Calculation of optimal TI associated with temperature changes of the water using Synthetic MRI

Ryuya Okawa[1) 2)] Go Yasui[1)] Yoshihiro Kanai[1)] Ban Mihara[3)] Norio Hayashi[4)] Akio Ogura[4)]

1)Department of Diagnostic Imaging , Mihara Memorial Hospital, Japan

2)Graduate School of Radiological Technology, Gunma Prefectural College of Health Sciences, Japan

3)Department of Neurology, Mihara Memorial Hospital, Japan

4)Department of Radiological Technology, Gunma Prefectural College of Health Sciences, Japan

[Purpose]

In postmortem brain fluid-attenuated inversion recovery (FLAIR) imaging, cerebrospinal fluid (CSF) signal suppression may be poor due to the effect of T_1 value fluctuations associated with body temperature changes. Therefore, it is necessary to measure the T_1 value corresponding to the temperature change of CSF and calculate the appropriate inversion time (TI). In this study, we calculated the optimal TI for fluctuations in the T_1 value associated with water temperature changes using the Synthetic magnetic resonance imaging (MRI) and investigated whether it was useful for suppressing water signals in FLAIR imaging by phantom experiments.

[Materials and Methods]

We performed phantom experiments by changing the temperature of pure water by 5 degrees, from 10 to 35 degrees. Synthetic MR images were obtained and the optimal TI for each phantom was calculated. A FLAIR image was obtained for each phantom set to a clinical TI (2700 ms) and the optimal TI; the signal intensity of each phantom was measured and compared with the two types of FLAIR images.

[Results]

The signal intensity of each phantom in the FLAIR image set to the optimal TI was lower than that in the FLAIR image set to the clinical TI at all temperatures.

[Conclusion]

Using the optimal TI calculated by Synthetic MRI, we were able to obtain FLAIR images that suppressed the water signal appropriately. Therefore, using Synthetic MRI is effective for calculating the optimal TI associated with water temperature changes.