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CHANGES OF CALCIUM-ACTIVATED POTASSIUM CHANNEL EXPRESSIONS IN RAT BLADDER AND URETER AFTER RELIEVING PARTIAL BALDDER OUTLET OBSTRUCTION

Hypothesis / aims of study
Recent several studies demonstrate that calcium activated potassium channel (K_{Ca}) may have a significant role in the urinary function and dysfunction and be an important therapeutic target. Here, we examine the changes of K_{Ca} expression following partial bladder outlet onstruction (BOO) and after relieving to clarify whether alterations in K_{Ca} channel expression underlying pathologies such as overactive bladder

Study design, materials and methods
Temporary BOO was induced by partial urethral ligation in 40 male Sprague Dawley rats and sham operation in 20 rats. BOO was relieved 2 week, 3 weeks after partial ligation and bladder and ureter were quickly removed, frozen in liquid nitrogen, and measured alterations of mRNA levels of K_{Ca} using reverse-transcription polymerase chain reaction.

Results
SK3 mRNA in urinary bladder was upregulated up to 2,5-fold 2 weeks after BOO, while BK, IK, SK1, and SK2 mRNAs were not changed significantly. Three weeks after BOO, BK mRNA was lower than sham-controls, whereas IK, SK1, and SK2 transcript signals were increased up to 2- to 4-fold. However, SK3 mRNA was similar to that in sham-controls. Significant increases of SK1 and SK2 mRNAs continued 6 and 4 weeks after BOO, respectively. After 3 weeks-obstruction and 3 weeks-remove, SK1 mRNA was similar in BOO and sham control rats. In ureter, changes of IK, SK1, and SK2 mRNA levels were demonstrated earlier than those in urinary bladder. After 2 week K_{Ca} messages, except BK, in BOO rats were decreased significantly compared with those in sham controls. Lowering of IK and SK3 mRNAs persisted throughout 4 weeks following BOO. BK and SK1 messages were still lower in BOO rats than those in control rats 6 weeks following obstruction. SK2 mRNA was similar in 3 weeks after BOO and upregulated up to 1.5-fold 4 weeks following surgery. Alterations of K_{Ca} messages, except SK1 and SK3, were vanished by relieving of BOO for the identical periods following 2 or 3 weeks obstruction. SK1 mRNA was continuously lowerer after 3 weeks obstruction followed by 3 weeks remove. SK3 mRNA was even increased by relieving of obstruction.

Interpretation of results
These results suggest that in rat bladder and ureter K_{Ca} may have an important role in modulating smooth muscle excitability and contractility, cell proliferation and growth in subtype-, organ-, and pathological stage-specific manners.

Concluding message
In rat bladder and ureter calcium activated potassium channel (K_{Ca}) may have an important role in modulating smooth muscle function and dysfunction.

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