

THE INFLUENCES OF OVARIECTOMY AND LONG-TERM ESTROGEN REPLACEMENT ON BLADDER SENSITIVITY IN THE RAT

Hypothesis / aims of study

The change in bladder function associated with the postmenopausal state, such as overactive bladder and hypersensitive bladder, are believed to be due to in part to estrogen deficiency. To date research on the success of estrogen replacement for bladder dysfunction has been laden with controversy. Although several in vitro studies in ovariectomized rats have shown changes in the contractility of the detrusor, there have been few in vivo studies, especially focusing on the sensory nerve of the bladder. Using an ovariectomized animal model, we investigated whether estrogen and progesterone act on C-fiber afferent activity. Furthermore, estrogen deficiency has been reported to be related to decrease in 5-HT_{1A} (serotonin) receptor in the spine. We also examined the influence of intrathecal administration of tandospirone, 5-HT_{1A} agonist, on the micturition reflex in the ovariectomized rat.

Study design, materials and methods

Sprague-Dawley female rats were placed divided into 6 treatment groups, including sham operated (SO), bilateral ovariectomy (OVX), OVX plus β -estradiol (10 μ g/day) replacement (OVXe), OVX plus progesterone (500 μ g/every 4 day) replacement (OVXp), OVX plus β -estradiol/progesterone replacement (OVXep), and OVX pretreated with resiniferatoxin (0.3 mg/kg, subcutaneously; OVXr) groups. For cystometric evaluation 6 weeks after OVX the animals underwent cystostomy catheterization. At 3 days after surgery, animals underwent cystometry analysis using physiological saline or potassium chloride (3.3 μ M). Intrathecal administrations of tandospirone (0.1 – 10 mg/ml; 0.5 μ l) were carried out in SO and OVX rats.

Results

When cystometry was achieved by infusing physiological saline, there were no differences in bladder capacity among 5 treatment groups. When infusing potassium chloride, however, significant decrease in bladder capacity was found in OVX and OVXp groups. Bladder capacities in OVXe, OVXep, and OVXr groups were not different from those in SO groups. Intrathecal administrations of tandospirone significantly increased bladder capacity in OVX rats, when compared to bladder capacity in SO rats.

Interpretation of results

The present study suggests that estrogen deficiency is related to the development of bladder hypersensitivity through upregulation of C-fiber bladder afferent activity. Long-term estrogen replacement is beneficial for treating postmenopausal bladder hypersensitivity. The underlying mechanisms of hypersensitive bladder after ovariectomy may be dependent on the change in the spinal 5-HT receptor system.

Concluding message

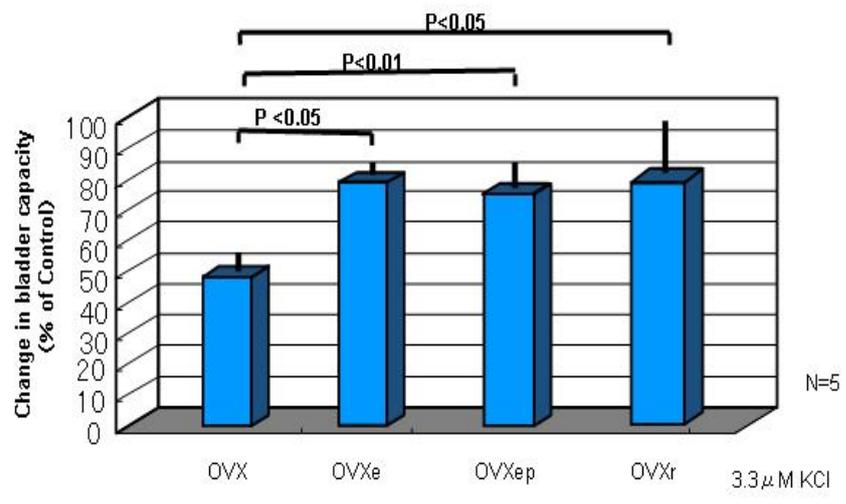
Long-term estrogen replacement is beneficial for treating postmenopausal bladder hypersensitivity.

References

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The journal of urology, vol. 170, 2512~2516, December, 2003

Fig: Change in bladder capacity of OVX, OVXe, OVXep, and OVXr groups when infusing potassium chloride.



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ANIMAL SUBJECTS: This study followed the guidelines for care and use of laboratory animals and was approved by University of Fukui