

# Autoimmune Pancreatitis: MRI pattern including manganese enhancement

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## Purpose

Autoimmune pancreatitis (AIP) is a rare form of chronic pancreatitis based on an autoimmune inflammatory process (1, 2). Up to 5% of all cases of chronic pancreatitis are thought to be AIP (2). It may be focal or diffuse. Typical cross sectional imaging characteristics for AIP include enlargement of the affected parts of the gland, irregular narrowing of the main pancreatic duct and reduced and delayed contrast uptake. To avoid unnecessary surgery focal forms of AIP have to be distinguished from pancreatic adenocarcinoma, while the main differential diagnoses for the diffuse form are pancreatic lymphoma and mild acute pancreatitis. The purpose of this study was to describe MR imaging characteristics of 12 patients with AIP with special emphasis on the value of manganese (MnDPDP, Teslascan®) as a pancreas specific contrast agent.

## Materials and Methods

Twelve patients (8 male, 4 female; Ø 46y) with confirmed AIP underwent MR imaging including MnDPDP (10 patients) and DWI (2 patients). Imaging was performed on a 1.5 T system (Siemens Symphony, Siemens Medical Systems, Erlangen, Germany) using gadopentetate dimeglumine for dynamic perfusion imaging (7 patients), followed by the application of MnDPDP. T1w-GE sequences were acquired after 60 and 90 minutes. Images were analyzed for typical imaging features of AIP. Special focus was set on pancreatic enhancement after manganese application and appearance on DWI (2 patients). Follow-up MRI was available in 8 patients, 4 of which received treatment with steroids.

## Results

Focal enlargement was found in 9 of 12 patients (75%), diffuse enlargement in 3 patients (25%). Affected parenchyma showed hypoattenuation in the arterial phase in 7 of 7 patients (100%) (Figure 1). 60-90 minutes after manganese application the normal pancreas showed enhancement with clear hypoattenuation of the affected areas in 10 of 10 patients (100%). The main pancreatic duct (MPD) was irregularly narrowed or occluded in 12 of 12 patients (100%). All 4 patients who received steroid therapy showed a significantly improved imaging appearance in follow-up examinations. A 62-year-old patient (Figure 2) who had a typical irregular narrowing of the MPD also showed a concomitant stenosis of the common bile duct with cholestasis, which completely resolved after steroid therapy. DWI was available in two patients, both of which showed significant restriction of diffusion (ADC 776-799 mm<sup>2</sup>/s).

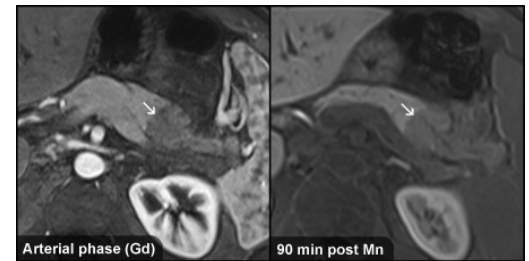
## Conclusions

Autoimmune pancreatitis is a form of chronic pancreatitis that is very difficult to diagnose because it is rare and might mimic lesions like pancreatic cancer if focal, or lymphoma if diffuse. MRI seems to be the most promising imaging modality for the evaluation of suspected AIP: Manganese is a pancreas specific contrast agent that identifies areas of focal AIP with 100% sensitivity in our cohort. A second advantage of MRI is the superior depiction of the pancreatic and biliary duct system (Figure 2) especially in cases of mild ductal irregularities, which also were detected in 100% of our patients. Thirdly, dynamic contrast-enhanced T1-weighted imaging of the pancreas can achieve a temporal resolution of less than 15 seconds, providing several arterial phases and thus enabling the radiologist to pick the optimal phase for the evaluation of early pancreatic contrast uptake (Figure 1, left image). Computed tomography on the other hand can usually only acquire one arterial phase, either with a fixed delay or with bolus tracking techniques, occasionally missing the optimal pancreatic phase. However, further work is necessary to confirm our hypothesis of the superiority of MRI over CT regarding the detection of subtle perfusion abnormalities in early AIP. In diffusion-weighted images both of our patients showed a significant restriction of diffusion (Figure 3) within the inflamed pancreatic tissue. Since both pancreatic adenocarcinoma (4) and lymphomatous infiltrations could result in focal or diffuse restriction of diffusion, the value of DWI for inclusion or exclusion of these lesions is limited. Regarding DWI in acute pancreatitis there is only one recent case report (5) in the literature stating that the inflamed tissue has lower ADC values compared to healthy pancreas. This seems somewhat anti-intuitive, since most acute inflammatory processes are characterized by an increased extracellular space due to edema, which should result in higher ADC values.

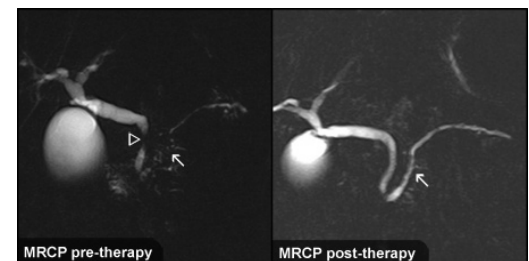
Especially considering the similar clinical presentation of AIP and mild acute pancreatitis further efforts are needed to evaluate the possible differentiation of these two entities with the help of DWI.

## References

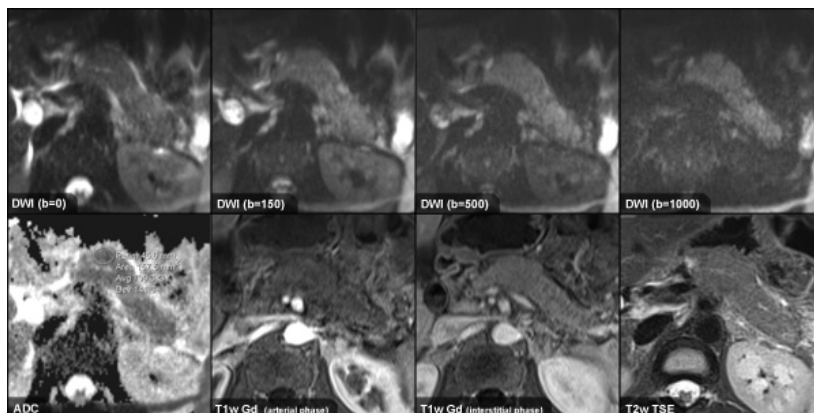
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**Figure 1:** 37 year-old male with AIP. Note the reduced uptake of gadolinium (left) and manganese (right) by the affected pancreas (white arrows)



**Figure 2:** 62 year-old male with AIP. Note the irregular narrowing of the pancreatic duct (arrow) and stenosis of the CBD (arrowhead). All pathological findings resolved after steroid therapy.



**Figure 3:** 33 year-old male with diffuse AIP. No contrast enhancement in the arterial phase. Note the loss of lobulation and the restricted diffusion (ADC 799 mm<sup>2</sup>/s).