

## THE DIFFERENT RELATIONSHIP WITH NERVE CENTER FROM NORMAL MICTURITION TO MORBID MICTURITION - COMPARING BETWEEN NORMAL AND CYSTITIS MODEL RAT BY USING C-FOS METHOD

### Hypothesis / aims of study

Recently, an immediate early gene related protein, c-Fos, one of the functional markers of neural activity, was well used in neuroscience field, because which was useful to identify central nucleus related sensory and estimated its activity related in central nervous system. c-Fos also was used in functional and identified of studying micturition related central nucleus, such as midbrain periaqueductal gray matter, pons, and lumbo-sacral cord. However, the relationship of cortex, insula, limbic system, amygdala, basal ganglia, thalamus micturition has not been fully reported. We studied the relationship between central nucleus and micturition, as well as found the different reflex of the nerve center in normal and cystitis micturition.

### Study design, materials and methods

Sprague-Dawley rats (12w, weighing about 300-350g) were used in this study and divided into 2 groups: normal (n=6) and cystitis (n=7) models. Four or three days before studies, a polyethylene tube (PE-50) was inserted into the bladder from the bladder dome with midline abdominal incision under anaesthesia. Then, rats were kept in metabolic cages in order to settle in to study's condition. Studies were performed in the daytime. Under freely moving and awake conditions, either saline (normal group) or 0.1% acetic acid (cystitis group) was infused continuously into bladder through the polyethylene catheter for 2 h. After the infusional stimulation with frequent storage and voiding cycle, the animals were sacrificed via intracardiac perfusion under deep anesthesia. Then, brain were removed and made into sections. With the use of the avidin-biotin complex (ABC) method, these sections were processed for immunoreactivity to c-Fos protein. All sections were examined with bright-field microscopy. c-Fos positive neurons were counted in observed fields including primary and secondary somatosensory cortex, insula, frontal cingulate cortex, amygdala, thalamus, hypothalamic nucleus, periaqueductal gray matter and brainstem reticular formation. Expression pattern of c-Fos positive neurons in these fields was identified in normal and cystitis model rats and the difference was evaluated.

### Results

In both normal and cystitis group, c-Fos positive neuron was found in all observed fields. In normal group, c-Fos positive neurons were commonly observed in brainstem reticular formation, thalamus and somatosensory cortex. However in periaqueductal gray matter, hypothalamic nucleus, insula and frontal cingulate cortex, c-Fos positive neuron was not common. On the other hand, in cystitis group, c-Fos positive neuron was commonly observed not only in reticular formation, thalamus and somatosensory cortex, but also in periaqueductal gray matter, hypothalamic nucleus, insula and frontal cingulate cortex.

### Interpretation of results

Micturition due to infusional stimulation caused neurons activity in all observe field in this study.

In normal group, neurons activity mainly occurred in reticular formation, thalamus and somatosensory cortex. However in cystitis group, neurons activity also occurred in periaqueductal gray matter, hypothalamic nucleus, insula and frontal cingulate cortex. According to somatosensory system, anterior spinothalamic tract which was supposed to conduct sensory-discriminative aspect, Lateral spinothalamic tract which was supposed to conduct emotional-cognitive aspect

### Concluding message

Micturition is widely related with somatosensory cortex, insula, frontal cingulate cortex, thalamus, hypothalamic nucleus, periaqueductal gray matter and reticular formation. However, under cystitis, the reflect pathway of micturition in nerve center may be different from normal micturition. This difference maybe reflect part of mechanism of morbid micturition of cystitis.

### Disclosures

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