Abstract

Hydrogen sulfide (H_2S), known as a toxic gas for a long time, was recently shown to be an important signaling molecule. Hydrogen sulfide is produced in small concentration in organism and exhibits a physiological role in many tissues (brain, blood vessels, lungs). Hydrogen sulfide is mostly formed enzymatically from L-cysteine by two enzymes - cystathionin β-synthase (CBS, EC 4.2.1.22, L-serine hydro-lyase) occurring especially in the brain and cystathionine γ-lyase (CSE, EC 4.4.1.1, L-cystathionine cysteine-lyase) generating hydrogen sulfide mainly in the small intestine, portal vein and thoracic aorta. In vessels hydrogen sulfide acts as a vasorelaxant factor and reduces blood pressure while in the brain it is involved in neuronal transmission. In addition to these effects, hydrogen sulfide plays a role in inflammatory processes as well as in the transmission of pain. Hydrogen sulfide acts through activation of K_{ATP} channel (in blood vessels, digestive tract, and in inflammation), activation of NMDA receptors (brain), reduces molecules causing oxidative stress (lungs, brain) and affects influx of Ca^{2+} ions into the cells (retina). Based on these findings it is apparent that the modulations of metabolism of hydrogen sulfide may have a therapeutic potential, e.g. in vascular disease or in inflammation. Present research focuses elucidating the role of hydrogen sulfide in health and disease and on finding possible pharmacological agents modulating the metabolism of H_2S.

Key words: Hydrogen sulfide (H_2S), cystathionine β-synthase (CBS), cystathionine γ-lyase (CSE), vazorelaxant factor, hypertension, K_{ATP} channels