Change of Cajal-like Cells in the interstitium of the bladder in the detrusor overactive rats

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Abstract
Changes of excitability of detrusor may play a significant role in the occurrence of Detrusor Overactivity (DO). The interstitial Cajal-like Cells mainly locates in gastrointestinal tract and urinary tract. Excitability probably originates from (ICCs) in the enteric nervous system. However, ICCs in the bladder have the similar function is not clear yet. We established a model of DO rats to investigate the relationship between the distribution of ICCs and the position of bladder pacemaker in DO rats. Results showed ICCs mainly located in dome of bladder in DO rats and sham rats. Compared to sham rats, the number of ICCs in DO rats increased obviously and the expression of HCN2 and connexin43 increased significantly in DO rats especially in the dome of bladder. It suggest that the change of interstitial Cajal-like Cells in dome of bladder may be the origin of excitability of the detrusor.

Background
ICCs cells were examined within the urinary bladder and proximal urethra of humans and guinea-pigs, using an antibody to nitric oxide synthase. [1]
Increased c-kit expression correlated with ICCs cells number.

Animal model of DO rats
30 female Wistar rats were randomly divided into 2 groups, the DO rats (20) carried out an operation of partial bladder outlet obstruction. the sham group (10) make the same incision without bladder outlet obstruction. It weeks later, undynamic evaluation was performed. Wave caused by detrusor contract was seen obviously during filling cystometry in the DO rats. The contractions may be phasic or terminal.

1. c-kit expression in different part of bladder

Correlation between C-kit and HCN2

2. co-expression of Connexin 43 and c-kit in bladder

3. the expression of HCN2 in different part of bladder

Summary
1. ICCs mainly located in dome of bladder in both group, the number of ICCs in DO rats growth obviously compare to normal group.
2. There is a significant difference of expression of c-kit, HCN2 and connexin43 between the dome wall and other parts of DO rat bladder while normal control group have not been seen. It hint the quantity, function, excitability and signal transmission of Cajal-like cells of interstitial are enhanced in DO rats.

Conclusion: The bladder pacemaker is more likely located in the dome wall of bladder in DO rats.

Reference