Signaling by hydrogen sulfide (H2S) and polysulfides (H2Sn)

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Since the identification of endogenous H_2S in the mammalian brain in 1989, studies of this molecule uncovered physiological roles in processes such as neuromodulation, vascular tone regulation, cytoprotection against oxidative stress. We previously demonstrated that H_2S induces Ca^{2+} influx in astrocytes by activating transient receptor potential (TRP) channels. During this study we found that H_2S_n activates TRP channels much more potently than does H_2S and that 3-mercaptopyruvate sulfurtransferase produces H_2S_3 and H_2S_2 that activate TRP ankyrin 1 channels Recently, we demonstrated that the chemical interaction of H_2S with nitric oxide (NO) generates H_2S_2 and H_2S_3, and that it gives a mechanism of a synergistic effect between H_2S and NO. Cysteine persulfide (Cys-SSH) together with its glutathione (GSH) counterpart (GSSH) have been proposed to be involved in redox homeostasis. We will also show that 3-mercaptopyruvate sulfurtransferase (3MST) produces Cys-SSH, GSSH, and persulfurated cysteine residues of proteins under physiological conditions together with H_2S_n and H_2S.