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**Title:** MICTURITION SUPPRESSION SITES IN THE PERIAQUEDUCTAL GRAY OF THE MIDBRAIN

### **Aims of Study**

It has been confirmed that the midbrain, mainly the periaqueductal gray (PAG), integrated specific movement patterns of the somatic and autonomic nervous system. Recently, Blok et al. found that there was a neural fiber communication between the PAG and the pontine micturition center (PMC). The nerve fibers ascending from the sacral spinal cord have much neural communications with the PAG than those with the PMC. They suggested that the micturition was controlled and regulated by not only the pons but also the midbrain. We have also found that the micturition inducing site was mainly located in the ventrolateral margin of the PAG using electrical and chemical microstimulation technique. If the PAG integrates a lot of information regarding the micturition, we need to know about not only inducing site but also suppression site in the PAG. We investigated whether the PAG had a suppression system for the micturition.

### **Methods**

The cats were decerebrated under a general anesthesia with halothane inhalation and the urethral catheter was inserted. The bladder contraction, electromyogram of the external urethral sphincter, blood pressure, and respiration were monitored simultaneously. After confirming a spontaneous contraction of the bladder, an insulated microelectrode (50 $\mu$ m in diameter) was pierced into the midbrain using stereotaxic equipment and the electrical microstimulation (block pulse, 200 $\mu$ sec, 50Hz) was provided to search for the micturition suppression site. The brainstem was fixed with 10% buffered formalin and serial sections (40-50 $\mu$ m) were prepared to make a stimulated point map.

### **Results**

We found that the sites suppressing spontaneous contraction of the bladder were present at the lateral side of the PAG in the midbrain and they were close to the micturition inducing site (Fig. 1). Electrical stimulation to these sites caused increased blood pressure, but did not affect electromyogram of the sphincter (Fig. 2). When the PAG and the PMC were stimulated simultaneously, the bladder contraction was completely suppressed.

### **Conclusion**

The PAG in the midbrain is strongly related to the micturition. The PAG has two coordinate functions which promote the micturition, while suppress the micturition. The PAG may play another role for controlling the PMC.

Fig. 1 The points where each reaction was observed by the electrical stimulation

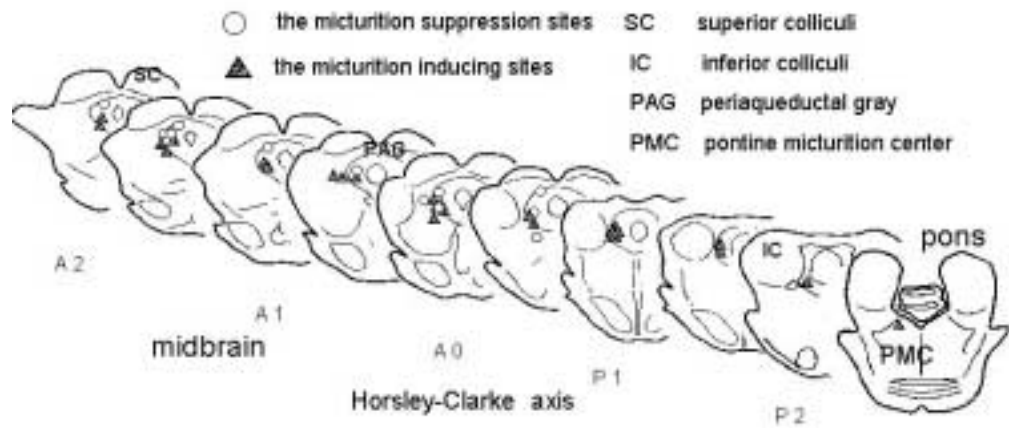


Fig. 2 Electrical stimulation to the micturition suppression site in the PAG

