



HOKKAIDO UNIVERSITY

Title	THE EFFECTS OF NOXIOUS MECHANICAL STIMULATION ON HEART RATE, MEAN ARTERIAL BLOOD PRESSURE AND CYTOTOXIC ACTIVITY OF SPLENIC NATURAL KILLER CELLS IN ANESTHETIZED RATS
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INFORMATION

Hokkaido University granted the Doctor of Veterinary Medical Science Degree to the following 4 reserchers on June 28, 1996, under the regulation (1962) authorizing the granting of the Doctor's degree to qualified researchers who were not graduates of the Graduate School of Veterinary Medicine.

The titles of their theses and other information are as follows :

THE EFFECTS OF NOXIOUS MECHANICAL STIMULATION ON HEART RATE, MEAN ARTERIAL BLOOD PRESSURE AND CYTOTOXIC ACTIVITY OF SPLENIC NATURAL KILLER CELLS IN ANESTHETIZED RATS

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The effects of noxious mechanical stimulation of various segmental areas on heart rate, mean arterial blood pressure and cytotoxic activity of splenic natural killer (NK) cells as well as cardiac, renal and splenic sympathetic nerve activities were examined in anesthetized rats with the central nervous system (CNS) intact or acutely spinalized at the cervical level. The results showed the existence of the two types of reflex responses, supraspinal and propriospinal, in the somato-autonomic reflex. The supraspinal one has characteristics of diffuse reflex organization, while the propriospinal one has strong segmental and lateral organization. The spinal reflex components elicited by segmental input, which are usually depressed by descending inhibitory pathways from the brain in CNS-intact preparation, are augmented or unmasked in spinalized preparation.

Somatic afferent regulation of cardiovascular functions : In CNS-intact rats, pinching for 20 s applied to any segmental skin area, but particularly that of the paw, produced an increase in heart rate, blood pressure and the sympathetic nerve activities. In acutely spinalized rats, pinching the chest, abdomen and back of the body produced large increases, while hindlimb and perineum stimulation induced only a small increase or no increase in heart rate, blood pressure and the sympathetic nerve activities. Stimulation of the right side produced particularly large responses in heart rate and stimulation of the ipsilateral side produced large responses in cardiac and renal sympathetic nerve activities in spinalized rats. Further study was intended to resolve whether both spinal and supraspinal reflex components exist in both A- and C-reflexes of the somato-cardiac sympathetic reflexes elicited by electrical single

shock to somatic afferent nerves in anesthetized rats. In CNS intact rats, a single shock to a segmental spinal afferent nerve produced spinal and supraspinal A- and C-reflex discharges in cardiac sympathetic nerves. On the other hand, a single shock to a tibial afferent nerve evoked supraspinal A- and C-reflex, which were not observed after spinalization. The spinal reflex pathway is segmentally organized, because the spinal reflex is evoked only when stimulation is delivered to afferent nerves close to the cardiac sympathetic outflow segments. With the CNS intact, the spinal reflex component is depressed by descending inhibitory pathways originating in the brain.

Somatic afferent regulation of cytotoxic activity of splenic cells: In CNS-intact rats, bilateral pinching stimulation of the skin of the hindpaws or abdomen for 30 min reduced cytotoxic activity of splenic NK cells and increased splenic sympathetic nerve activity. The pinching-induced suppression of cytotoxic activity of NK cells was abolished after surgical transection of the splenic sympathetic nerves. In acutely spinalized rats, pinching of the abdomen reduced cytotoxic activity of splenic NK cells and increased splenic sympathetic nerve activity, while hindlimb stimulation induced no responses. These results indicate that the suppression of cytotoxic activity of splenic NK following noxious pinching stimulation is reflex response mediated via the splenic sympathetic nerve and that spinal and supraspinal pathways are involved in the reflex responses.

Original papers of this thesis appeared in "Japanese Journal of Physiology", Vol. 44, 651-664 (1994), "Neuroscience Research", Vol. 22, 297-305 (1995), and "Neuroscience Research", (1996, in press).