

Pflugers Archiv European Journal of Physiology 2010 vol.459 N3, pages 389-397

Hydrogen sulfide increases calcium-activated potassium (BK) channel activity of rat pituitary tumor cells

Sitdikova G., Weiger T., Hermann A.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

Hydrogen sulfide (H₂S) is the third gasotransmitter found to be produced endogenously in living cells to exert physiological functions. Large conductance (maxi) calcium-activated potassium channels (BK), which play an important role in the regulation of electrical activity in many cells, are targets of gasotransmitters. We examined the modulating action of H₂S on BK channels from rat GH3 pituitary tumor cells using patch clamp techniques. Application of sodium hydrogen sulfide as H₂S donor to the bath solution in whole cell experiments caused an increase of calcium-activated potassium outward currents. In single channel recordings, H₂S increased BK channel activity in a concentration-dependent manner. Hydrogen sulfide induced a reversible increase in channel open probability in a voltage-dependent, but calcium independent manner. The reducing agent, dithiothreitol, prevented the increase of open probability by H₂S, whereas, the oxidizing agent thimerosal increased channel open probability in the presence of H₂S. Our data show that H₂S augments BK channel activity, and this effect can be linked to its reducing action on sulfhydryl groups of the channel protein.

<http://dx.doi.org/10.1007/s00424-009-0737-0>

Keywords

Gasotransmitter, GH3 cells, H₂s, Maxi calcium-activated potassium channel patch clamp