen sulphide.

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