

The Multidisciplinary Management of Pancreatic and Liver Tumors: The Advocate Aurora Experience



November 18, 2021

Overview

Time	Presenter	Title
7:05-7:10	Aaron Chevinsky, MD, FACS	CALP – Center for Advanced Liver and Pancreas Surgery
7:10-7:15	Marc Mesleh, MD, FACS	Advances in Diagnosis, Treatment & Management of Pancreatic Cancer
7:15-7:25	Geoff Bellini, MD	Surgical Team Approach to Advanced Recovery (STAAR) Pancreatic Resections
7:25-7:35	Nikolaos Dallas, MD, FACS	Surgical Management of Metastatic Disease to the Liver
7:35-7:40	John Brems, MD, FACS	Irreversible Electroporation (IRE) for Borderline Resectable Pancreatic Cancer
7:40-8:00	Panel	Questions and Answers

CALP - Center for Advanced Liver and Pancreas Surgery



Aaron H. Chevinsky, MD MBA FACS

Medical Director of Surgical Oncology, Aurora Health Care

Clinical Adjunct Professor of Surgery, UW School of Medicine & Public Health

Program Director, Complex Surgical Oncology Fellowship

November 18, 2021

CALP Function

- To standardize care for patients with liver and pancreatic tumors across the Advocate Aurora Health System
- To develop and implement quality improvement protocols
- To evaluate new technologies and equipment
- To assess and implement research studies
- To assist in the education of residents, fellows, APPs, nurses...
 - Complex General Surgical Oncology Fellowship – ASLMC
 - General Surgery Residency – Advocate Masonic Hospital

Surgical Oncologists



Geoffrey Bellini, MD
St. Luke's Medical Center



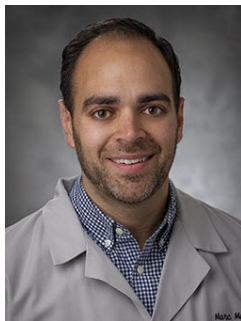
John Brems, MD, FACS
Sherman Hospital



Aaron Chevinsky, MD, FACS
St. Luke's Medical Center



Nikolaos Dallas, MD, FACS
Illinois Masonic Medical Center



Marc Mesleh, MD, FACS
Christ Medical Center

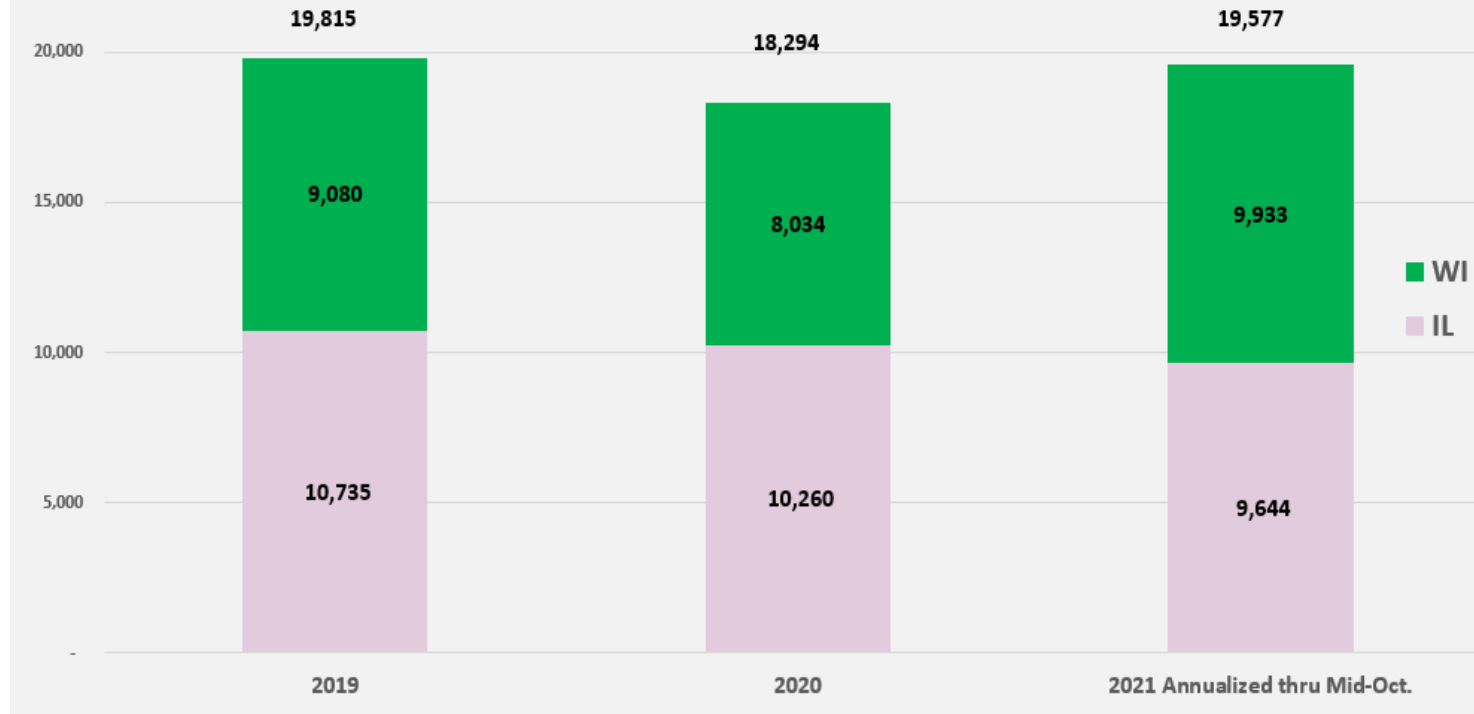


Wesley Papenfuss, MD, FACS
St. Luke's Medical Center



Fabio Sbrana, MD, FACS
Lutheran General Hospital

IL-WI All Cancer Cases 2019-2021 (Annualized thru Mid October)



*Volumes are tentative

*Includes all new cases to AAH, analytical and non-analytical cases

*The registry is currently working through a database conversion

IL				
	2019	2020	2021 Annualized thru 10/15	GRAND TOTALS
LIVER & BILE DUCTS	137	122	80	339
PANCREAS	379	295	306	980
WI				
LIVER & BILE DUCTS	95	73	126	294
PANCREAS	259	232	237	728
GRAND TOTALS	870	722	749	2341

**Number of Cancers
Diagnosed at AAH
within each state**

IL = 1 in 8

WI = 1 in 4

Pancreatic and Liver Surgery

Pancreas and Liver 2014-2021 (Q1/Q2/Q3) YTD (Includes all Aurora)

<u>Summary</u>										<u>Advocate</u>
	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021 Q1/Q2/Q3</u>	
Total Panc Cancers			197	191	196	182	253	216	188(215)	
Whipple	0	19	16	25	26	32	39	34	41(55)	38(49)
Distal	<u>10</u>	<u>10</u>	<u>15</u>	<u>7</u>	<u>5</u>	<u>19</u>	<u>26</u>	<u>30</u>	33(44)	15(20)
Total									<u>2</u>	
	10	29	31	32	31	51	65	64	76(100)	53(71)
Other	8	3	1	2	19	18	16	23	12(16)	(Intent to treat)

	<u>Aurora Total Liver(Excluding Biopsies)</u>					
	<u>Resect +/- ABL</u>	<u>Ablate Alone</u>	<u>Nanoknife</u>	<u>Other</u>	<u>Total</u>	<u>Advocate</u>
<u>2015</u>	20	5	0	0	25	
<u>2016</u>	26	4	0	0	30	
<u>2017</u>	29	8	2	8	47	
<u>2018</u>	17	6	1	9	33	
<u>2019</u>	24	3	0	0	27	
<u>2020</u>	31	2	0	4	43	
<u>2021(Q1-Q3)</u>	40	1	0	10	50(67)	11(15)

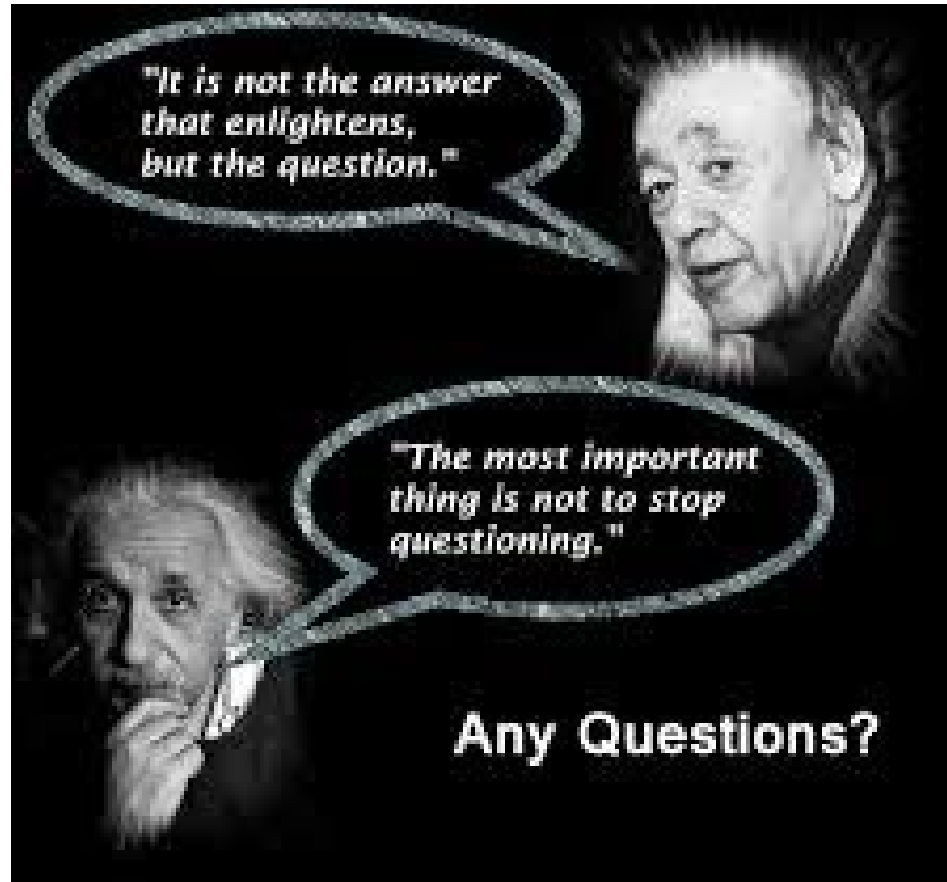
Goals of CALP and Surgical Oncology

- **Multidisciplinary Care for all AAH patients**
 - Site Specific Tumor Meetings
 - GI – Thursday 7-8:00 AM
 - Liver Metastases – 1st and 3rd Tuesdays 7-8:00 AM
 - Regional Conferences
- **Research**
- **Education**
 - Surgical Oncology Fellowship
 - Surgical Residency
 - Breast Surgery Fellowship

Navigation

- Oncology Nurse Navigators available at every site
 - Specialized in GI, Pancreas and Hepatobiliary Diseases
- Support patients through collaboration amongst specialists in order to streamline and personalize care
 - Individualize assistance to the patient family and caregiver through out cancer treatment
 - Provide emotional support and education
 - Identify and remove barriers to care





Advances in Diagnosis, Treatment & Management of Pancreatic Cancer



Marc Mesleh, MD, FACS

Chairman of the Integrated Cancer Network Program in the South Chicagoland PSA
Clinical Associate Professor of Surgery – UIC
Advocate Christ Medical Center

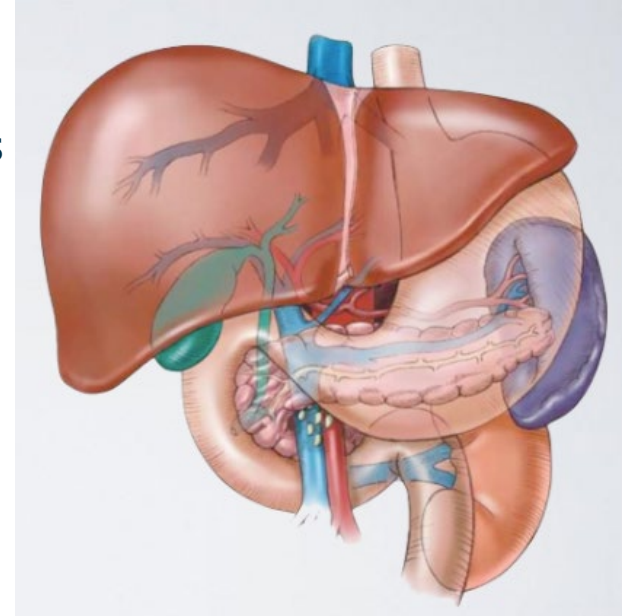
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Advances in Diagnosis & Treatment of Pancreatic Cancer

Evaluation of Pancreatic Mass

Presentation

- Incidental – Pancreatic Tail Lesions
- Painless Jaundice – Pancreatic Head Lesions
- Abdominal/Back Pain – Worrisome for Vascular Invasion
- NEW onset Diabetes
- Vague Symptoms
 - Bloating
 - Poor Appetite
 - Weight Loss
 - Diarrhea (Exocrine Insufficiency)



Evaluation of Pancreatic Mass

Interventional GI

Endoscopic Ultrasound – Biopsy Lesion

ERCP – Stent Bile Duct

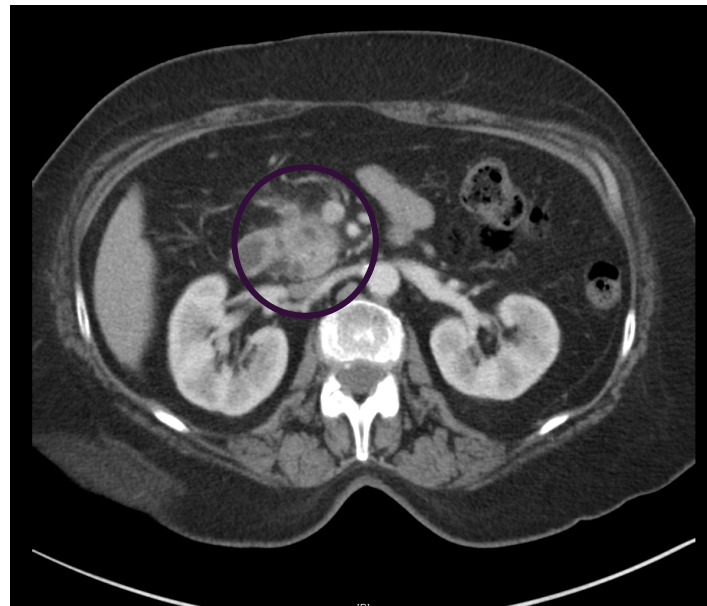
Imaging

CT scan with IV Contrast

- Triple Phase: Pre-contrast, Arterial phase, and Venous phase
- MRI with and without Contrast
 - *Preferred test
- MRCP is inadequate as this is a non-contrast study and doesn't give information on vascular involvement

Tumor Marker

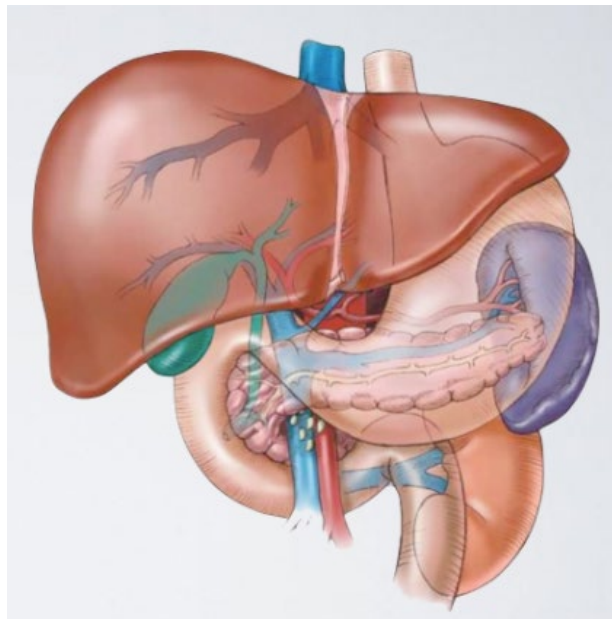
CA 19-9, CEA



Evaluation of Pancreatic Mass

Staging

- Rule-out Metastatic Disease
- Assess for Lymphadenopathy
- Assess for Vascular Involvement



Resectability Status	Arterial	Venous
Resectable	<ul style="list-style-type: none"> • No arterial tumor contact (celiac axis [CA], superior mesenteric artery [SMA], or common hepatic artery [CHA]). 	<ul style="list-style-type: none"> • No tumor contact with the superior mesenteric vein (SMV) or portal vein (PV) or $\leq 180^\circ$ contact without vein contour irregularity.
Borderline Resectable ^b	<p>Pancreatic head/uncinate process:</p> <ul style="list-style-type: none"> • Solid tumor contact with CHA without extension to CA or hepatic artery bifurcation allowing for safe and complete resection and reconstruction. • Solid tumor contact with the SMA of $\leq 180^\circ$ • Solid tumor contact with 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 noted if present, as it may affect surgical planning. <p>Pancreatic body/tail:</p> <ul style="list-style-type: none"> • Solid tumor contact with the CA of $\leq 180^\circ$ • Solid tumor contact with the CA of $>180^\circ$ without involvement of the aorta and with intact and uninvolved gastroduodenal artery thereby permitting a modified Appleby procedure (some panel members prefer these criteria to be in the locally advanced category). 	<ul style="list-style-type: none"> • Solid tumor contact with the SMV or PV of $>180^\circ$, contact of $\leq 180^\circ$ 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).
Locally Advanced ^{b,c}	<p>Head/uncinate process:</p> <ul style="list-style-type: none"> • Solid tumor contact with SMA $>180^\circ$ • Solid tumor contact with the CA $>180^\circ$ <p>Pancreatic body/tail:</p> <ul style="list-style-type: none"> • Solid tumor contact of $>180^\circ$ with the SMA or CA • Solid tumor contact with the CA and aortic involvement 	<ul style="list-style-type: none"> • Unreconstructible SMV/PV due to tumor involvement or occlusion (can be due to tumor or bland thrombus)

Management of Pancreatic Tumors

Management of Pancreatic Cancer



National
Comprehensive
Cancer
Network®

NCCN Guidelines Version 2.2021 Pancreatic Adenocarcinoma

[NCCN Guidelines Index](#)
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[Discussion](#)

INTRODUCTION

Decisions about diagnostic management and resectability should involve multidisciplinary consultation at a high-volume center with use of appropriate imaging studies.

Pathology

Surgical Oncology

Genetics

Medical Oncology

Nurse Navigator

PATIENT
Multidisciplinary
Cancer
Conference

**Radiation
Oncology**

Interventional GI

Radiology

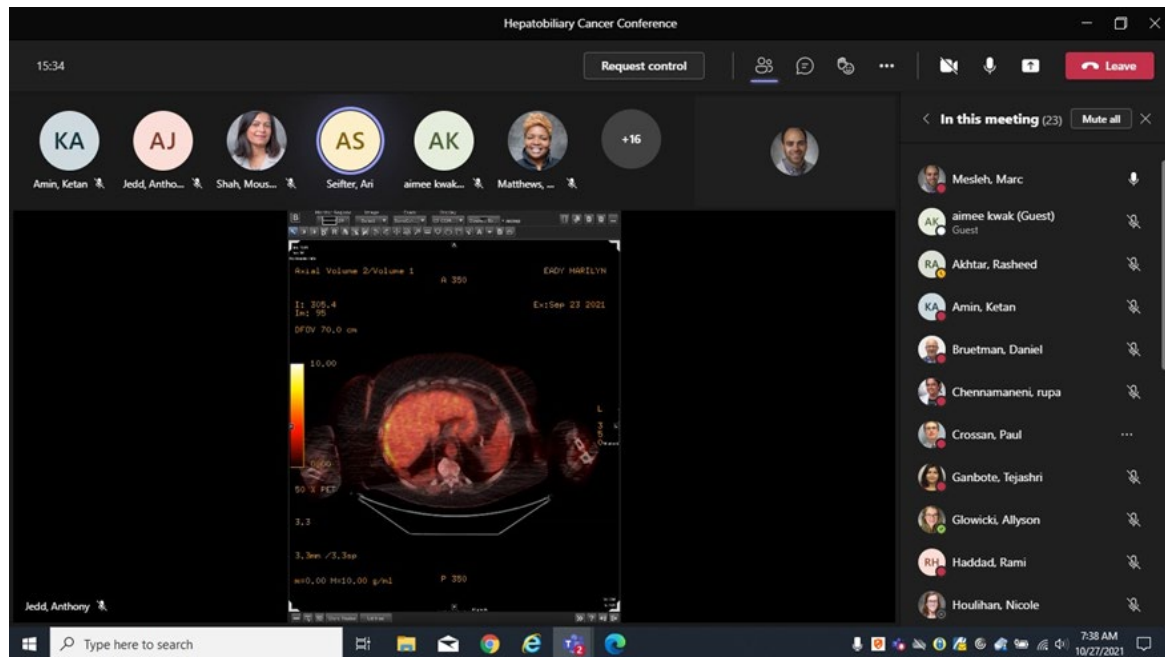
**Research
Coordinators**

**Interventional
Radiology**

Management of Pancreatic Cancer

100% of Patients Presented

- Includes those Diagnosed within the system
- Also, those diagnosed elsewhere but getting evaluated by our team



Management of Pancreatic Cancer

Neoadjuvant Chemotherapy

- Now used for all patients with Pancreatic Adenocarcinoma
- Regardless of Resectability status

Improved overall survival

- Earlier Systemic Treatment of Microscopic Metastatic Disease
- Downstage tumor
- Assess Biology of Tumor and response to Chemo Regimen

Management of Pancreatic Cancer

Neoadjuvant Chemotherapy

- Now used for all patients with Pancreatic Adenocarcinoma

ORIGINAL ARTICLE

OPEN

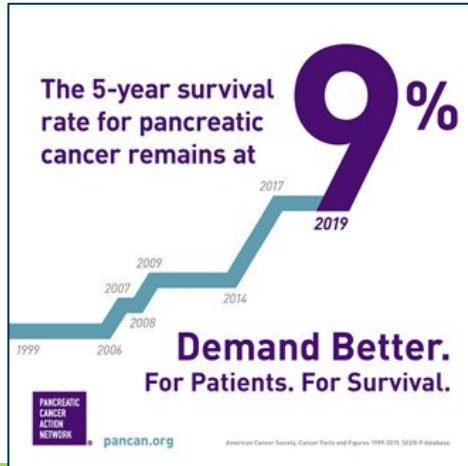
Factors Predicting Response, Perioperative Outcomes, and Survival Following Total Neoadjuvant Therapy for Borderline/Locally Advanced Pancreatic Cancer

Mark J. Truty, MD, MSc, FACS,* Michael L. Kendrick, MD,* David M. Nagorney, MD,* Rory L. Smoot, MD,* Sean P. Cleary, MD,* Rondell P. Graham, MD,† Ajit H. Goenka, MD,* Christopher L. Hallemeier, MD,§ Michel G. Haddock, MD,§ William S. Harmsen, MS,|| Amit Mahipal, MBBS,† Robert R. McWilliams, MD,‡ Thorvardur R. Halfdanarson, MD,‡ and Axel F. Grothey, MD‡

	Recurrence Free Survival	Overall Survival	Historical Data
Median	23.5 mo	58.8 mo	
1-Year	65%	96%	59%
2-Year	48%	78%	29%
3-Year	32%	62%	17%

Improving Prognosis

Patient's Life after surgery



Surgical Team Approach to Advanced Recovery(STAAR) Pancreatic Resections



Geoff Bellini, MD

Board Certified in Complex General Surgical Oncology & General Surgery

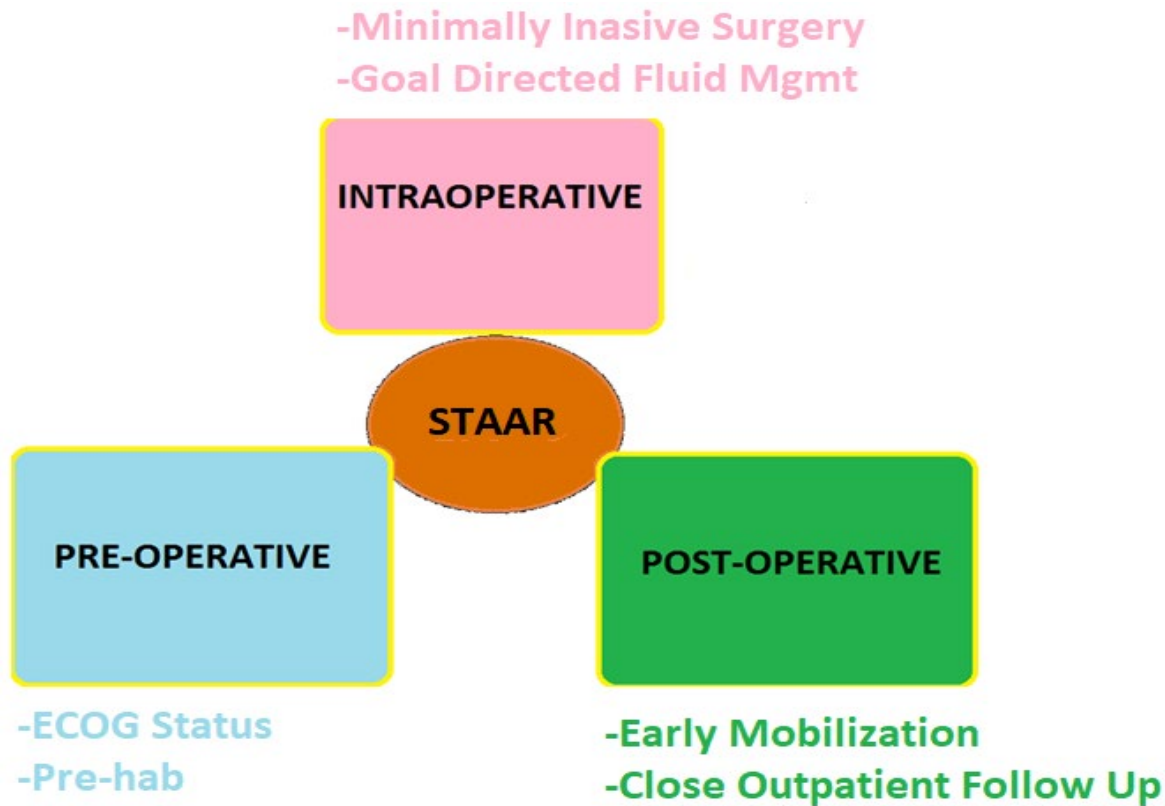
Director Surgical Oncology Fellowship Rotation

Aurora St. Luke's Medical Center

No disclosures

November 18, 2021

STAAR COMPONENTS



Pre-Operative Initiatives

- Standardized Pre-Op Assessment
 - ECOG status for all patients
 - Consideration for “Pre-hab” based on upon ECOG status ≥ 1
 - Dietician referral if BMI <19, 10-15% weight loss in 6 months, and albumin less than 3
 - Pre-operative carbohydrate drink (CHO) 2-3hrs prior to surgery: ERAS Clear, apple juice
 - *insulin resistance post op ->
 - *pain, nausea, preservation of skeletal muscle mass with improved length of stay as well

ECOG	Description
0	Fully active, able to carry on all pre-disease performance without restriction.
1	Restricted in physically strenuous activity but ambulatory and able to carry out work of a light or sedentary nature, e.g., light house work, office work.
2	Ambulatory and capable of all selfcare but unable to carry out any work activities. Up and about more than 50% of waking hours.
3	Capable of only limited selfcare, confined to bed or chair more than 50% of waking hours.
4	Completely disabled. Cannot carry on selfcare. Totally confined to bed or chair

Intraoperative Initiatives

Order Sets

SURG IP Surgical Enhanced Recovery - STAAR PRE  Personalize  

- Epidural for open cases
- Hemodynamic Monitoring → Flo-Trac
 - Minimally invasive using A-line
 - Provides information on following parameters every 20 seconds
 - Stroke Volume
 - Mean arterial pressure
 - Systemic vascular resistance
 - Cardiac output

Minimally Invasive Surgery

- Decreased blood loss
- Less postoperative pain
- Decreased length of stay
- Faster overall recovery
- Earlier application of adjuvant therapy

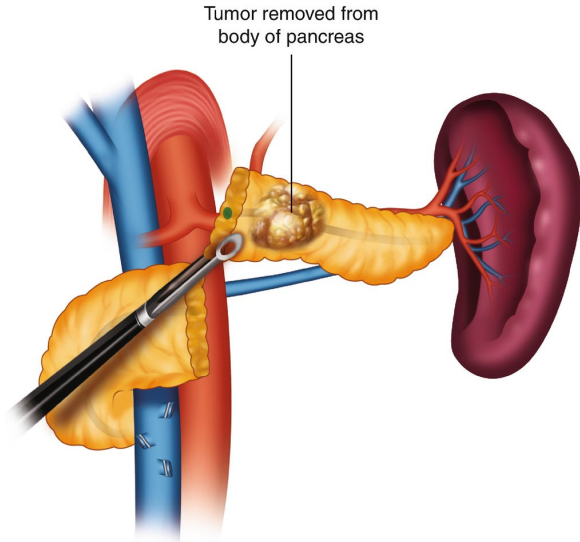
Robotic Surgery Advantages

- Reduced operator fatigue
- Motion stabilization
- 3D imaging
- 10x magnification
- Improved instrumentation/dexterity

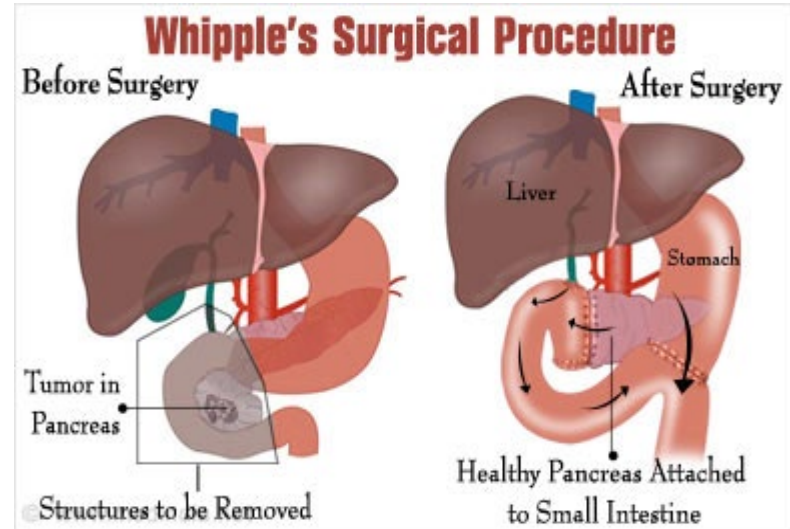


Robotic Cases Performed

Distal Pancreatectomy



Pancreaticoduodenectomy (Whipple)



Open vs Robotic



Most Importantly

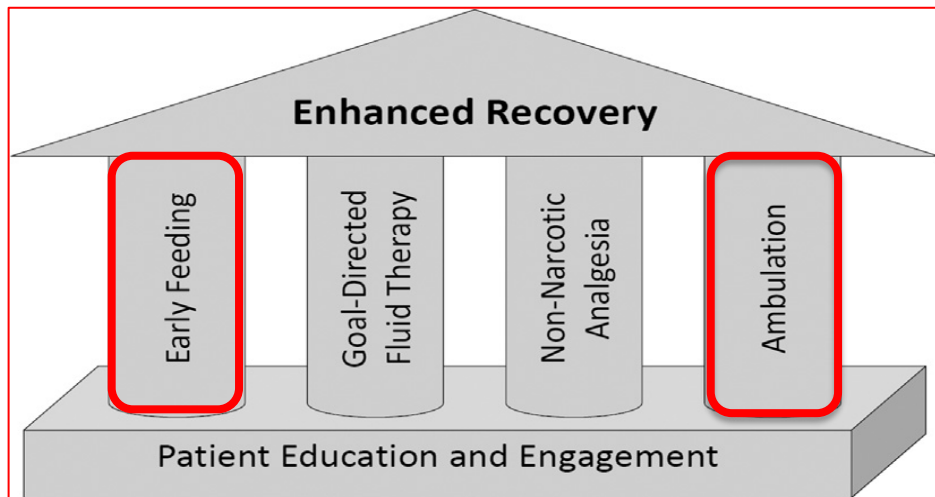
Regardless of Robotic or Open approach

- 1) Perform a safe operation
- 2) Perform a proper oncologic operation

Post Operative Initiatives

Standardized algorithm for pain control, lines and tubes removal and diet advancement based on postoperative day

- Foley removal by POD 1-2
 - Early Feeding and Early Mobilization
- Minimizing narcotic use: Toradol, Tylenol
- Goal: Drain removal by POD 3 if amylase normal



After DC & Post Op Visit

- Lovenox DVT prophylaxis for 28 days on discharge for all cancer patients
- Evaluate necessity of pancreatic enzyme supplementation
- Assessment for follow up or referral for glycemic management
- Assessment for follow up or referral to medical oncology/radiation oncology for further treatment or surveillance
- Whipple patient prescribed PPI for 12 months after surgery to decrease incidence of marginal ulcer development

Readmission Prevention

- **Low risk 0-4 points**
 - 5.8% Readmission risk
 - Call 2-3 days post DC
 - f/u 1.5-2 weeks in office
- **Intermediate risk 5-6 points**
 - 11.9% Readmission risk
 - Call 1-2 days post DC
 - f/u 1-1.5 weeks in office
 - Consider second f/u week 2
- **High risk ≥ 7**
 - Call 1-2 days post DC
 - f/u 0.5-1week in off
 - Second f/u week 2

TABLE 1. HOSPITAL Score Calculation

Characteristics	Value	Points
Low Hemoglobin level at discharge (<12 g/dL)	Yes	1
Discharge from an O ncology service	Yes	2
Low Sodium level at discharge (<135 mmol/L)	Yes	1
P rocedure during hospital stay	Yes	1
I ndex admission T ype: urgent or emergent	Yes	1
N o. hospital A dmissions in prior year	≤ 1	0
	2-5	2
	≥ 5	5
I ndex hospitalization L ength of stay ≥ 5 d	Yes	2

The HOSPITAL score has 13 total points as scored above.

Bold indicates the letters associated with the HOSPITAL acronym from each characteristic.

Surgical Management of Metastatic Disease to the Liver



Nikolaos A. Dallas, MD, MBA, FACS, FSSO

Surgical Oncologist, INCP Chair, Central Chicagoland PSA

Director of Surgical Student Education

Co-Director, Creticos Cancer Center, AIMMC

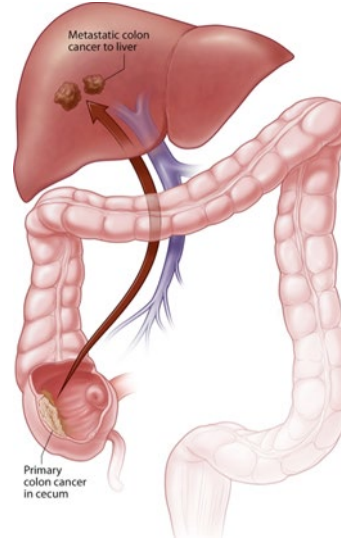
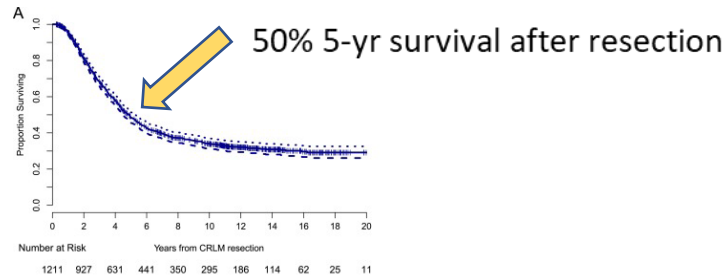
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Liver metastases are common. . .

- 25-30% of breast cancer patients develop distant metastatic disease, 50% go to liver
- 25-30% of patients with colorectal cancer will develop liver metastases during the course of their treatment
- ~50-70% of gastro-entero-hepatic neuroendocrine cancer patients will develop liver metastases during their lifetime
- Up to 10% of gastric cancer patients have liver metastases at presentation, and 34% will develop during their lifetime
- Liver is common site of distant metastasis in:
 - Pancreatic cancer
 - Cholangiocarcinoma
 - Melanoma
 - Prostate cancer
 - Ovarian cancer
 - Others...

Colorectal Liver Metastases

- Colorectal cancer is 3rd leading cause of cancer death in US
- 25-30% of patients develop liver metastases at or after diagnosis
- 25% of these patients have resectable disease



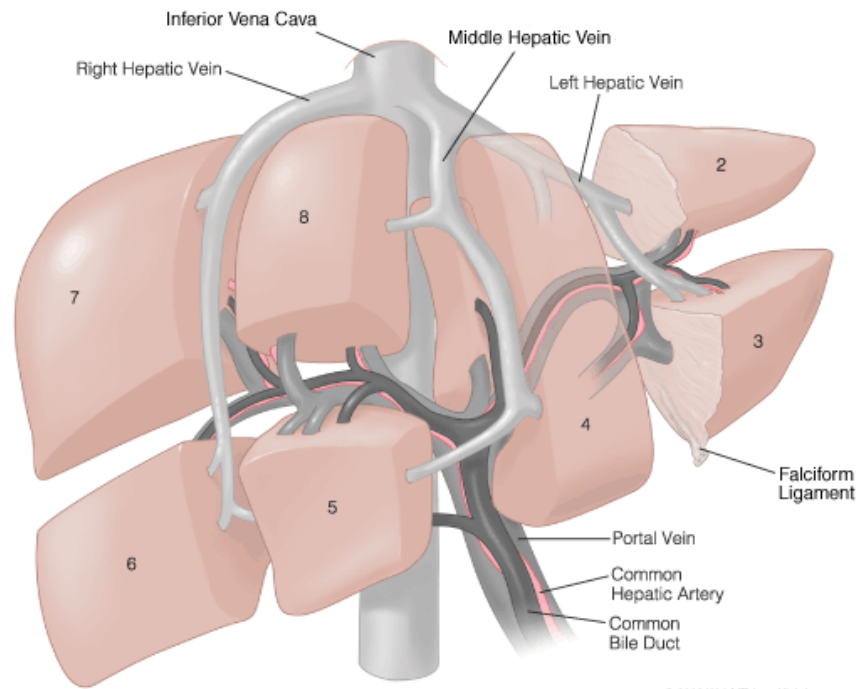
Treatment of Liver Metastasis

- Indications for Liver Metastasectomy

1. No extra-hepatic disease (relative)
2. Adequate Future Liver Remnant (FLR)
3. R0 resection achieved
4. At least 2 adjacent liver segments spared (with associated in/outflow and biliary drainage)

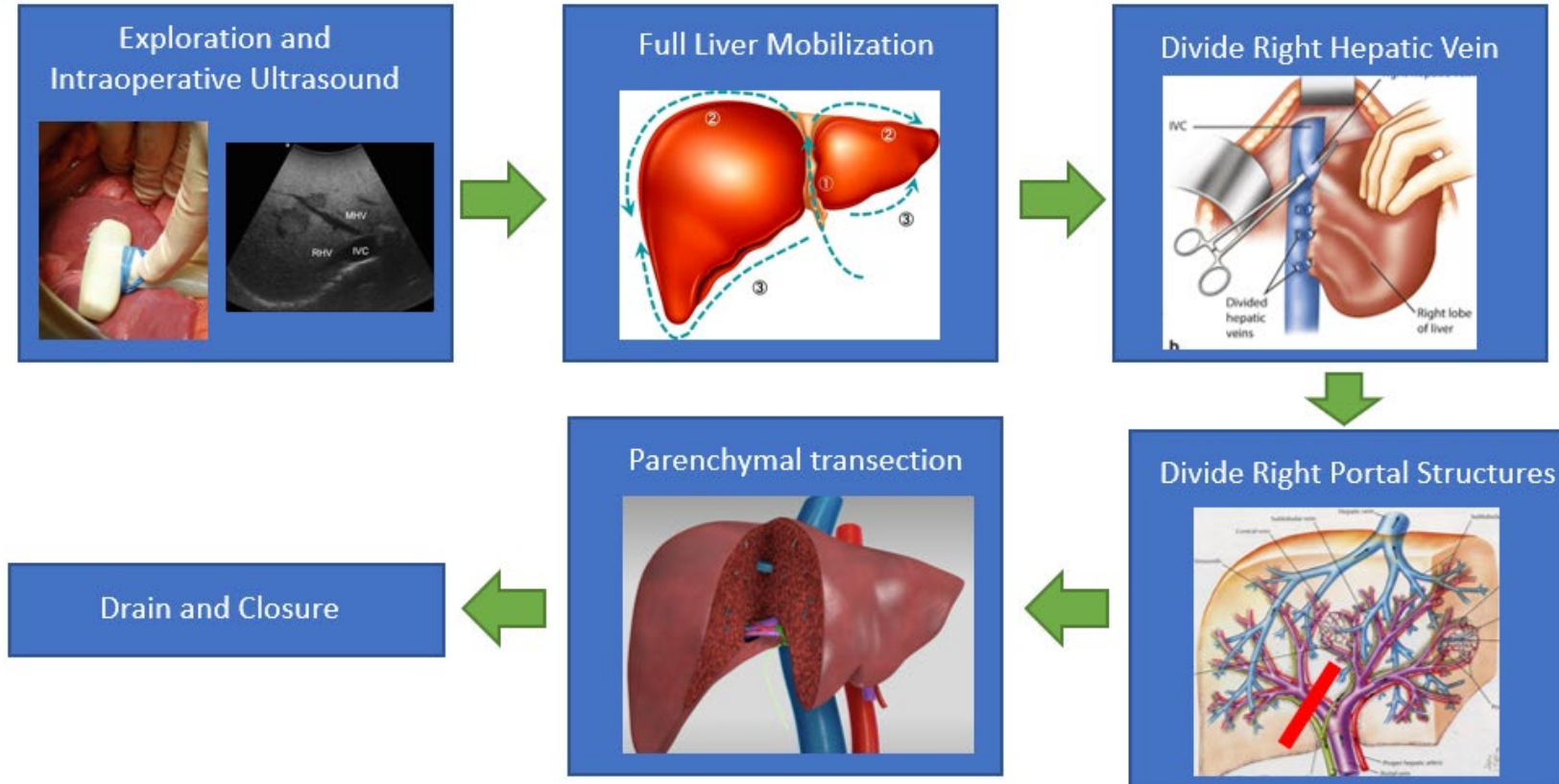
- Liver directed therapy

1. Ablation
2. Cryotherapy
3. Chemo-embolization & bland embolization
4. Y-90 therapy
5. Radiation therapy
6. Regional Therapy



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What is involved in a formal Right Hepatectomy?

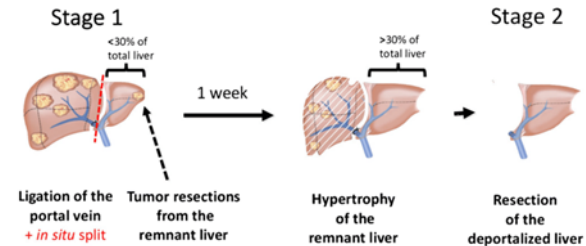
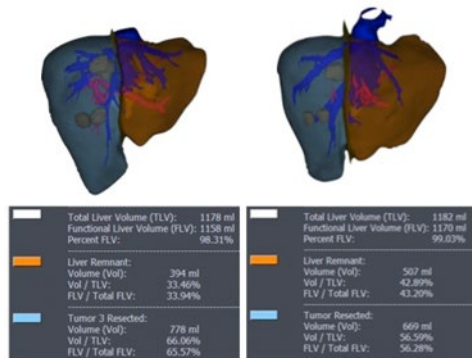


The key to liver resection . . . the FLR

- Liver failure after resection has a mortality of over 80%
- A minimum of 20-25% FLR has been advocated... more for steatosis, heavily pre-treated patients, etc.
- Up to 80% of the liver can be removed, and it will grow back!
- Strategies exist to increase FLR volume...

The key to liver resection . . . the FLR

- Portal Vein Embolization(PVE)
 - Embolize main lateral portal vein
 - Ipsilateral liver shrinks, contralateral liver grows (FLR)
 - Then resect ipsilateral liver with tumors in 1 month (fails in 20%)
- Associating Liver Partition with Portal vein ligation for Staged hepatectomy (ALPPS)
 - Right portal vein ligated surgically and liver split at falciform
 - Remnant left liver hypertrophies and resection undertaken 7-15 days later
 - High morbidity, controversial utility



Liver

Actual 10-year survival after hepatic resection of colorectal liver metastases: what factors preclude cure? ☆



John M. Creasy^a, Eran Sadot^a, Bas Groot Koerkamp^a, Joanne F. Chou^b, Mithat Gonen^b, Nancy E. Kemeny^c, Vinod P. Balachandran^a, T. Peter Kingham^a, Ronald P. DeMatteo^a, Peter J. Allen^a, Leslie H. Blumgart^a, William R. Jarnagin^a, Michael I. D'Angelica^{a,*}

^a Department of Surgery, Memorial Sloan Kettering Cancer Center, New York, NY

^b Department of Epidemiology and Biostatistics Memorial Sloan Kettering Cancer Center, New York, NY

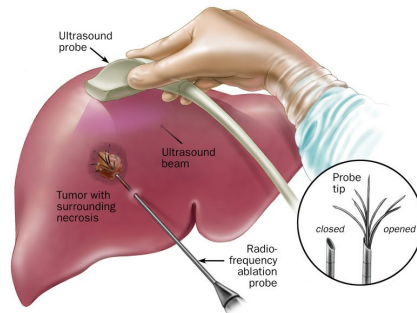
^c Department of Medicine, Memorial Sloan Kettering Cancer Center, New York, NY

- Disease-specific survival (DSS) was 4.9 years in resected patients (median)
- 10-year DSS was 34% (42% for low clinical risk score, 35% for high)
- Observed cure rate was 20.4% (15.6% after primary resection, 4.8% with 2nd)
- No individual factor was predictive of failure
- If high clinical risk score and extra-hepatic disease developed, cure rate 3.5%

Ablative Techniques

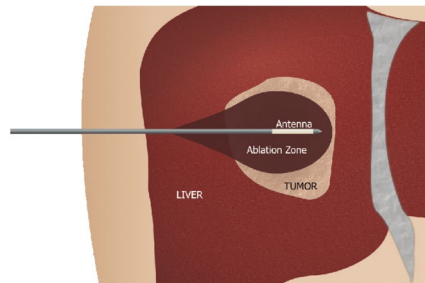
- RFA (radiofrequency ablation)

- Often used in poor surgical or non-operative candidates
- Higher OS and DFS in resected patients



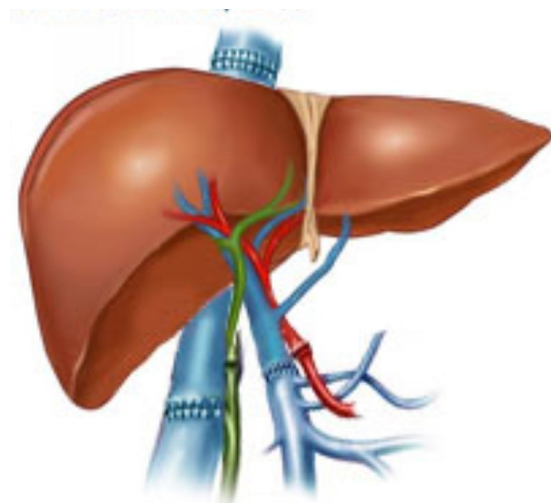
- MWA (microwave ablation)

- Similar patient population as RFA
- Lower ablation-site recurrences than RFA
- Studies still not conclusive



Orthotopic Liver Transplant (OLT)

- Studies demonstrated favorable outcomes in patients with unresectable liver metastases receiving transplant (SECA trial in Norway)
- 5-yr OS of 60% (vs 19% in chemotherapy alone)
- Clinical features used to select patients
- Other trials underway (SECA III, TRANSMET)
- Biggest challenge in US is complex organ allocation issues and availability of grafts



Metastatic Liver Tumors at AAH

- Cases performed at select high-volume centers of excellence
- Multidisciplinary Tumor Board to discuss prospective and ongoing treatment patients across all of Illinois and Wisconsin
- Developing standardized protocols for management of these complex patients

Irreversible Electroporation (IRE) for Borderline Resectable Pancreatic Cancer



John Brems, MD, FACS

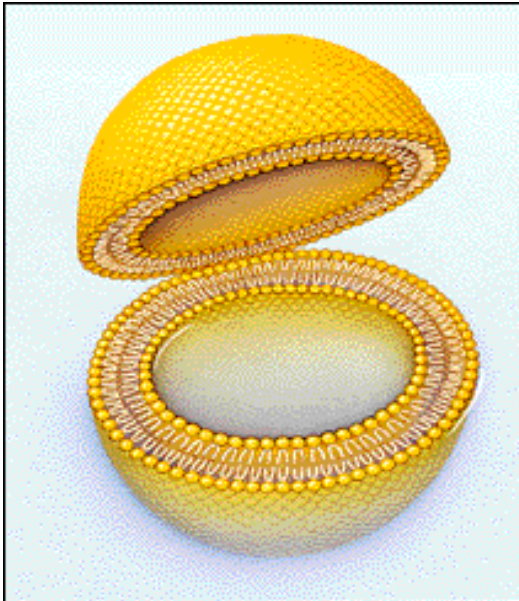
Director of the Center for Advanced Liver and Pancreatic Care
Advocate Sherman Hospital

November 18, 2021

NanoKnife® System Overview

- Uses high voltage, low energy electrical pulses to achieve tissue effect
- Does not rely on heat to ablate tissue
- Poses no heat sink issues
- Well demarcated post ablation zone
- Allows real-time CT/US imaging of ablated zones

How Electroporation Works



- The function of a cell membrane is to separate the intracellular and extracellular milieu and to control the transport processes between the interior and the exterior of the cell according to the cell needs.
- Electroporation is a way to increase cell membrane permeability by subjecting it to an electrical field¹.

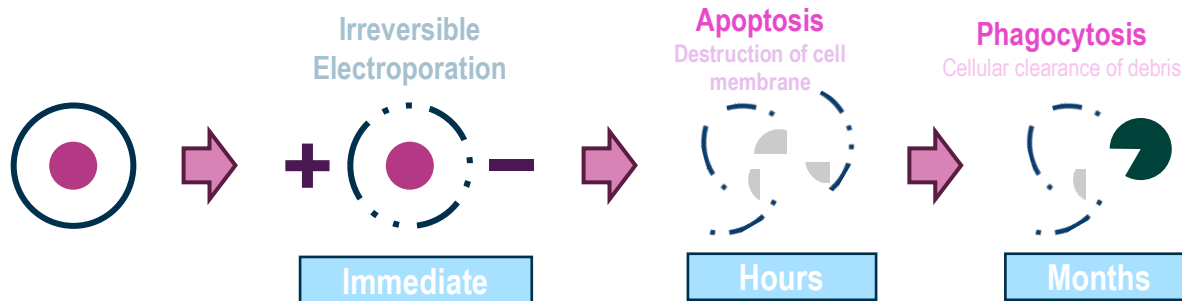
Mechanism of Action

- Series of short, low energy DC electrical pulses create defects (pores) in cell membranes
- Cell death occurs via “apoptosis like” phenomena
- This immune mediated cell death allows cellular clearance of debris and creates minimal tissue distortion

Reminder: This process takes time (8-10 weeks)

Confirming Efficacy – 3 months, avoid early PET scanning ALL will be positive

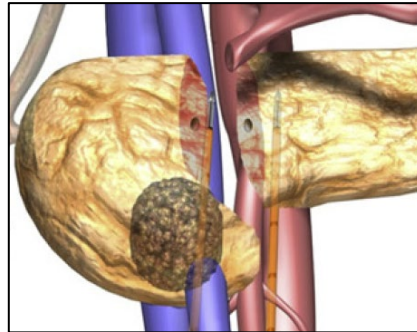
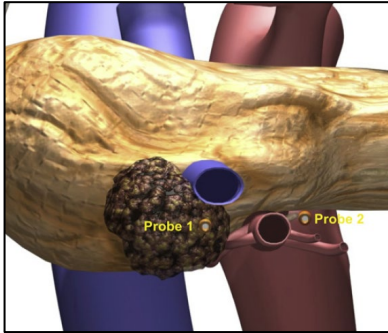
Commonly restart chemotherapy 4-6 weeks post IRE



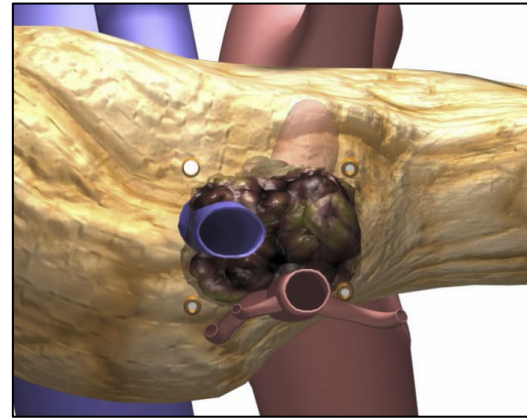
IRE in Pancreas

Used in Locally Advanced (Stage III)

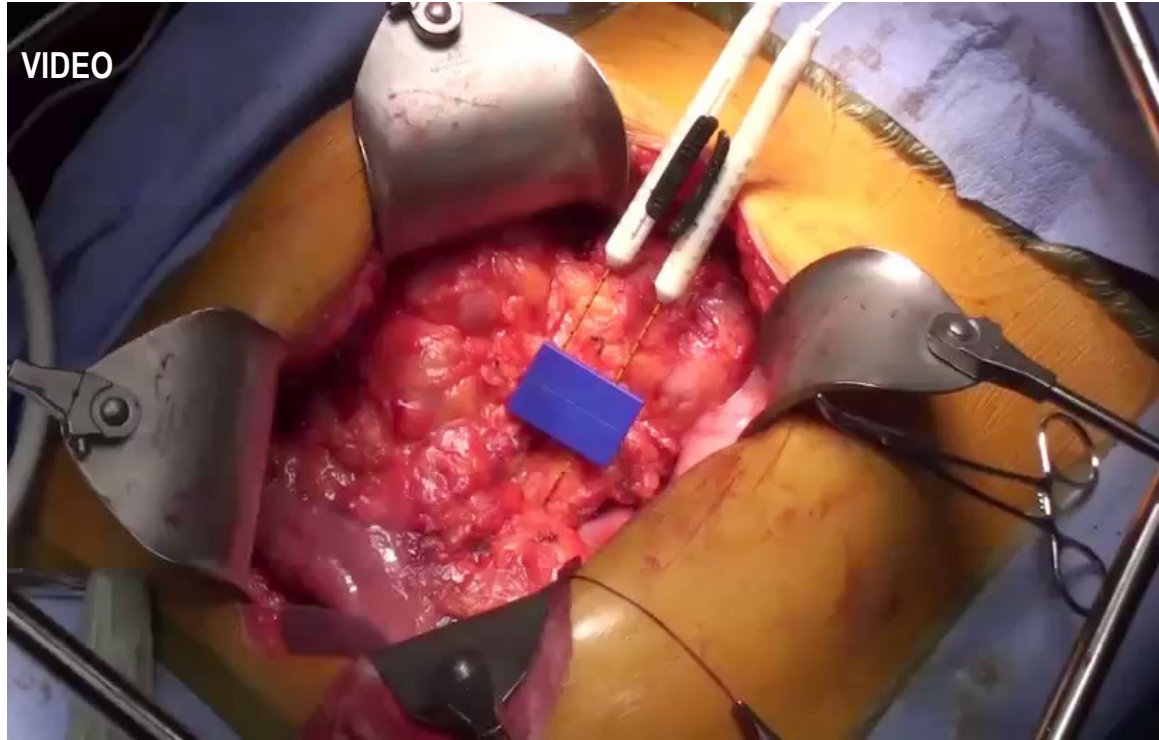
Margin
Accentuation



inSitu



Pulse Delivery



IRE (N=62)

In-situ -21

Accentuation of Vascular
Margin -41

