

## Pancreatic Cancer Screening and Surveillance with MRI – 7 Year Experience

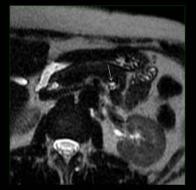
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**Introduction:** The incidence of pancreatic cancer is low however it is a lethal disease being the 4<sup>th</sup> leading cause of cancer death (1). Eighty percent of pancreatic cancers are unresectable at diagnosis. MRI offers potential to detect tumors when they are small. MRI is costly as a screening test and thus would need to be applied in a high risk population to be cost effective. The purpose of this study is to determine the potential effectiveness of an abbreviated non contrast MRI protocol in screening a high risk population for pancreatic cancer.

**Methods:** From 2003-2010, 259 patients in 155 high risk families underwent annual MRI. Eligible patients had familial pancreatic cancer (FPC) (64.4%), BRCA1 (1.9%), BRCA2 (26%), p16 (4.2%), Peutz-Jeghers syndrome (2.7%) or hereditary pancreatitis (0.8%). Average length of follow-up was 3.2 (0-7) years. An MRI was performed using a 1.5T and later a 3T scanner with a phased array surface coil. 3D T1 gradient echo weighted fat saturated (LAVA, VIBE), axial and slab single shot RARE (SSFSE, HASTE) as well as in and out of phase gradient echo imaging was performed through the pancreas as part of a 20 minute exam without IV contrast.

**Results:** Pancreatic cancer was found in 2 of 259 patients with FPC (0.8%). The first patient was a 57 year old female diagnosed with a 1.5cm mass on MRI in the head of the pancreas during her 4th surveillance scan (Fig 1). The patient underwent surgery for stage IIB (T1N1MX) adenocarcinoma. Concurrent IPMN was found. She has subsequently recurred and is undergoing chemotherapy. The second patient was an 80 year old male who was had a suspected cancer on his second evaluation requiring further imaging. On followup he was diagnosed with symptomatic and unresectable pancreatic adenocarcinoma with liver metastases. IPMNs were seen in 14 patients (5.4%) (Fig 2). Seven significant incidental findings (2.7%) were detected by MRI.

 A  B	 A  B
<b>Fig 1</b> A) Coronal slab MRCP shows a double duct sign. B) Unenhanced T1 shows a 1.5cm mass in the neck of the pancreas (white arrow). There is both upstream and downstream dilation of the pancreatic duct in keeping with the diagnosis of IPMN and pancreatic adenocarcinoma	<b>Fig 2</b> A) Axial T2 shows complex cystic lesion in tail of pancreas which suspicious for small side branch IPMN which was resected. B) Coronal T2 weighted image shows a second similar lesion was seen in the head of the pancreas

**Discussion:** We have the longest total enrolment and follow-up surveillance periods of all published studies. In at risk patients we note a high prevalence of side branch IPMN (5.4%) which is associated with pancreatic cancer. During our 7 year screening experience only 2 cases of pancreatic adenocarcinoma were observed (0.8%). Taking into account estimated relative risk for mutation carriers the expected number of cases was 2.7, nearly equivalent to our observed number. Despite MRI screening the cancers were detected late. This has been the experience in screening studies including endoscopic ultrasound to date (2). **In conclusion** MRI has a potential role in pancreatic screening but annual screening with non contrast MRI may be inadequate. Further improvement in patient imaging methods with IV contrast, more frequent surveillance (<1 year interval), better spatial resolution and better patient selection methods will likely be required.

### References:

1. American Cancer Society, 2010
2. Verna, EC. Pancreatic cancer screening in a prospective cohort of high-risk patients: a comprehensive strategy of imaging and genetics. Clin Cancer Res 2010, 16(20): 5028-5037.

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