EXPANDED ABSTRACT

The essential role of luminal BK channels in distal colonic K⁺ secretion

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Abstract : Distal colonic K⁺ excretion is determined by the balance of K⁺ absorption and K⁺ secretion of the enterocytes. K⁺ secretion occurs via active basolateral K⁺ uptake mostly via the NKCC1 co-transporter followed by K⁺ exit via a luminal K⁺ channel. The specific focus here is directed towards the luminal secretory K^{+} channel (1). Several recent observations highlight the pivotal role of the large conductance, Ca²⁺-activated K_{Ca}1.1 (BK, KCNMA) channel as the only functionally relevant luminal K⁺ efflux pathway in mouse distal colon (2, 3). This conclusion was based on defining results from BK knock-out mice. The following key observations were made: 1. BK channels mediate the resting distal colonic K⁺ secretion (2, 4), 2. They are acutely stimulated by activation of luminal nucleotide receptor and elevations of intracellular Ca²⁺ (2, 4, 5), 3. Colonic BK channels are up-regulated by increases of plasma aldosterone (3), 4. In addition, the cAMP-stimulated distal colonic K⁺ secretion is apparently mediated via BK channels, 5. Finally, aldosterone was found to up-regulate specifically the ZERO (e.g. cAMP activated) C-terminal splice variant of the BK channel. In summary, we suggest that the sole exit pathway for transcellular K⁺ secretion in mammalian distal colon is the BK channel, which is the target for short term intracellular Ca²⁺ and cAMP activation and long term aldosterone regulation. J. Med. Invest. 56 Suppl.: 301, December, 2009

Keywords : *K*⁺ *channel, ion secretion, colon, epithelium*

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