

## **Primary Sensory Neurons Innervating the Urinary Bladder Express T-Type Calcium Channel Modulating the Function of the Bladder Contractions in Cystitis**

**Introduction and Objective:** The roles of sensory neurons in bladder function are gradually being explained. We hypothesized that modulation of the sensitivity of sensory neurons innervating the urinary bladder changes the bladder function. Low-voltage-activated T-type Calcium (Ca) channel is considered to modulate the sensitivity of neurons and was investigated in primary sensory neurons innervating the urinary bladder.

**Materials and Methods:** Sprague-Dawley rats (female, 200-250g) were used. Dorsal root ganglions at L6-S1 level were investigated with RT-PCR technique and immunohistochemical analysis for detecting expression of low-voltage-activated T-type calcium channel. Animals were anesthetized using sodium pentobarbital (50 mg/kg, i.p.), and, via a midline laparotomy, Fast Blue as retrograde neuron tracer was injected around the bladder wall with 26G Hamilton micro syringe. After a two-month survival interval, these animals were divided into two groups, control group and cystitis model group. Cyclophosphamide (150mg/kg, i.p. 48 hour before sacrifice) was used to induce cystitis. Frozen section of DRGs at L6-S1 level in each groups were made and studied with immunohistochemical analysis.

**Results:** Weak expression of T-type Ca channel subtype  $\alpha 1G$  and strong expression of subtype  $\alpha 1H$  in DRGs at L6-S1 level were detected by RT-PCR. T-type Ca channel subtype  $\alpha 1H$  was detected on parts of neuronal cell bodies. Subtype  $\alpha 1I$  was not detected on DRG by either RT-PCR or immunohistochemical analysis. The low-voltage-activated T-type calcium channel subtype  $\alpha 1H$  was partially stained immunohistochemically on primary afferent neurons innervating the urinary bladder demonstrated by retrograde neuron tracer in the control group and cystitis group. The expression rate of T-type Ca channel subtype  $\alpha 1H$  on bladder primary afferent neurons was higher in the cystitis group than in the control group.

**Conclusions:** Low-voltage-activated T-type calcium channel subtype  $\alpha 1H$  is partially expressed on primary afferent neurons innervating the urinary bladder. T-type Ca channels open with small voltage alternation and are considered to be a modulator of sensitivity of sensory neurons. Regulation of the expression rate of these T-type Ca channels has a possible role in regulation of bladder activity.