Diagnosis of chronic pancreatitis with secretin-enhanced diffusion-weighted MR imaging

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Purpose: A prior study has looked at the usefulness of secretin-enhanced diffusion-weighted imaging (DWI) could differentiate normal from chronic pancreatitis (CP) patients (1). We wished to determine if DWI at 3.0 T MRI is able to diagnose not only the presence of but also the severity of CP.

Methods: This prospective study was HIPAA-compliant and approved by the institutional review board. Patients with known CP and healthy volunteers were recruited and scanned after informed consent. The Cambridge classification (2) was used to categorize patients with known CP as having mild or severe disease. Healthy volunteers were deemed to have normal pancreas. Serial DWI and MRCP sequences (Table1) were acquired before and every minute for 15 minutes after intravenous injection of 18.5 mcg of new synthetic human secretin formulation (RG1068, RepliGen Corp., Waltham, MA) using a 3.0 T MRI (Siemens Trio Tim, Erlangen, Germany). The apparent diffusion coefficient (ADC) of the head, body and tail of pancreas were measured for each DWI scan.

Results: 28 subjects were enrolled (15 normal, 5 mild CP, 8 severe CP). Patients with mild or severe CP were older than those without pancreatitis (p=0.01); there was no gender difference between the groups. Pre-secretin and maximum post-secretin ADC values were higher in normal volunteers than in either mild or severe CP groups (all $p \leq 0.01$) (Table 2, Figure 1). Though maximum ADC was higher in mild CP compared to severe CP, the difference was not statistically significant ($p=0.28$). Percent increase in ADC post-secretin and the time to peak ADC did not vary significantly among groups. Pre-secretin ADC 220 x 10^{-5} mm^2/sec was optimal for delineating normal from CP patients.

Conclusion: Pancreatic ADC obtained with DWI at 3.0T may aid in the diagnosis of chronic pancreatitis. ADC response to secretin administration does not reliably categorize the severity of chronic pancreatitis.

Table 1. MR sequences

MRCP Sequences	TR (ms)	TE (ms)	Flip angle	Slice thickness (mm)	Matrix
MRCP thick slab coronal	2000	750	180	40	256 X 256
DWI SE-EPI axial*	1000	57	90	10	128 X 96

* SE EPI = Single shot echo planar imaging with breath-hold, NEX of 1
b values of 0, 200, 400 sec/mm^2, GRAPPA acceleration factor of 2

Table 2. ADC response to secretin, by pancreatitis severity; ADC values are x 10^{-5} mm^2/sec

	Mean ADC (SD)			p values *		
	Normal	Mild CP	Severe CP	All groups	Normal vs. Mild CP	Mild vs. Severe CP
Pre-secretin	244.5 (53.1)	162.4 (31.7)	177.3 (22.9)	<0.01	<0.01	0.25
Maximum post-secretin	315.9 (56.3)	226.0 (42.6)	246.3 (49.7)	<0.01	<0.01	0.28
% increase post-secretin	32.0 (23.0)	41.0 (23.1)	35.9 (29.2)	0.59	0.38	0.97
Time to peak (min)	5.2 (4.1)	4.6 (5.3)	7.5 (4.6)	0.38	0.84	0.27

*All groups - Kruskal-Wallis test; normal vs. mild, normal vs. severe, mild vs. severe: Mann-Whitney test

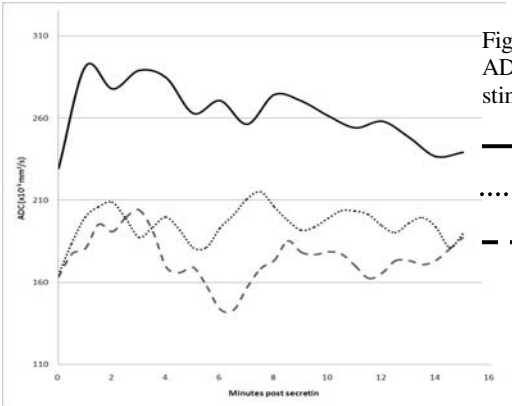

Figure 1. Variation in ADC with secretin stimulation.

References

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