

# THE USEFULNESS OF DIFFUSION-WEIGHTED IMAGING (DWI) AND APPARENT DIFFUSION COEFFICIENT (ADC) VALUE FOR THE DIAGNOSIS AND THE ASSESSMENT OF THE THERAPEUTIC EFFECT ON AUTOIMMUNE PANCREATITIS (AIP)

Keizo Tanitame<sup>1</sup>, Yuko Nakamura<sup>1</sup>, Yoko Kaichi<sup>1</sup>, Chihiro Tani<sup>1</sup>, Yukiko Honda<sup>1</sup>, Miyuki Takasu<sup>1</sup>, and Kazuo Awai<sup>1</sup>  
<sup>1</sup>Diagnostic Radiology, Graduate School of Biomedical Sciences, Hiroshima University, Hiroshima, Hiroshima, Japan

## Problem

It is difficult to differentiate between mass-forming autoimmune pancreatitis (AIP) and pancreatic carcinoma. DWI may be useful for identifying mass-forming AIP and pancreatic carcinoma, and the ADC value of DWI may be a quantitative evaluation method for the differentiation of them and the assessment of the severity of AIP. We retrospectively compared the ADC values of healthy pancreatic parenchyma, IgG4-related AIP, IgG4-negative AIP with normal serum IgG4 levels and pancreatic carcinoma and investigated their usefulness in the follow-up of patients with IgG4-related AIP during steroid therapy.

## Methods

We enrolled 35 subjects with normal pancreas, 17 patients with AIP (IgG4-related AIP: 10, IgG4-negative AIP: 7), 27 patients with pancreatic carcinoma and one patient with malignant lymphoma, and we used a 1.5-T MR scanner with an 8-channel phased array body coil. Free-breathing single shot spin-echo based diffusion-weighted images in the axial plane were acquired at TR 6000 ms, TE 74 ms, FOV 280x350 mm, matrix 128x192, slice thickness 6 mm, b-value 1000 s/mm<sup>2</sup>, 6 acquisitions. We computed ADC maps with manufacturer-supplied software and placed regions of interest on the pancreatic parenchyma of normal subjects and on pancreatic lesions. Mean ADC values were compared among normal pancreatic parenchyma, IgG4-related AIP lesions, IgG4-negative AIP lesions, carcinomas and malignant lymphoma. Follow-up analysis using ADC values of AIP lesions and serum IgG4 levels in 6 patients with IgG4-related AIP was performed during steroid therapy.

## Results

The median ADC values of healthy pancreatic parenchyma, pancreatic lesions of IgG4-related AIP, IgG4-negative AIP and carcinoma were 1.56x10<sup>-3</sup> mm<sup>2</sup>/sec (range, 1.09-2.06x10<sup>-3</sup>), 1.06x10<sup>-3</sup> mm<sup>2</sup>/sec (0.92-1.23x10<sup>-3</sup>), 0.99x10<sup>-3</sup> mm<sup>2</sup>/sec (0.85-1.25x10<sup>-3</sup>), and 1.20x10<sup>-3</sup> mm<sup>2</sup>/sec (0.90-1.72x10<sup>-3</sup>), respectively; they were significantly lower in AIP lesions and carcinomas than normal pancreatic parenchyma (p < 0.001, each). Although the ADC values were significantly lower in IgG4-related AIP, IgG4-negative AIP lesions than carcinoma (p = 0.007 and 0.005, respectively), there was considerable overlap (Fig.1). During steroid therapy, ADC values increased in a week in all 6 patients with IgG4-related AIP (Fig.2) while serum IgG4 decreased in only 3 patients.

## Conclusion

ADC values of DWI may be useful for differentiating between AIP and malignant pancreatic tumors and for assessing the effect of steroid therapy in patients with IgG4-related AIP.

## References

1. Lee S, Byun J, Park B, et al. (2008) Quantitative analysis of diffusion-weighted magnetic resonance imaging of the pancreas: usefulness in characterizing solid pancreatic masses. *JMRI* 28:928-36
2. Sahani DV, Sainani NI, Deshpande V, et al. (2009) Autoimmune pancreatitis: disease evolution, staging, response assessment, and CT features that predict response to corticosteroid therapy. *Radiology* 250:118-29
3. Taniguchi T, Kobayashi H, Nishikawa K, et al. (2009) Diffusion-weighted magnetic resonance imaging in autoimmune pancreatitis. *Japanese Journal of Radiology* 27:138-42
4. Moon SH, Kim MH, Park DH, et al. (2008) Is a 2-week steroid trial after initial negative investigation for malignancy useful in differentiating autoimmune pancreatitis from pancreatic cancer? A prospective outcome study. *Gut* 57:1704-12
5. Chari ST, Smyrk TC, Levy MJ, et al. (2006) Diagnosis of autoimmune pancreatitis: the Mayo Clinic experience. *Clin Gastroenterol Hepatol* 4: 1010-6

Mean ADC value (X10<sup>-3</sup>mm<sup>2</sup>/s)

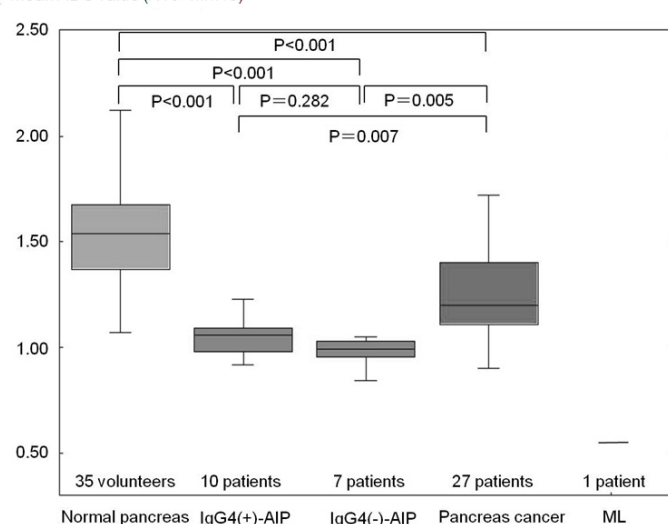


Fig.1 Comparison of mean ADC values among healthy pancreatic parenchyma, IgG4-related AIP, IgG4-negative AIP, pancreatic carcinoma and malignant lymphoma.

Mean ADC value (X10<sup>-3</sup>mm<sup>2</sup>/s)

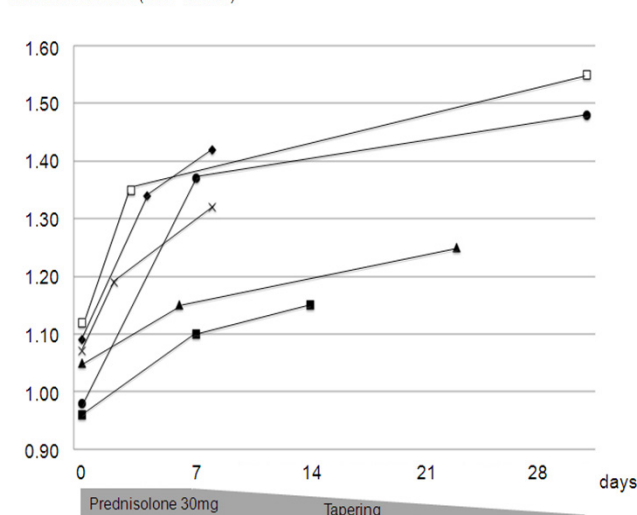


Fig.2 Changes of ADC value in IgG4-related AIP lesions during steroid therapy.