Pancreatic Adenocarcinoma:
Everything You Need to Know From Cross-Sectional Imaging to Treatment

Andrew W. Bowman, MD PhD
Assistant Professor of Radiology
Mayo Clinic Florida

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Disclosures

• No financial relationships to disclose
• No off-label uses will be discussed
Learning Objectives

• Review MR features of pancreas adenocarcinoma
• Illustrate how MR can diagnose and stage pancreas adenocarcinoma
• Describe the MR findings of pancreas adenocarcinoma after neoadjuvant therapy and surgical resection
Imaging Pancreas Adenocarcinoma

• Diagnosis
• Stage disease
• Monitor treatment
• Restage disease after neoadjuvant therapy
• Postoperative surveillance
Imaging Pancreas Adenocarcinoma

• MR is a feasible and acceptable method for imaging pancreas adenocarcinoma
• MR and CT have demonstrated similar performance in the evaluation of pancreas adenocarcinoma
• MR may be superior to CT in diagnosing hepatic metastatic disease

Holzapfel K et al. Abdom Imaging 2011;36(2):179-84
Motosugi U et al. Radiology 2011;260(2):446-53
MCF Pancreas Mass Imaging Protocol

- 3T exam, with IV glucagon
- Coronal, axial (FS), sagittal T2
- Axial in-out phase
- Axial diffusion
- Axial, coronal, sagittal precontrast T1FS
- Axial MRA thru pancreas, liver (2 sequences)
- Axial, coronal, sagittal PV phase postcontrast T1FS
- MRCP sequences centered on pancreas
- Axial delayed postcontrast T1FS
- Motion-corrected subtractions
Diagnosis
MR Features of Pancreas Adenocarcinoma

- Hypointense, hypoenhancing mass
- Variable T2 intensity (typically slightly hyperintense to pancreas)
- Restricts diffusion
- Locoregional disease may enhance more than primary tumor
- Metastases typically restrict diffusion, poorly or peripherally enhance
Hypointense, hypoenhancing mass in pancreatic head
Pancreatic duct dilatation
Restricted diffusion
Malignant transformation of sidebranch IPMN
Mucinous cystadenoma with mural carcinoma
Main duct IPMN
Diagnosis Mimics
2 months later
Resolved focal uncinate pancreatitis
Groove pancreatitis
Neuroendocrine tumor with liver metastases
Pseudopapillary tumor
Duodenal periampullary carcinoma
Stage Disease
Continuum of resectability for pancreatic adenocarcinoma

- No distant metastases
- No arterial or venous involvement
- Attachment to other organs (e.g., spleen)
- Venous involvement (SMV or portal) less than 180 degrees, as long as there is suitable vessel proximal and distal to the areas of involvement for reconstruction
- Gastroduodenal artery encasement up to the common hepatic artery with other short segment encasement or abutment of the hepatic artery, but without extension to celiac trunk
- Tumor abutment of the SMA less than one-half the circumference of the vessel wall.
- Greater than 180 degree encasement or occlusion/thrombus of SMA, unreconstructable SMV or SMV-portal vein confluence occlusion
- Direct involvement of the inferior vena cava, aorta, celiac trunk or hepatic artery, as defined by absence of a fat plane between low density tumor and these structures on CT or EUS.
- Metastases to lymph nodes beyond the peripancreatic tissues
- Distant metastases

SMV: superior mesenteric vein; SMA: superior mesenteric artery; CT: computed tomography; EUS: endoscopic ultrasound.

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Tumor localized to pancreatic head
SMV, possible SMA abutment
Extensive celiac, SMA encasement
Celiac encasement on CT
No celiac encasement on MR
Enlarged peripancreatic node
Omental deposit
Liver metastases
MCF Pancreas Mass Imaging Protocol

- 3T exam, with IV glucagon
- Coronal, axial (FS), sagittal T2
- Axial in-out phase
- Axial diffusion
- Axial, coronal, sagittal precontrast T1FS
- **Axial MRA thru pancreas, liver (2 sequences)**
- Axial, coronal, sagittal PV phase postcontrast T1FS
- MRCP sequences centered on pancreas
- Axial delayed postcontrast T1FS
- Motion-corrected subtractions
Hemangioma or metastasis?
Metastasis
Progression of liver metastases

Initial staging

6 months later
Liver metastasis
Restage Disease After Neoadjuvant Therapy
Initial Staging
Tumor regression from SMV, SMA

Initial staging

2 months later
Initial staging
Initial staging
4 months later
4 months later
Decreased soft tissue about hepatic artery

Initial staging

4 months later
Decreased soft tissue about hepatic artery and portal vein
Initial staging
5 months later
Initial staging

Decreased soft tissue around celiac, SMA

5 months later
Postoperative Surveillance
Expected appearance post resection
18 months later
Local tumor recurrence

Initial postop exam

18 months later
6 months later
Tumor recurrence causing PD dilatation
Post distal pancreatectomy
Tumor recurrence narrowing portal vein

Prior postop exam

6 months later
Initial postop exam
2 months later
3 more months later
Hepatic microabscesses

Initial postop exam

2 months later

3 more months later
Prior central pancreatectomy for NET
8 months later
Tail pancreatitis

Postop exam

8 months later
Post neoadjuvant treatment
Post Appleby procedure with total pancreatectomy
Post Appleby with stents in the portal vein, hepatic artery
Post neoadjuvant treatment
Post Appleby with subtotal pancreatectomy
Post Appleby with hepatic arterial collaterals and portal vein thrombosis
Summary

• MRI can be an excellent modality in the diagnoses, staging, and surveillance of pancreas adenocarcinoma

• MRI may be superior to CT in detecting metastatic disease from pancreas adenocarcinoma

• Newer imaging techniques may further refine the ability of MRI to evaluate pancreatic cancer
Thank You!!

bowman.andrew@mayo.edu