GI MALIGNANCIES

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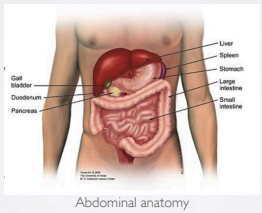
WHAT IS CANCER?

- The National Comprehensive Cancer Network defines cancer as, "a disease of cells that have an abnormal life cycle and grow or spread into other tissue"[1]
- Cancer is the second leading cause of death in the United States[2]

1. Patient and Caregiver Resources Dictionary. NCCN.org https://www.nccn.org/patients/resources/dictionary/default.aspx. Published 2019. Accessed March 9, 2019.
2. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2019. *CA: A Cancer Journal for Clinicians*. 2019;69(1):7-34. doi:10.3322/caac.21551

OVERVIEW

- GI malignancies include cancers of the esophagus, stomach, liver, biliary tract, gallbladder, pancreas, small bowel, colon, rectum, and anus



Abdominal anatomy

1. What is the Pancreas? Pancreatic Cancer Action Network. https://www.pancan.org/facing-pancreatic-cancer/about-pancreatic-cancer/what-is-the-pancreas/. Accessed March 10, 2019.

IMPACT

	ESTIMATED NEW CASES			ESTIMATED DEATHS		
	BOTH SEXES	MALE	FEMALE	BOTH SEXES	MALE	FEMALE
All sites	**1,762,450**	**870,970**	**891,480**	**606,880**	**321,670**	**285,210**
Oral cavity & pharynx	**53,000**	**38,140**	**14,860**	**10,860**	**7,970**	**2,890**
Tongue	17,060	12,550	4,510	3,020	2,220	800
Mouth	14,310	8,430	5,880	2,740	1,800	940
Pharynx	17,870	14,450	3,420	3,450	2,660	790
Other oral cavity	3,760	2,710	1,050	1,650	1,290	360
Digestive system	**328,030**	**186,080**	**141,950**	**165,460**	**97,110**	**68,350**
Esophagus	17,650	13,750	3,900	16,080	13,020	3,060

27.26% of cancer related deaths are from GI malignancies

Estimated New Cancer Cases and Deaths by Sex, United States, 2019

1. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2019. *CA: A Cancer Journal for Clinicians.* 2019;69(1):7-34. doi:10.3322/caac.21551

INCIDENCE AND MORTALITY

Estimated New Cases

Males			Females		
Prostate	174,650	20%	Breast	268,600	30%
Lung & bronchus	116,440	13%	Lung & bronchus	111,710	13%
Colon & rectum	78,500	9%	Colon & rectum	67,100	8%
Urinary bladder	61,700	7%	Uterine corpus	61,880	7%
Melanoma of the skin	57,220	7%	Melanoma of the skin	39,260	4%
Kidney & renal pelvis	44,120	5%	Thyroid	37,810	4%
Non-Hodgkin lymphoma	41,090	5%	Non-Hodgkin lymphoma	33,110	4%
Oral cavity & pharynx	38,140	4%	Kidney & renal pelvis	29,700	3%
Leukemia	35,920	4%	Pancreas	26,830	3%
Pancreas	29,940	3%	Leukemia	25,860	3%
All Sites	**870,970**	**100%**	**All Sites**	**891,480**	**100%**

Estimated Deaths

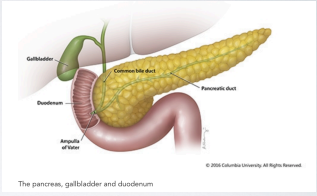
Males			Females		
Lung & bronchus	76,650	24%	Lung & bronchus	66,020	23%
Prostate	31,620	10%	Breast	41,760	15%
Colon & rectum	27,640	9%	Colon & rectum	23,380	8%
Pancreas	23,800	7%	Pancreas	21,950	8%
Liver & intrahepatic bile duct	21,600	7%	Ovary	13,980	5%
Leukemia	13,150	4%	Uterine corpus	12,160	4%
Esophagus	13,020	4%	Liver & intrahepatic bile duct	10,180	4%
Urinary bladder	12,870	4%	Leukemia	9,690	3%
Non-Hodgkin lymphoma	11,510	4%	Non-Hodgkin lymphoma	8,460	3%
Brain & other nervous system	9,910	3%	Brain & other nervous system	7,850	3%
All Sites	**321,670**	**100%**	**All Sites**	**285,210**	**100%**

Ten Leading Cancer Types for the Estimated New Cancer Cases and Deaths by Sex, United States, 2019[2]

1. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2019. *CA: A Cancer Journal for Clinicians.* 2019;69(1):7-34. doi:10.3322/caac.21551

THE PANCREAS

- Located in the upper abdomen[1]
- 6-10 inches long[2]
- Secretes hormones into the blood to regulate blood sugar — insulin and glucagon; known as the ENDOCRINE PANCREAS[2]
- Excretes enzymes into the GI tract that aid in the digestion of carbohydrates, proteins and fats — amylase, protease, lipase; known as the EXOCRINE PANCREAS[2]



The pancreas, gallbladder and duodenum

Anatomy of the pancreas[1]

1. The Pancreas and Its Functions. Columbia University Department of Surgery. http://columbiasurgery.org/pancreas/pancreas-and-its-functions. Accessed March 10, 2019.
2. What is the Pancreas? Pancreatic Cancer Action Network. https://www.pancan.org/facing-pancreatic-cancer/about-pancreatic-cancer/what-is-the-pancreas/. Accessed March 10, 2019.

PANCREATIC CANCER

- Most common malignancy of the pancreas is **PANCREATIC DUCTAL ADENOCARCINOMA (PDAC)**[1], or cancer of the exocrine pancreas[2]
- PDAC is the 3rd most common cause of cancer-related deaths[1]
- PDAC is projected to surpass colorectal cancer in cancer-related deaths by 2020[1]
- PDAC overall (all stages) 5 year survival is only 7.7%[1]

1. Denbo JW, Kim MP, Katz MHG. Pancreatic ductal adenocarcinoma. In Feig BW, Ching CD, ed. *The MD Anderson Surgical Oncology Handbook*. Philadelphia PA: Wolters Kluwer; 2019: 398-412.
2. The Pancreas and Its Functions. Columbia University Department of Surgery. http://columbiasurgery.org/pancreas/pancreas-and-its-functions. Accessed March 10, 2019.

RISK FACTORS

- Cigarette smoking
- Alcohol use
- History of pancreatitis
- Diabetes mellitus

Denbo JW, Kim MP, Katz MHG. Pancreatic ductal adenocarcinoma. In Feig BW, Ching CD, ed. *The MD Anderson Surgical Oncology Handbook*. Philadelphia, PA: Wolters Kluwer; 2019: 398-412.

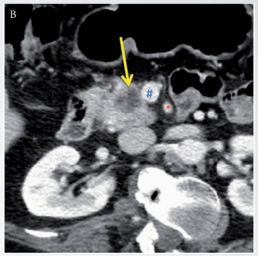
PRESENTING SYMPTOMS

- Obstructive jaundice (50%)
- Weight loss
- Abdominal pain, frequently radiates to the back between the shoulder blades
- Recent diagnosis of type II diabetes

Denbo JW, Kim MP, Katz MHG. Pancreatic ductal adenocarcinoma. In Feig BW, Ching CD, ed. *The MD Anderson Surgical Oncology Handbook*. Philadelphia PA: Wolters Kluwer; 2019: 398-412.

WORK UP AND STAGING

- Pancreatic protocol CT scan, including chest
  - evaluate tumor relationship to surrounding vasculature
  - evaluate nodal involvement
  - evaluate for distant metastases (commonly liver, peritoneum, lung)



CT image of resectable pancreas mass (yellow arrow)
Blue # - Superior mesenteric vein. Red . - Superior mesenteric artery.

Appel BL, Tolat P, Oshima K, Evans DB, Tsai S. Clinical and pathology staging for pancreatic cancer. In Morita SY, Balch CM, Klimberg VS, Pawlik TM, Posner MC, Tanabe KK, ed. *Textbook of Complex General Surgical Oncology*. New York: McGraw-Hill Education; 2018: 1554-1565.

WORK UP AND STAGING

- Endoscopic ultrasound
  - Evaluate tumor and nodal status
  - Obtain tissue biopsy for diagnosis
  - Evaluate tumor relationship to nearby vasculature
- Tumor markers
  - CA 19-9 (not sensitive or specific for pancreas cancer)

Denbo JW, Kim MP, Katz MHG. Pancreatic ductal adenocarcinoma. In Feig BW, Ching CD, ed. *The MD Anderson Surgical Oncology Handbook*. Philadelphia, PA: Wolters Kluwer; 2019: 398-412.

Table 1. **Definitions for T, N, M**
American Joint Committee on Cancer (AJCC) TNM Staging of Pancreatic Cancer (8th ed., 2017)

	T	**Primary Tumor**
TX		Primary tumor cannot be assessed
T0		No evidence of primary tumor
Tis		Carcinoma *in situ* This includes high-grade pancreatic intraepithelial neoplasia (PanIn-3), intraductal papillary mucinous neoplasm with high-grade dysplasia, intraductal tubulopapillary neoplasm with high-grade dysplasia, and mucinous cystic neoplasm with high-grade dysplasia
T1		Tumor ≤2 cm in greatest dimension
	T1a	Tumor ≤0.5 cm in greatest dimension
	T1b	Tumor >0.5 cm and <1 cm in greatest dimension
	T1c	Tumor 1–2 cm in greatest dimension
T2		Tumor >2 cm and ≤4 cm in greatest dimension
T3		Tumor >4 cm in greatest dimension
T4		Tumor involves the celiac axis, superior mesenteric artery, and/or common hepatic artery, regardless of size

N	**Regional Lymph Nodes**
NX	Regional lymph nodes cannot be assesseds
N0	No regional lymph node metastases
N1	Metastasis in one to three regional lymph nodes
N2	Metastasis in four or more regional lymph nodes

M	**Distant Metastasis**
M0	No distant metastases
M1	Distant metastasis

Table 2. **AJCC Prognostic Groups**

	T	**N**	**M**
Stage 0	Tis	N0	M0
Stage IA	T1	N0	M0
Stage IB	T2	N0	M0
Stage IIA	T3	N0	M0
Stage IIB	T1, T2, T3	N1	M0
Stage III	T1, T2, T3	N2	M0
	T4	Any N	M0
Stage IV	Any T	Any N	M1

Tempero MA, Molafa MP, Al-Hawary M, et al. Pancreatic Adenocarcinoma Version 1.2019. *NCCN Clinical Practice Guidelines in Oncology*. https://www.nccn.org/professionals/physician_gls/pdf/pancreatic.pdf Accessed March 11, 2019.

CANCER TREATMENTS

Surgery: Works where we can remove tumor and reconstruct organs

Radiation: Use of x-rays to kill cancer cells; works in small, defined areas

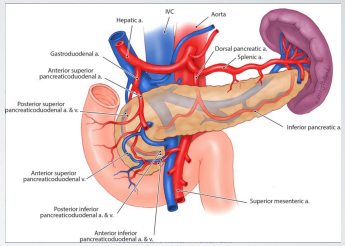
Chemotherapy: Medications given IV or oral that travel through the body to treat cancer cells all over

TABLE 139-1: Definition of Resectability Used by the Multidisciplinary Pancreatic Cancer Working Group at the Medical College of Wisconsin

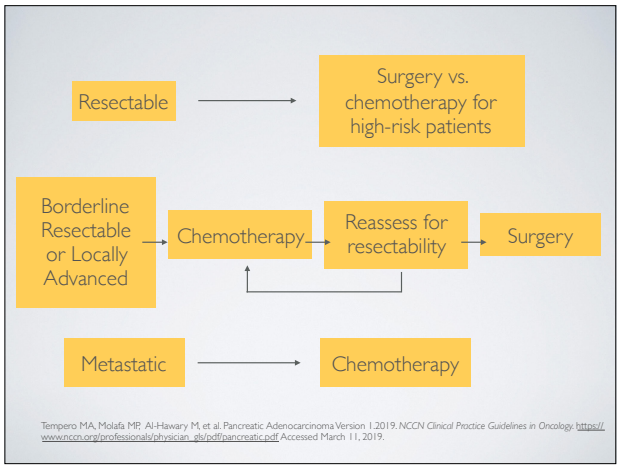
Resectable	
Tumor–artery relationship	No radiographic evidence of arterial abutment (celiac, SMA, or hepatic artery)
Tumor–vein relationship	Tumor-induced narrowing ≤50% of SMV, PV, or SMV/PV
Borderline Resectable	
Artery	Tumor abutment (≤180°) of SMA or celiac artery: Tumor abutment or short-segment encasement (>180°) of the hepatic artery
Vein	Tumor-induced narrowing of >50% of SMV, PV, or SMV/PV confluence. Short-segment occlusion of SMV, PV, SMV/PV with suitable PV (above), and SMV (below) to allow for safe vascular reconstruction
Extrapancreatic disease	CT scan findings suspicious, but not diagnostic, of metastatic disease (e.g., small indeterminate liver lesions which are too small to characterize)
Locally Advanced	
Artery	Tumor encasement (>180°) of SMA or celiac artery
Vein	Occlusion of SMV, PV, or SMV/PV *without* suitable vessels above and below the tumor to allow for reconstruction (no distal or proximal target for vascular reconstruction)
Extrapancreatic disease	No evidence of peritoneal, hepatic, extra-abdominal metastases
Metastatic	
Evidence of peritoneal or distant metastases	

Abbreviations: SMA, superior mesenteric artery; PV, portal vein; SMV, superior mesenteric vein Abbreviations; CT, computed tomography; HA, hepatic artery; NCCN, National Comprehensive Cancer Network.

Appel BL, Tolat P, Oshima K, Evans DB, Tsai S. Clinical and pathology staging for pancreatic cancer. In Morita SY, Balch CM, Kimberg VS, Pawlik TM, Posner MC, Tanabe KK, ed. *Textbook of Complex General Surgical Oncology*. New York: McGraw-Hill Education; 2018: 1554-1565.



Cesmebasi A, Malefant J, Patel SD, et al. The surgical anatomy of the lymphatic system of the pancreas. *Clinical Anatomy*. 2014;28(4):527-537. doi:10.1002/ca.22461



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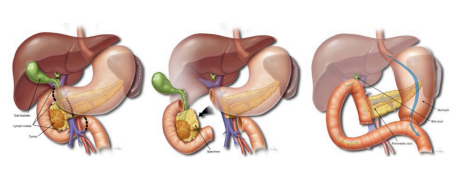
SURGICAL INTERVENTIONS

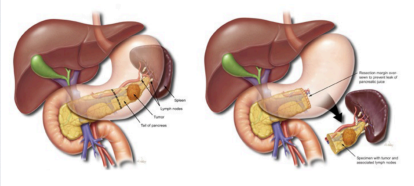
- Pancreaticoduodenectomy (Whipple)
  - For tumors to the right of the superior mesenteric artery and portal vein



Whipple Procedure. Baylor College of Medicine. https://www.bcm.edu/healthcare/care-centers/pancreas-center/procedures/whipple-procedure. Accessed March 11, 2019.

SURGICAL INTERVENTIONS

- Distal pancreatectomy and splenectomy
  - For tumors to the left of the superior mesenteric artery and portal vein



Distal Pancreatectomy and Splenectomy. Baylor College of Medicine. https://www.bcm.edu/healthcare/care-centers/pancreas-center/procedures/distal-pancreatectomy-splenectomy. Accessed March 11, 2019.

SURGICAL INTERVENTIONS

- Pre-operative optimization
  - Nutrition
  - Diabetes control
  - Optimization of medical co-morbities (cardiac and respiratory especially)
- Post-operative considerations
  - ~5-10 day hospital stay
  - ~12-16 week post-op recovery
  - Risks of pancreatic leak, gastroparesis, exocrine pancreatic insufficiency
  - Post-op nutritional deficits
  - Post-op endurance deficits

CHEMOTHERAPY AND RADIATION

- Recommended chemotherapy for resectable, borderline resectable, or locally advanced pancreatic cancer is 6 months of chemo, given every other week.
  - imperative in treatment of pancreas cancer as 80-90% of patients who receive a "curative" resection will develop recurrence
  - specific regimen is largely chosen based on patient's medical co-morbidities, functional status, and tolerance of chosen regimen

Denbo JW, Kim MP, Katz MHG. Pancreatic ductal adenocarcinoma. In Feig BW, Ching CD, ed. *The MD Anderson Surgical Oncology Handbook*. Philadelphia, PA: Wolters Kluwer; 2019: 398-412.

CHEMOTHERAPY AND RADIATION

- May precede surgery (neoadjuvant)
  - requires definitive tissue diagnosis prior to initiation
  - may allow for tumor down-staging and improved surgical resection
  - allows time for clinically progressive or occult disease to be identified, and may spare an unnecessary operation
- May follow surgery (adjuvant)
  - up to 50% of patients who receive surgery first will not finish chemotherapy due to surgery related complications
  - does not allow for possible tumor down-staging prior to surgery

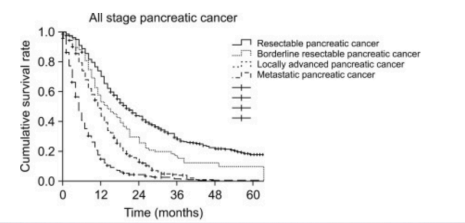
Denbo JW, Kim MP, Katz MHG. Pancreatic ductal adenocarcinoma. In Feig BW, Ching CD, ed. *The MD Anderson Surgical Oncology Handbook*. Philadelphia, PA: Wolters Kluwer; 2019: 398-412.

SURVEILLANCE

Surveillance every 3–6 mo for 2 years, then every 6–12 mo as clinically indicated:
- **H&P for symptom assessment**
- **CA 19-9 level (category 2B)**
- **Consider chest CT and CT or MRI of abdomen and pelvis with contrast (category 2B)**

Tempero MA, Molafa MP, Al-Hawary M, et al. Pancreatic Adenocarcinoma Version 1.2019. *NCCN Clinical Practice Guidelines in Oncology*. https://www.nccn.org/professionals/physician_gls/pdf/pancreatic.pdf Accessed March 11, 2019.

SURVIVAL



Lee DH, Jang JY, Kang JS, et al. Recent treatment patterns and survival outcomes in pancreatic cancer according to clinical stage based on single-center large-cohort data. *Ann Hepatobiliary Pancreat Surg.* 2018;22(4):386-396.

CASE STUDY

- 56 yo AAM newly diagnosed with DM2. Otherwise in usual state of health, no significant medical problems. Active, no physical limitations.
- 1 month later develops painless jaundice and pruritus
- Referred to local gastroenterologist who completed lab work up and liver biopsy (not revealing)
- 2 months after development of painless jaundice pt was admitted to UNC with total bilirubin level 35x upper limit of normal

CASE STUDY

- CT scan abd/pelvis demonstrated 3.5 cm pancreatic head mass with marked biliary ductal dilatation and pancreatic ductal dilatation s/t obstruction. Mass abuts portal vein. No lymphadenopathy noted.
- Endoscopic ultrasound revealed 3 cm pancreatic head mass with biliary obstruction. Abutment of portal vein. FNA completed.
- ERCP with metal common bile duct stent placement.

CASE STUDY

- FNA (biopsy) results revealed pancreatic adenocarcinoma
- CT chest completed for final staging - no evidence of metastatic disease to the chest
- CA 19.9 within normal limits
- Tumor was deemed borderline resectable due to abutment of portal vein
- Patient referred to Medical Oncology for initiation of chemotherapy

CASE STUDY

- Interval scans after 4 cycles, 7 cycles and 12 cycles of chemotherapy revealed stable mass in the head of the pancreas with continued abutment of portal vein

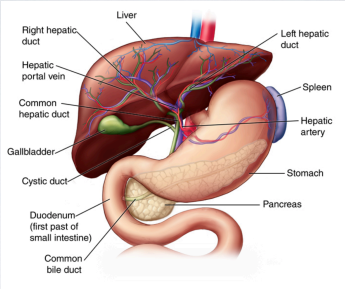
CASE STUDY

- Patient was taken to the OR for surgical resection (Whipple) 4 weeks after last chemo treatment
- Post-op course was uneventful and patient was discharged home on post op day 6
- Final pathology revealed ypT1cN1 (1/34 nodes) with positive margins

CASE STUDY

- Final pathology results were reviewed at UNC's GI multidisciplinary tumor board with recommendations for patient to undergo radiation therapy due to positive surgical margins
- Patient was referred to Radiation Oncology as recommended, and is currently completing course of radiation therapy
- After completion of treatment, patient will begin surveillance regimen including history and physicals, labs, and CT scans at regular intervals

THE LIVER



Liver: Anatomy and Functions. hopkinsmedicine.org https://www.hopkinsmedicine.org/healthlibrary/conditions/liver_biliary_and_pancreatic_disorders/liver_anatomy_and_functions_85,P00676. Accessed March 13, 2019.

THE LIVER

- Located in the right upper quadrant of the abdomen
- Produces bile which aids the digestion of fats and removes waste from liver excreting into the intestines, and ultimately feces
- Produces proteins found in plasma
- Produces cholesterol
- Storage of excess glucose (glycogen) and creation of glucose when needed (gluconeogenesis)
- Regulates protein levels / protein metabolism
- Processes hemoglobin and stores iron
- Filters blood of toxins (including medications)
- Regulates blood clotting
- Clears bilirubin (a byproduct of red blood cells) via the bile

Liver: Anatomy and Functions. hopkinsmedicine.org https://www.hopkinsmedicine.org/healthlibrary/conditions/liver_biliary_and_pancreatic_disorders/liver_anatomy_and_functions_85,P00676. Accessed March 13, 2019.

HEPATOCELLUAR CARCINOMA

- Hepatocellular carcinoma (HCC) is cancer of the liver cells
- 5th most common cause of cancer in the world
- 3rd most common cause of cancer-related deaths worldwide
- Rates of HCC are rising, with incidence tripling in the US since 1970
- 5 year survival rate for HCC (all stages) is 16%
- 90% of HCC develops in the setting of cirrhosis

Qadan M, Jarnagin WR. Hepatocellular carcinoma. In Morita SY, Balch CM, Klimberg VS, Pawlik TM, Posner MC, Tanabe KK, ed. *Textbook of Complex General Surgical Oncology*. New York: McGraw-Hill Education; 2018:1365-1378.

RISK FACTORS FOR HCC

- Hepatitis B virus - most common cause of HCC in the World[1]
- Hepatitis C virus - most common cause of HCC in the Western world[1]
- Alcoholic cirrhosis[1]
- Nonalcoholic Fatty Liver Disease (NAFLD)[1] / Nonalcoholic Steatohepatitis (NASH)[2]
- Metabolic disorders (hemochromatosis, Wilsons disease, alpha-1 antitrypsin deficiency)[2]

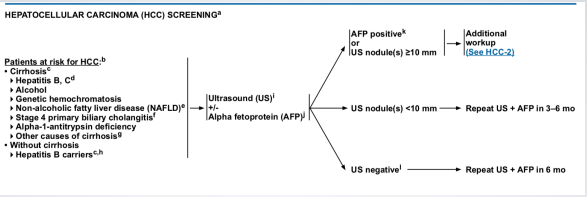
1. Qadan M, Jarnagin WR. Hepatocellular carcinoma. In Morita SY, Balch CM, Klimberg VS, Pawlik TM, Posner MC, Tanabe KK, ed. *Textbook of Complex General Surgical Oncology*. New York: McGraw-Hill Education; 2018:1365-1378.
2. Snyder RA, Vauthey JN. Hepatobiliary Cancers. In Feig BW, Ching CD, ed. *The MD Anderson Surgical Oncology Handbook*. Philadelphia, PA: Wolters Kluwer; 2019:357-397.

SCREENING

- "The purpose of a cancer screening test is to identify the presence of specific cancer in an asymptomatic individual in a situation where early detection has the potential to favorably impact patient outcomes."
- Screening for HCC is recommended for those with cirrhosis caused by:
  - Hepatitis B and C
  - Alcoholic cirrhosis
  - NASH / NAFLD
  - Primary biliary cholangitis

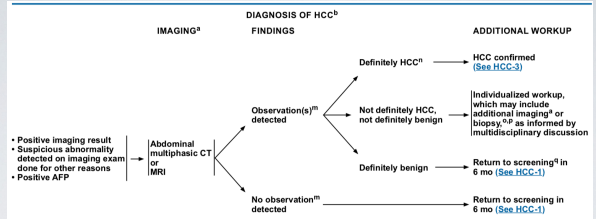
Benson AB, D'Angelica MI, Abbott DE, et al. Hepatobiliary Cancers Version 2.2019. *NCCN Practice Guidelines in Oncology*. https://www.nccn.org/professionals/physician_gls/pdf/hepatobiliary.pdf Accessed March 13, 2019.

SCREENING



Benson AB, D'Angelica MI, Abbott DE, et al. Hepatobiliary Cancers Version 2.2019. *NCCN Practice Guidelines in Oncology*. https://www.nccn.org/professionals/physician_gls/pdf/hepatobiliary.pdf Accessed March 13, 2019.

SCREENING



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PRESENTING SYMPTOMS

- Can be asymptomatic
- Upper abdominal pain or discomfort
- Palpable upper abdominal mass
- Weight loss
- Ascites
- <5% present with tumor rupture

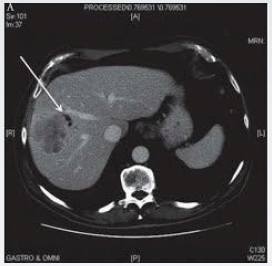
Snyder RA, Vauthey JN. Hepatobiliary Cancers. In Feig BW, Ching CD, ed. *The MD Anderson Surgical Oncology Handbook*. Philadelphia, PA: Wolters Kluwer; 2019:357-397.

WORK UP AND STAGING

- Alpha-fetoprotein (AFP)
  - tumor marker - increased in 50-90% of patients with HCC
  - not sensitive or specific for HCC
- Imaging studies can be diagnostic with HCC (don't necessarily need a tissue diagnosis)
  - CT
  - MRI
  - Ultrasound (false negative rate of 50%)
- Tissue diagnosis should be performed if imaging and tumor markers are equivocal

Snyder RA, Vauthey JN. Hepatobiliary Cancers. In Feig BW, Ching CD, ed. *The MD Anderson Surgical Oncology Handbook*. Philadelphia, PA: Wolters Kluwer; 2019:357-397.

WORK UP AND STAGING



CT of hepatocellular carcinoma

Qadan M, Jarnagin WR. Hepatocellular carcinoma. In Morita SY, Balch CM, Klimberg VS, Pawlik TM, Posner MC, Tanabe KK, ed. *Textbook of Complex General Surgical Oncology*. New York: McGraw-Hill Education; 2018:1365-1378.

WORK UP AND STAGING

American Joint Committee on Cancer (AJCC)
TNM Staging for Hepatocellular Cancer (8th ed., 2017)

***Table 1.* Definitions for T, N, M**

	Primary Tumor
T	
TX	Primary tumor cannot be assessed
T0	No evidence of primary tumor
T1	Solitary tumor ≤2 cm, or >2 cm without vascular invasion
T1a	Solitary tumor ≤2 cm
T1b	Solitary tumor >2 cm without vascular invasion
T2	Solitary tumor >2 cm with vascular invasion, or multiple tumors, none >5 cm
T3	Multiple tumors, at least one of which is >5 cm
T4	Single tumor or multiple tumors of any size involving a major branch of the portal vein or hepatic vein, or tumor(s) with direct invasion of adjacent organs other than the gallbladder or with perforation of visceral peritoneum

	Regional Lymph Nodes
N	
NX	Regional lymph nodes cannot be assessed
N0	No regional lymph node metastasis
N1	Regional lymph node metastasis

	Distant Metastasis
M	
M0	No distant metastasis
M1	Distant metastasis

***Table 2.* AJCC Prognostic Groups**

	T	N	M
Stage IA	T1a	N0	M0
Stage IB	T1b	N0	M0
Stage II	T2	N0	M0
Stage IIIA	T3	N0	M0
Stage IIIB	T4	N0	M0
Stage IVA	Any T	N1	M0
Stage IVB	Any T	Any N	M1

Histologic Grade (G)

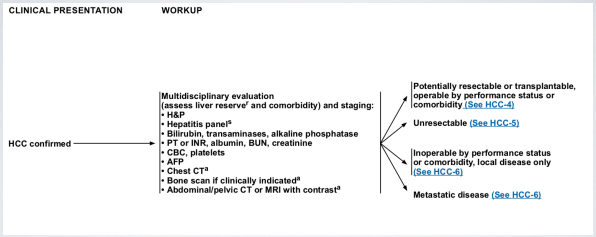
GX	Grade cannot be accessed
G1	Well differentiated
G2	Moderately differentiated
G3	Poorly differentiated
G4	Undifferentiated

Fibrosis Score (F)
The fibrosis score as defined by Ishak is recommended because of its prognostic value in overall survival. This scoring system uses a 0-6 scale.

F0	Fibrosis score 0-4 (none to moderate fibrosis)
F1	Fibrosis score 5-6 (severe fibrosis or cirrhosis)

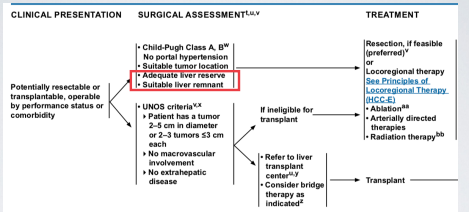
Benson AB, D'Angelica MI, Abbott DE, et al. Hepatobiliary Cancers Version 2.2019. *NCCN Practice Guidelines in Oncology*. https://www.nccn.org/professionals/physician_gls/pdf/hepatobiliary.pdf Accessed March 13, 2019.

TREATMENT



Benson AB, D'Angelica MI, Abbott DE, et al. Hepatobiliary Cancers Version 2.2019. *NCCN Practice Guidelines in Oncology*. https://www.nccn.org/professionals/physician_gls/pdf/hepatobiliary.pdf Accessed March 13, 2019.

TREATMENT



Future liver remnant should be no less than 20% of liver volume in a healthy liver, ~40% in a cirrhotic[2]

1. Benson AB, D'Angelica MI, Abbott DE, et al. Hepatobiliary Cancers Version 2.2019. *NCCN Practice Guidelines in Oncology*. https://www.nccn.org/professionals/physician_gls/pdf/hepatobiliary.pdf Accessed March 13, 2019.
2. Qadan M, Jarnagin WR. Hepatocellular carcinoma. In Morita SY, Balch CM, Klimberg VS, Pawlik TM, Posner MC, Tanabe KK, ed. *Textbook of Complex General Surgical Oncology*. New York: McGraw-Hill Education; 2018:1365-1378.

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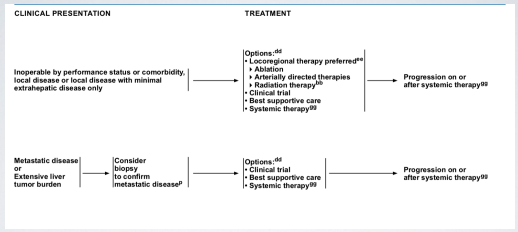

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SURGICAL CONSIDERATIONS

- Pre-operative optimization
  - Nutrition
  - Optimization of medical co-morbities (cardiac and respiratory especially)
- Post-operative considerations
  - ~5-7 day hospital stay
  - ~12-16 week post-op recovery
  - Post-op endurance deficits
  - Liver will regenerate over the course of a days to weeks

Qadan M, Jarnagin WR. Hepatocellular carcinoma. In Morita SY, Balch CM, Klimberg VS, Pawlik TM, Posner MC, Tanabe KK, ed. *Textbook of Complex General Surgical Oncology*. New York: McGraw-Hill Education; 2018:1365-1378.

SURGICAL CONSIDERATIONS

- Surgical risks
  - Bleeding
  - Infections
  - Liver failure

SURVEILLANCE

- **Imaging[cc] every 3–6 mo for 2 y, then every 6–12 mo**
- **AFP, every 3–6 mo for 2 y, then every 6–12 mo**
- **See relevant pathway (HCC-2 through HCC-6) if disease recurs**
- **Refer to a hepatologist for a discussion of antiviral therapy for carriers of hepatitis**

Benson AB, D'Angelica MI, Abbott DE, et al. Hepatobiliary Cancers Version 2.2019. *NCCN Practice Guidelines in Oncology*. https://www.nccn.org/professionals/physician_gls/pdf/hepatobiliary.pdf Accessed March 13, 2019.

CASE STUDY

- 57 yo F presents to ED with new, sudden onset RUQ abdominal pain x 1 day
- PMH of obesity, hypertension and hyperlipidemia
- Labs within normal limits
- CT scan obtained demonstrating large left hepatic mass, imaging favored benign hepatic lesion
- Patient was admitted for serial CBCs to monitor Hgb levels due to concern of bleeding into liver mass

CASE STUDY

- Hepatitis A, B and C serologies were sent — all negative
- AFP obtained — elevated
- CA 19.9 (tumor marker used mostly in pancreas cancer and cancer of the biliary system) obtained — negative
- CEA (tumor marker for colon cancer) obtained — negative

CASE STUDY

- Pt was discharged on hospital day 2 with improved pain, and stable blood counts
- Follow up as an outpatient included:
  - upper endoscopy and colonoscopy to rule out any possibility of upper or lower GI cancers with a metastasis to her liver — negative
  - percutaneous biopsy of liver mass — biopsy proved HCC

CASE STUDY

- Preoperative imaging was reviewed in detail, and patient was determined to have a resectable tumor based on hepatic vascular anatomy and future liver remnant. She was not a candidate for liver transplant based on size of her tumor.
- She underwent left hepatectomy several weeks after initial presentation with symptoms
- She did very well post-operatively and was discharged home on POD 5
- Final pathology revealed HCC with negative margins
- Patient is currently recovering from surgery, and doing very well

QUESTIONS?