

## MICTURITION-RELATED NEURONAL FIRING IN THE PERIAQUEDUCTAL GRAY AREA IN CATS

### Hypothesis / aims of study

The midbrain periaqueductal gray (PAG) is the area promoting emotional motor responses, reproductive behaviours and analgesia [1]. Recent studies suggest that neurons in the PAG may be crucial for regulating the micturition reflex in both experimental animals [2,3] and humans [4,5].

### Study design, materials and methods

We examined single neuronal activities in the PAG and the adjacent area in response to isovolumetric spontaneous micturition reflexes in the 20 supracollicular decerebrated cats.

### Results

Total 84 neurons were recorded in the PAG area that were related to urinary storage/micturition cycles. Of the neurons recorded, the most common were tonic storage neurons (43%), followed by tonic micturition neurons (29%), phasic storage neurons (15%) and phasic micturition neurons (13%). In addition to the tonic/phasic as well as storage/micturition classification, the neurons showed diverse discharge patterns: augmenting, constant and decremting, and the constant discharge pattern being most common. Of the 16 neurons located within the PAG, which had similar discharge patterns with those just ventral to the PAG, the micturition neurons were distributed in a broader area, whereas the storage neurons seemed to be concentrated in the middle part of the PAG (P0-1, Horsley-Clarke coordinate). High frequency stimulation (HFS; 0.2 ms duration, 100 Hz) applied in the PAG area elicited inhibition of the micturition reflex. Effective amplitude of the electrical stimulation for evoking inhibitory responses was less than 50 microA.

### Concluding message

Inhibition of the micturition reflex by HFS-PAG in the present study was relevant to the results in the previous studies [6,7]. In addition, the present study showed for the first time that there were micturition-related neuronal firings in the PAG in cats, suggesting the PAG is involved in neural control of micturition.

### References

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Figures

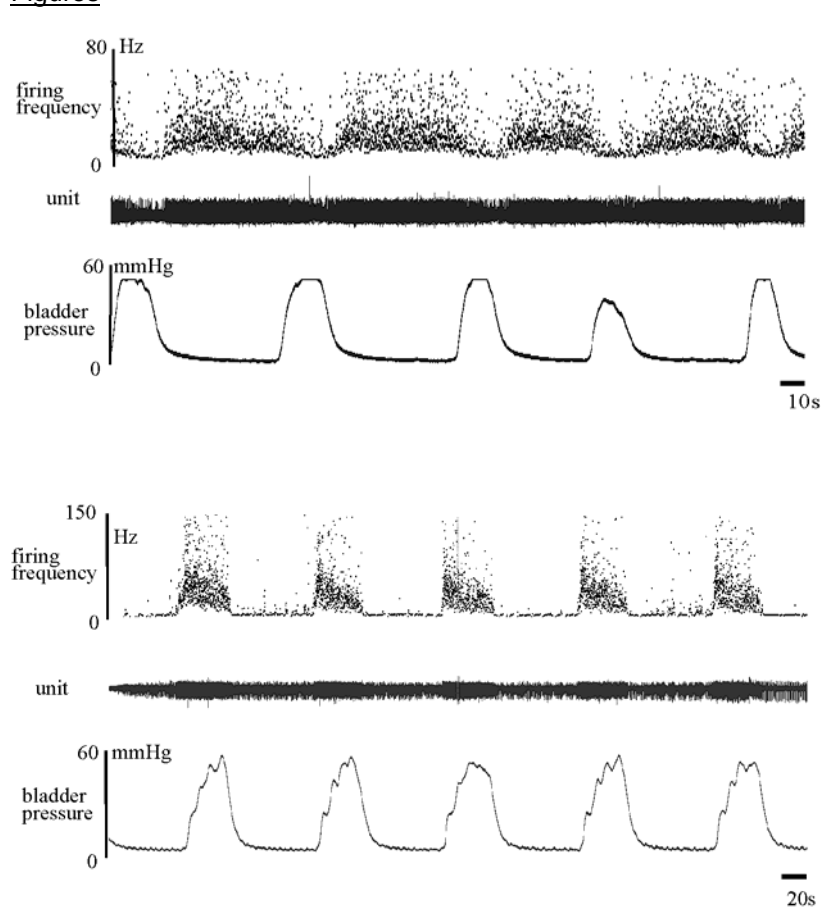


Fig 1 Micturition-related neurons in the PAG. Upper: tonic storage neuron, Lower: tonic micturition neuron.

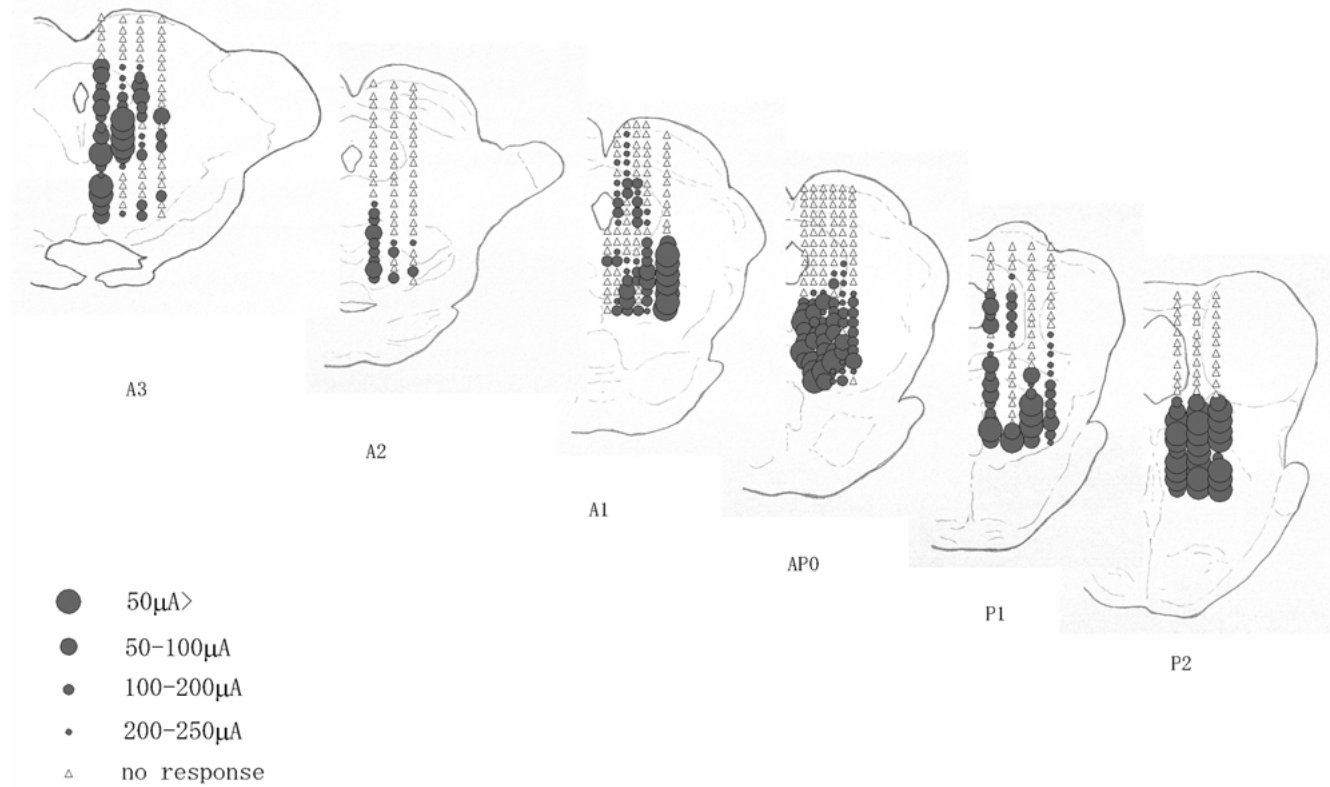


Fig 2 Location of HFS-PAG area that evoked inhibition of micturition.