



Pancreatic ductal adenocarcinoma (PDA)

Accurate diagnosis and staging

- Only 15-20% have potentially resectable disease at the time of their presentation
- Patients with complete, incomplete or margin positive resection (R0 or R1 residual microscopic / R2 residual macroscopic disease respectively) have progressively decreasing survival rates
- Complete margin negative surgical resection (R0 resection) remains the main hope of improved survival and potential cure of the tumor

Conlon KC, et al. Long-term survival after curative resection for pancreatic ductal adenocarcinoma. Clinicopathologic analysis of 5-year survivors. Ann Surg 1996. /aradhachary GR, et al. Borderline resectable pancreatic cancer: definitions, management. and role of preoperative therapy. Ann Surg Oncol 2006.



Imaging modalities

- Endoscopic Ultrasound
- Computed Tomography
- Magnetic Resonance Imaging/ Cholangiopancreatography



- MDCT angiography
 - Thin slice acquisitions
 - High spatial resolution



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Imaging Role is to evaluate:

- I. The appearance, size and location of the lesion
- II. The surrounding vessels for possible involvement
- III. Extra-pancreatic extension and metastasis



MDCT

 Small but significant number of tumors are iso-attenuating on CT which are indirectly assessed through secondary signs (ex: Abruptly interrupted PD or CBD dilatation, focal pancreatic contour bulge, localized atrophy)



Kim JH, et al. Visually isoattenuating pancreatic adenocarcinoma at dynamic-enhanced CT: frequency, clinical and pathologic characteristics, and diagnosis at imaging examinations. Radiology 2010



MDCT

• secondary signs (ex: Abruptly interrupted PD or CBD dilatation, focal pancreatic contour bulge, localized atrophy)





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• Best role as problem solving for iso-attenuating pancreatic lesions and characterization of indeterminate hepatic lesions on MDCT

Koelblinger C, et al. Gadobenate dimeglumine-enhanced 3.0-T MR imaging versus multiphasic 64-detector row CT: prospective evaluation in patients suspected of having pancreatic cancer. Radiology 2011















RADIOLOGY REPORTING TEMPLATE

Why

- The variability in expertise and definition of disease extent among different practitioners
- Frequent lack of complete reporting of pertinent imaging findings
- Need for standardized template for radiology reporting, using <u>universally accepted</u> and <u>agreed</u> <u>on terminology</u>
- Clinicians need





Reporting Template

- Three parts:
 - Arterial assessment
 - Venous assessment
 - · Local and distant tumor extension
 - Adjacent organs involvement
 - Lymph nodes status and metastasis (liver, peritoneal, others)

Vascular assessment

- · Degree of arterial contact
 - Solid tumor contact
 - Hazy fat density (frequently post treatment)
- Caliber narrowing or contour deformity
- · Extension along SMA and SMV jejunal branches, CHA branches
- Thrombosis

Al-Hawary MM et al. Pancreatic ductal adenocarcinoma radiology reporting template: consensus statement of the society of abdominal radiology and the American pancreatic association. Gastroenterology. 2014. Radiology. 2014.

Morphologic evaluation

- Appearance
 - Hypo, iso or Hyper attenuating
- Size
- Location
 - Head or body
- Pancreatic duct narrowing
- CBD narrowing
- Calcifications



Arterial evaluation

- List every relevant vessel
 - SMA
 - CA
 - CHA
 - · Arterial variants if present
- · Describe degree of contact
 - ≤ 180 degree of the vessels circumference
 - > 180 degree of the vessels circumference
- · Presence of caliber narrowing or contour deformity
 - Most specific for vessel involvement
- · Particular attention to
 - CHA branches (RHA and LHA) involvement
 - · SMA jejunal branches involvement











Venous evaluation

- · List every relvant vessel
 - MPV
 - SMA
- Describe degree of contact
 - ≤ 180 degree of the vessels circumference
 - > 180 degree of the vessels circumference
 - · Thrombosis or collaterals if present
- Presence of caliber narrowing or contour deformity (including tear drop deformity)
 - · Most specific for vessel involvement
- Particular attention to
 - · SMV jejunal branches involvement











Extra-pancreatic evaluation

- Liver lesions
 - Suspicious/Indeterminate
 - Benign
- Peritoneal nodules
- LN
 - Location (important if local or distant), can change staging to metastatic
- Invasion of surrounding organs







Impression

- Tumor
 - Size and location
- Vascular contact
 - Which vessels are involved
 - Degree of contact
- Metastatic evaluation

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NCCN Guidelines Version 1.2016 Pancreatic Adenocarcinoma

Resectability Status	Arterial	Venous
Resectable	No arterial tumor contact (celiac axis [CA], superior mesenteric artery [SMA], or common hepatic artery [CHA]).	No tumor contact with the superior mesenteric vein (SMV) or portal vein (PV) or ≤180° contact without vein contour irregularity.
Borderline Resectable	Pancreatic head /uncinate process: • Solid tumor contact with CHA without extension to celiac axis or hepatic artery bifurcation allowing for safe and complete resection and reconstruction. • Solid tumor contact with the SMA of ≤180° • Presence of variant arterial anatomy (ex: accessory right hepatic artery, replaced right hepatic artery, replaced CHA and the origin of replaced or accessory artery) and the presence and degree of tumor contact should be should be noted if present as it may affect surgical planning. Pancreatic body/tail: • Solid tumor contact with the CA of ≤180° • Solid tumor contact with the CA of ≤180° • Solid tumor contact with the CA of ≤180°	Solid tumor contact with the SMV or PV of >80%, contact of 5180° with contour irregularity of the vein or thrombosis of the vein but with suitable vessel proximal and distal to the site of involvement allowing for safe and complete resection and vein reconstruction. Solid tumor contact with the inferior vena cava (IVC).
Jnresectable	Bistant metastasis (including non-regional lymph node metastasis) Head/uncinate process: Solid tumor contact with SMA >180° Solid tumor contact with the CA >180° Solid tumor contact with the first jejunal SMA branch Body and tail Solid tumor contact of >180° with the SMA or CA Solid tumor contact with the CA and aortic involvement	Head/uncinate process.

NCCN National Comprehensive Cancer Network* Pancreatic Adenocarcinoma			
PRINCIPLES OF DIAGNOSIS, IMAGING, AND STAGING PANCREATIC CANCER RADIOLOGY REPORTING TEMPLATE ¹			
Morphologic Evaluation			
Appearance (in the pancreatic parenchymal phase)	□ Hypoattenuating	□ Isoattenuating	□ Hyperattenuating
Size (maximal axial dimension in centimeters)	Measurable	Nonmeasurable (isoattenuating tumors)	
Location	Head/uncinate (right of SMV)	Body/tail (left of SMV)	
Pancreatic duct narrowing/abrupt cutoff with or without upstream dilatation	Present	Absent	
Biliary tree abrupt cutoff with or without upstream dilatation	Present	□ Absent	
		Reporting template c	ontinued on next page
¹ Adapted from: Al-Hawary MM, Francis IR, Chari ST, et al. Pancreatic duct statement of the Society of Abdominal Radiology and the American Pancr 2016 National Comprehensive Cancer Network, Inc. Alinghs reserved. These guidelines and this To view the most recent and complete version of the NCCN Suidelines, go online to NCCN.org.	al adenocarcinoma radic eatic Association. Radio illustration may not be reprodu	ology reporting template: conse ogy. 2014 Jan; 270(1):248-260 ced in any form without the express wri	TRUE PANC-A

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Network [®] Pancrea	tic Adeno	ocarcino	ma	
PANCREATIC CANO	ER RADIOL	OGY REPO	ORTING TEMP	
Arterial Evaluation				
SMA Contact	Present	Absent		
Degree of solid soft-tissue contact	□ ≤180	□ >180	1	
Degree of increased hazy attenuation/stranding contact	□ ≤180	□ >180	1	
ocal vessel narrowing or contour irregularity	Present	Absent	1	
Extension to first SMA branch	Present	Absent	1	
			1	
Celiac Axis Contact	Present	□ Absent	1	
Degree of solid soft-tissue contact	□ ≤180	□ >180	1	
Degree of increased hazy attenuation/stranding contact	□ ≤180	□ >180	1	
Focal vessel narrowing or contour irregularity	Present	Absent]	
]	
CHA Contact	Present	Absent]	
Degree of solid soft-tissue contact	□ ≤180	□ >180	1	
Degree of increased hazy attenuation/stranding contact	□ ≤180	□ >180]	
ocal vessel narrowing or contour irregularity	Present	Absent		
Extension to celiac axis	Present	□ Absent]	
Extension to bifurcation of right/left hepatic artery	Present	Absent		
Arterial Variant	Present	Absent		
/ariant anatomy	Accessory right hepatic artery	Replaced right hepatic artery	Replaced common hepatic artery	Others (origin of replaced o accessory artery)
/ariant vessel contact	Present	Absent		
Degree of solid soft-tissue contact	□ ≤180	□ >180		
Denne of increased being otherworth of the second second second	□ ≤180	□ >180		
Degree of increased hazy attenuation/stranding contact			1	

PRINCIPLES OF DIAGNOS PANCREATIC CANCER RADIO	IS, IMAGING, AND S ⁻ LOGY REPORTING 1	TAGING TEMPLATE	1
Venous Evaluation			
MPV Contact	Present	□ Absent	Complete occlusion
Degree of solid soft-tissue contact	□ ≤180	□ >180	
Degree of increased hazy attenuation/stranding contact	□ ≤180	□ >180	
Focal vessel narrowing or contour irregularity (tethering or tear drop)	Present	Absent	
SMV Contact	Present	□ Absent	Complete occlusion
Degree of solid soft-tissue contact	□ ≤180	□ >180	
Degree of increased hazy attenuation/stranding contact	□ ≤180	□ >180	
Focal vessel narrowing or contour irregularity (tethering or tear drop)	Present	Absent	
Extension	Present	Absent	
Other			
Thrombus within vein (tumor, bland)	□ Present □ MPV □ SMV □ Splenic vein	□ Absent	
Venous collaterals	Present Around pancreatic head Porta hepatis Root of the mesentery Left upper quadrant	□ Absent	

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NCCN Guidelines Version 1.2016 Pancreatic Adenocarcinoma

PRINCIPLES OF DIAGNOSIS, IMAGING, AND STAGING PANCREATIC CANCER RADIOLOGY REPORTING TEMPLATE¹

Liver lesions		Absent
	Suspicious Indeterminate Itikaly bapian	Absent
Peritoneal or omental nodules	Present	Absent
Ascites	□ Present	□ Absent
Suspicious lymph nodes	Present Porta hepatis Celiac Splenic hilum Paraaortic Aortocaval Other	□ Absent
Other extrapancreatic disease (invasion of adjacent structures)	Present Organs involved:	□ Absent
Impression		
•	Tumor size:	Tumor location:
Vascular contact	Present Vessel involved: Extent:	Absent
Metastasis	Present (Location) D Absent

 1Adapted from: Al-Hawary MM, Francis IR, Chari ST, et al. Pancreatic ductal adenocarcinoma radiology reporting template: consensus statement of the Society of Abdominal Radiology and the American Pancreatic Association. Radiology. 2014 Jan; 270(1):248-280.
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Reporting	Template		
Morphologic Evaluation	Venous evaluation		
Appearance (in the pancreatic parenchymal phase): hypo-, iso-, or hyperattenuating	Venous evaluation		
Size (maximal axial dimension in centimeters): measurable or nonmeasurable (isoattenuating	MPV: Present, absent, or complete occusion		
tumors)	Degree of solid soft-tissue contact: ≤180° or >180°		
Location (head right of SMV, body left of SMV): head/uncinate or body/tail	Degree of increased hazy attenuation/stranding contact: ≤180° or >180°		
Pancreatic duct narrowing/abrupt cutoff with or without upstream dilatation: present or absent	Focal vessel narrowing or contour irregularity (tethering or tear drop): present or absent		
Biliary tree abrupt cutoff with or without upstream dilatation: present or absent	SMV: Present, absent, or complete occlasion		
Arterial evaluation	Degree of solid soft- tissue contact: ≤180° or >180°		
SMA: Present or absent	Degree of increased hazy attenuation/stranding contact: ≤180° or >180°		
Degree of solid soft-tissue contact: ≤180° or >180°	Focal vessel narrowing or contour irregularity (tethering or tear drop): present or absent		
Degree of increased hazy attenuation/stranding contact: ≤180° or >180°	Extension to first draining vein: present or absent		
Focal vessel narrowing or contour irregularity: present or absent	Thrombus within vein: present or absent (MPV, SMV, or splenic vein) (tumor, bland)		
Extension to first SMA branch: present or absent	Venous collaterals: present or absent (around pancreatic head, porta hepatis, root of the		
Celiac Axis: Present or absent	mesentery, or left upper quadrant)		
Degree of solid soft-tissue contact: ≤180° or >180°	Extrapancreatic evaluation		
Degree of increased hazy attenuation/stranding contact: ≤180° or >180°	Line beingt neuerst as absent susaising/indatesminate or Brahr basim		
Focal vessel narrowing or contour irregularity: present or absent	Ever restorts: present or absent; suspicious/indeterminate or acety beingn		
CHA: Present or absent	Peritoneal or omental nodules: present or absent		
Degree of solid soft-tissue contact: ≤180° or >180°	Ascites: present or absent		
Degree of increased hazy attenuation/stranding contact: ≤180° or >180°	Suspicious lymph nodes: present or absent (porta hepatis, celiac, splenic hilum, paraaortic,		
Focal vessel narrowing or contour irregularity: present or absent	Other extreme service disease (marging of adjusted structure)), assessed as about		
Extension to celiac axis: present or absent	Outer extrapartereate disease (invasion of adjacent structures): present or absent		
Extension to bifurcation of right/left hepatic artery: present or absent	Impression: Tumor: size and location		
Arterial Variant: Present or absent	Vascular contact: absent or present (vessel involved and extent)		
Variant anatomy: Accessory right hepatic artery, replaced right hepatic artery, replaced common hepatic artery, others (origin of replaced or accessory artery)	Metastasis: absent or present (location)		
Variant vessel contact: present or absent			
Degree of solid soft-tissue contact: ≤180° or >180°			
Degree of increased hazy attenuation/stranding contact: ≤180° or >180°			
Focal vessel narrowing or contour irregularity: present or absent			
Al-Hawary MM et al. Pancreatic ductal adenocarcinoma radiology reporting template: consensus statement of the society of abdominal radiology and the American pancreatic association. Gastroenterology. 2014. Radiology. 2014.			

Conclusion

 For patients with PDA optimal imaging techniques and adequate reporting of imaging findings (<u>complete</u>, <u>pertinent</u>, and <u>accurate</u>) is essential for proper disease extent evaluation

