

Gait Analysis of Decerebellate Rats for Evaluation of Site Specificity of Cerebellar Dysfunction

Cerebellar dysfunction is one of the main causes of motion disorder. In order to relieve the symptom, it is necessary to clarify fundamental cerebellar functions, which will also contribute to the diagnoses, prophylaxes, treatments and rehabilitation of cerebellar dysfunction. And, it is known that cerebellum has a site specificity of function. Clinical cases and animal experiments of animals that have lesions of cerebellum shows that lesion of each area of cerebellum causes different symptoms. However, information about site specificity of cerebellum is incomplete. Especially, there are few studies about how the dysfunction of different area of cerebellum will affect motor function during walking.

In this study, we evaluated the effect of site specificity of cerebellar motor dysfunction of partially decerebellate rat. We presented the hypothesis that disorder of each area of cerebellum causes abnormal posture, decreased muscle tone, lowering movement velocity and influence on emotion function. To validate it, as shown in Fig. 1, we conducted experiments where we made rats, whose medial area or lateral area of cerebellum has been removed, walking a treadmill. We measured the motion and EMG of extensor muscles of their limbs, especially the angles between their limbs and plane when toe off (Fig. 2), their movement velocity on treadmill and voluntary locomotor activity. The results indicated that rats which have removal of medial area show abnormal motion of hindlimbs and rats which have removal of bilateral area show no abnormal motion of their limbs, but rats which have removal of bilateral area and posterior medial area show abnormal motion of forelimbs.

Keywords: decerebellation, site specificity of cerebellar function, gait analysis of slope walking, posture control

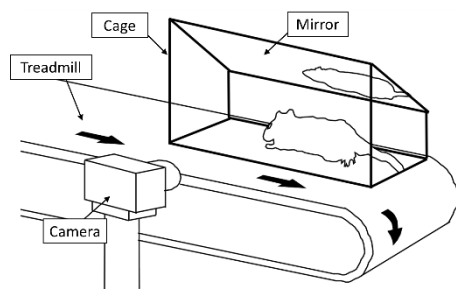


Fig. 1 Equipment of experiment.

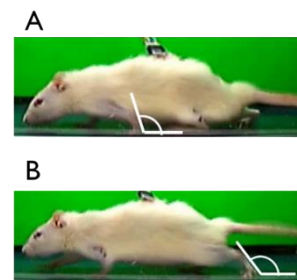


Fig. 2 Measurement of motion of limbs

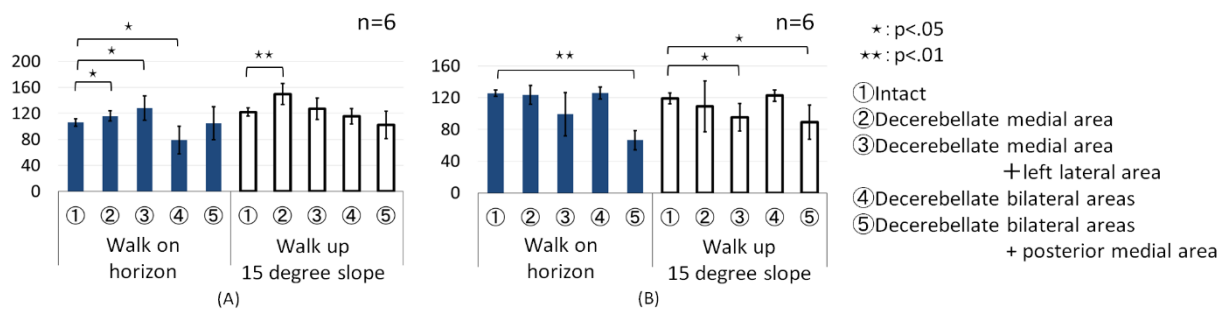


Fig. 3 Measurement of angle between each limb and plane when toe off (A) forelimb (B) hindlimb