EXOGENOUS HYDROGEN SULFIDE ATTENUATES OXIDATIVE STRESS IN SPONTANEOUSLY HYPERTENSIVE RATS

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ABSTRACT: Vascular oxidative stress occurs in hypertensive states and the potential role of antihypertensive drugs as antioxidants is currently under review. Hydrogen sulfide (H₂S) is a recently recognized member of gasotransmitters, which may act to decrease blood pressure in experimental hypertension. The present study evaluated the antioxidant potential of hydrogen sulfide in SHR. NaHS, donor of H₂S, was subjected to a series of in vitro tests to evaluate its antioxidant capacity. For in vivo study Wistar Kyoto (WKY) and spontaneously hypertensive rats (SHR) were divided in 4 groups namely WKY control (I), WKY-NaHS treated (II), SHR control (III) and SHR-NaHS treated (IV). Groups II and IV received NaHS, 50 μM/kg i.p. daily for 4 weeks. Blood pressure, renal cortical blood perfusion and pulse wave velocity were measured in acute studies. Oxidative and antioxidant markers from plasma were measured at the end of 4 weeks. In vitro, NaHS was found to be a free radical scavenger, reductant and inhibitor of lipid peroxidation. In vivo, the SHR control rats had higher blood pressure, lower renal cortical blood perfusion, lower H₂S and nitric oxide (NO) in plasma and oxidative stress than compared to the WKY control as evidenced by decreased superoxide dismutase, glutathione and total antioxidant, and increased malondialdehyde plasma levels. NaHS treatment reduced blood pressure, increased renal cortical blood perfusion and increased H₂S and NO plasma levels, and up-regulated the antioxidant defences in SHR-NaHS treated rats. The findings of this study suggest that the administration of NaHS not only reduces the blood pressure but also attenuates the oxidative stress in SHR.

INTRODUCTION: Oxidative stress implies an increased steady state level of molecular oxygen or reactive oxygen species (ROS) due to an imbalance between their production and elimination.

The generation of reactive oxygen species (ROS) is an inevitable consequence of aerobic metabolism. Formation of superoxide (O₂⁻), a primary ROS, occurs during the normal metabolic processes or oxygen “activation” by physical irradiation.

Hypertension is a chronic medical condition usually associated with increased cardiac and vascular ROS. Increased vascular oxidative stress has been observed in different models of experimental hypertension, for example, angiotensin II-induced hypertension, Dahl salt-sensitive hypertension,