Effect of H_2S donor, NaHS on rat blood pressure and possible involvement of calcium RyR2 channel

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Hydrogen sulfide, H_2S, is an endogenously formed gaseous transmitter. H_2S is involved in a regulation of cardiovascular functions. It affects several cardiac ion channels (i.e. L-type Ca^{2+} channel, K_{ATP} channel, Cl^- channel). Protective effects of H_2S were shown for both ischemia/reperfusion preconditioning and postconditioning. It might be also beneficial in treatment of hypertension. Therefore, we decided to study the effects of H_2S on blood pressure and heart rate of anaesthetized rats and on the activity of ryanodine receptor Ca^{2+} release channels (RyR2) derived from cardiac sarcoplasmic reticulum.

NaHS (up to 64 μmol/kg, i.v.), a donor of H_2S, decreased transiently the blood pressure to (84.5–46.5)%, followed by its increase to (107.8–170.8)%. Single channel properties of RyR2 channels were studied in bilayer lipid membrane. NaHS modulated RyR2 channel activity. It increased 3.6-fold open probability of the channel at 50 μmol/l. At higher concentrations (500 – 1000 μmol/l), in 6/11 experiments NaHS decreased P-open, while in 5/11 experiments, it did not have any effect.

The results indicate that H_2S and/or HS^- effects on blood pressure are concentration dependent (biphasis), and that modulation of RyR2 by H_2S might be responsible, at least in part, for the increase of blood pressure.