THE ROLE OF POTASSIUM ION CHANNELS IN COUGH AND OTHER DEFENSE REFLEXES OF AIRWAYS

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Background: The aim of our experiments was to prove the involvement of ATP sensitive (K^+_{ATP}) and large conductance calcium-activated (BK^+_{Ca}) potassium ion channels in airway sensory nerves activity which mediate cough and other reflexes resulting in the peripheral release of neuropeptides and increased airway smooth muscles reactivity.
Material and methods: We tested whether the openers of both potassium ion channels, K^+_{ATP} - pinacidil and BK_{Ca} – NS 1619, inhibit cough reflex and modulate the airway smooth muscle (ASM) reactivity *in vivo* as well as *in vitro* conditions in guinea pigs. The cough reflex was induced chemically by exposure to 0.3 M citric acid (CA) aerosol for a 3 min. The cough effort was defined as a sudden enhancement of expiratory flow accompanied by a typical cough movement recognized by a trained observer. The cough response was expressed as a total number of coughs during CA exposure. The airway smooth muscle reactivity in *in vivo* conditions was expressed as a value of specific airway resistance calculated as time difference of pressure changes by Pennock. The changes of the ASM reactivity in *in vitro* conditions in response to cumulative doses of contractive mediators (histamine and acetylcholine) after administration of NS 1619 and pinacidil were tested bya method of tissue bath.
Results: Our experiments showed following results:
1. Both openers of potassium ion channels inhibit citric acid induced cough. Their effect was prevented by pretreatment of selective blockers, K^+_{ATP} - glibenclamide and BK^+_{Ca} – tetraethylammonium chloride.
2. ASM reactivity in *in vivo* conditions was significantly reduced by pinacidil and NS 1619 and almost completely antagonized by pretreatment of ion channels blockers.
3. The results of *in vivo* ASM reactivity measurements corresponded with the above mentioned findings.
Conclusions: The study shows that both K^+_{ATP} and BK_{Ca} ion channel activation inhibited airway sensory nerves and played an important role in the mechanisms of cough and other reflexes accompanied with ASM reactivity.

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