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DISTRIBUTION OF HYPERPOLARIZATION-ACTIVATED CYCLIC NUCLEOTIDE-GATED CATION CHANNEL SUBTYPES IN RAT URINARY BLADDER

Hypothesis / aims of study

To investigate the distribution of hyperpolarization-activated cyclic nucleotide-gated (HCN) channel and its isoforms in bladder, especially in bladder interstitial cell of Cajal (ICC).

Study design, materials and methods

HCN subtypes were observed in rat bladder tissue preparation by double-labeled immunofluorescence. Density of HCN immunopositive bladder ICCs were evaluated by counting the number of cells with elongated lateral branches and stained both by HCN and c-kit (CD117) antibodies in bladder dome, corpus and trigone regions under 400×magnification.

Results

The expression of HCN was confirmed in bladder ICCs by double-labeled fluorescence through co-labeling of HCN and c-kit. HCN3 was barely founded on ICCs all through the bladder. HCN1 was the most prominent isolations and located mainly in bladder dome. HCN2 has the similar location features as HCN1. However, HCN4 mainly located in the bladder corpus. The exact distribution density of HCN isoforms was shown below.

Table 1. Density of HCN positive ICCs in different locations of normal bladder(/field,n=12)

	Dome	Corpus	Trigone
HCN1+ ICCs*	13.75±2.86	11.00±3.52	7.83±3.01
HCN2+ ICCs	9.75±2.80	8.75±2.18	4.17±1.59
HCN3+ ICCs	0.33±0.65	0.42±0.51	0.08±0.29
HCN4+ ICCs	6.50±3.87	8.83±3.04	3.25±2.22

*: $p < 0.05$ vs. HCN2+, HCN3+, HCN4+ ICCs

Interpretation of results

There were HCN channels expressed on bladder ICCs which was thought to be a “pacemaker” and “transfer station” in urinary bladder. HCN channel may play important role in initiating electric activities and neurotransmission. ICCs with different HCN subtypes may participate in different physiological functions.

Concluding message

Three HCN channel isoforms exist in the bladder, especially on bladder ICCs. HCN1 took the most dominant position and HCN3 cannot be detected in dome, corpus and trigone regions.

Disclosures

Funding: This study was supported by the National Natural Science Foundation of China (No.81000288,81070606), and the Chongqing Scientific Foundation (CSTC2010BA5005). The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the report. **Clinical Trial:** No **Subjects:** ANIMAL **Species:** rat **Ethics Committee:** Research Council and Animal Care and Use Committee of Third Military Medical University,China