別紙様式３（修士申請者用）

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学位論文題名（注：学位論文題名が英語の場合は和訳をつけること）

Exploring the Impact of Hydrocephalus on Awake Resting-State Functional Connectivity of Rodents

齧歯類における覚醒下安静時の機能的連結性と水頭症への影響の探索

学位の種類：　修士（　　放射線学　）
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注：1 ページあたり 1,000 字程度（英語の場合 300 ワード程度）で、本様式 1～2 ページ（A4 版）程度とする。

Introduction: Defects in the movement of the cilia in the ventricles of the brain can cause congenital hydrocephalus, which prevents the normal flow of cerebrospinal fluid. The hydrocephalus gene is associated with brain growth factors. As a result, numerous children with hydrocephalus have cognitive deficits, such as memory issues. Hydrocephalus causes damage to brain structures that is sufficiently predictable to affect brain function. Thus, to understand the resting brain functional network of hydrocephalus, we performed awake resting-state functional MRI (rsfMRI) in rodents with hydrocephalus.

Materials & Methods: Ten-week-old awake hydrocephalic rats (n = 5, Male, Charles River) and healthy control rats (n = 5, Male, Clea) were scanned using a 9.4T-MRI scanner and a custom-made rat head coil for T2WI and rsfMRI data. Then, we co-registered 130 regions of interest (ROIs) with the standard F344 atlas and evaluated the significant difference in functional connectivity between the two groups. Furthermore, a Mann-Whitney's U test with Bonferroni correction ($\alpha = 0.05$) was used to compare brain functional connectivity in both groups.

Results: There were no obvious similarities between the two groups. Eight resting-state functional networks (rs-FN) in the cortex of the hydrocephalic group show a statistically significance and significant difference compared to the control group.

Discussion: We assumed that a significant loss of connectivity, for instance in the memory related primary somatosensory region, is characteristic of hydrocephalus. The functions related to regions in the found functional networks must indicate an association with a composite hydrocephalus phenotype.

Conclusions: Results highlight the availability of significant rs-FN in hydrocephalus rats, associated with the functional decline. This is a new translational diagnostic approach to hydrocephalus in humans.