

# Pancreas Grossing Update



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# What has Changed?

- **New AJCC 8<sup>th</sup> Edition:**
  - **Size based T staging**
  - **≤ 1mm = positive margin**
  
- **New PDAC patient management:**
  - **All PDAC receive neoadjuvant**
    - **More vessel involvement**
    - **Tumor regression grade**

# PDAC Resectability Criteria



National  
Comprehensive  
Cancer  
Network®

NCCN Guidelines Version 1.2020

Pancreatic Adenocarcinoma

NCCN Evidence Blocks™

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## CRITERIA DEFINING RESECTABILITY STATUS AT DIAGNOSIS<sup>a</sup>

- Decisions about resectability status should be made in consensus at multidisciplinary meetings/discussions.

Resectability Status	Arterial	Venous
Resectable	<ul style="list-style-type: none"> <li>• No arterial tumor contact (celiac axis [CA], superior mesenteric artery [SMA], or common hepatic artery [CHA]).</li> </ul>	<ul style="list-style-type: none"> <li>• No tumor contact with the superior mesenteric vein (SMV) or portal vein (PV) or <math>\leq 180^\circ</math> contact without vein contour irregularity.</li> </ul>
Borderline Resectable <sup>b</sup>	<p><u>Pancreatic head/uncinate process:</u></p> <ul style="list-style-type: none"> <li>• Solid tumor contact with CHA without extension to CA or hepatic artery bifurcation allowing for safe and complete resection and reconstruction.</li> <li>• Solid tumor contact with the SMA of <math>\leq 180^\circ</math></li> <li>• 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.</li> </ul> <p><u>Pancreatic body/tail:</u></p> <ul style="list-style-type: none"> <li>• Solid tumor contact with the CA of <math>\leq 180^\circ</math></li> <li>• Solid tumor contact with the CA of <math>&gt;180^\circ</math> 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).</li> </ul>	<ul style="list-style-type: none"> <li>• Solid tumor contact with the SMV or PV of <math>&gt;180^\circ</math>, contact of <math>\leq 180^\circ</math> 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.</li> <li>• Solid tumor contact with the inferior vena cava (IVC).</li> </ul>
Locally Advanced <sup>b,c</sup>	<p><u>Head/uncinate process:</u></p> <ul style="list-style-type: none"> <li>• Solid tumor contact with SMA <math>&gt;180^\circ</math></li> <li>• Solid tumor contact with the CA <math>&gt;180^\circ</math></li> </ul> <p><u>Pancreatic body/tail:</u></p> <ul style="list-style-type: none"> <li>• Solid tumor contact of <math>&gt;180^\circ</math> with the SMA or CA</li> <li>• Solid tumor contact with the CA and aortic involvement</li> </ul>	<ul style="list-style-type: none"> <li>• Unreconstructible SMV/PV due to tumor involvement or occlusion (can be due to tumor or bland thrombus)</li> </ul>

# What is important for staging/template?

## SIZE

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### Primary Tumor# (T)

T0 No evidence of primary tumor

Tis Carcinoma in situ

T1 Tumor  $\leq 2$  cm in greatest dimension

T1a Tumor  $\leq 0.5$  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  $\leq 4$  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

## LYMPH NODES

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### Regional Lymph Nodes (N)

N0 No regional lymph node metastasis

N1 Metastasis in 1-3 regional lymph nodes

N2 Metastasis in  $\geq 4$  regional lymph nodes

# What is important for staging/template?

## OTHER COMPONENT

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IPMN

MCN

ITPN

## EXTENSION

---

Confined to pancreas

Peripancreatic ST

Duodenal wall

Ampulla

Adjacent organ/structure

## SITE

---

Head

Tail

Body

Uncinate process

Other

## MARGINS

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Neck/proximal

Retroperitoneal

CBD

$\leq 1$  mm = positive margin

# Other cancers in Whipple



## Distal bile duct

### T Stage

- T1 Tumor invades the bile duct wall with a depth less than 5mm
- T2 Tumor invades the bile duct wall with a depth of 5-12mm
- T3 Tumor invades the bile duct wall with a depth >12mm
- T4 Tumor involves the celiac axis, superior mesenteric artery, and/or common hepatic artery

## Ampulla

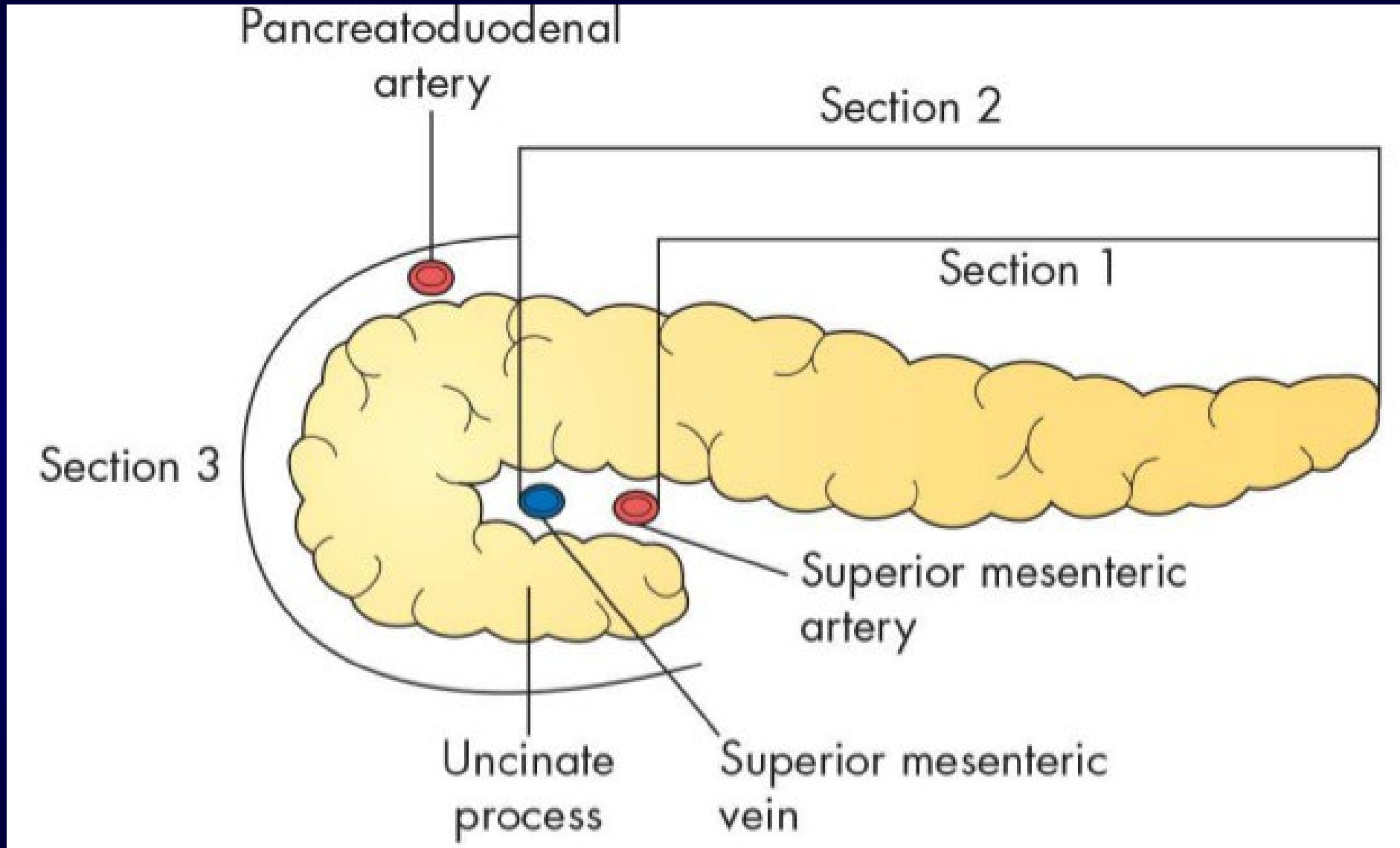
### T Stage

- T1a Tumor limited to the ampulla or sphincter of Oddi
- T1b Tumor invades beyond the sphincter of Oddi and/or into the duodenal submucosa
- T2 Tumor invades into the muscularis propria of the duodenum
- T3a Tumor directly invades the pancreas (up to 0.5 cm into the pancreas)
- T3b Tumor extends more than 0.5 cm into the pancreas, or extends into peripancreatic tissue or periduodenal tissue or duodenal serosa without involvement of the celiac axis or SMA
- T4 Tumor involves the celiac axis, SMA, and/or CHA, irrespective of size

# Outline

- **Anatomy**
- **Whipple (pancreatoduodenectomy)**
- **Distal pancreatectomy**

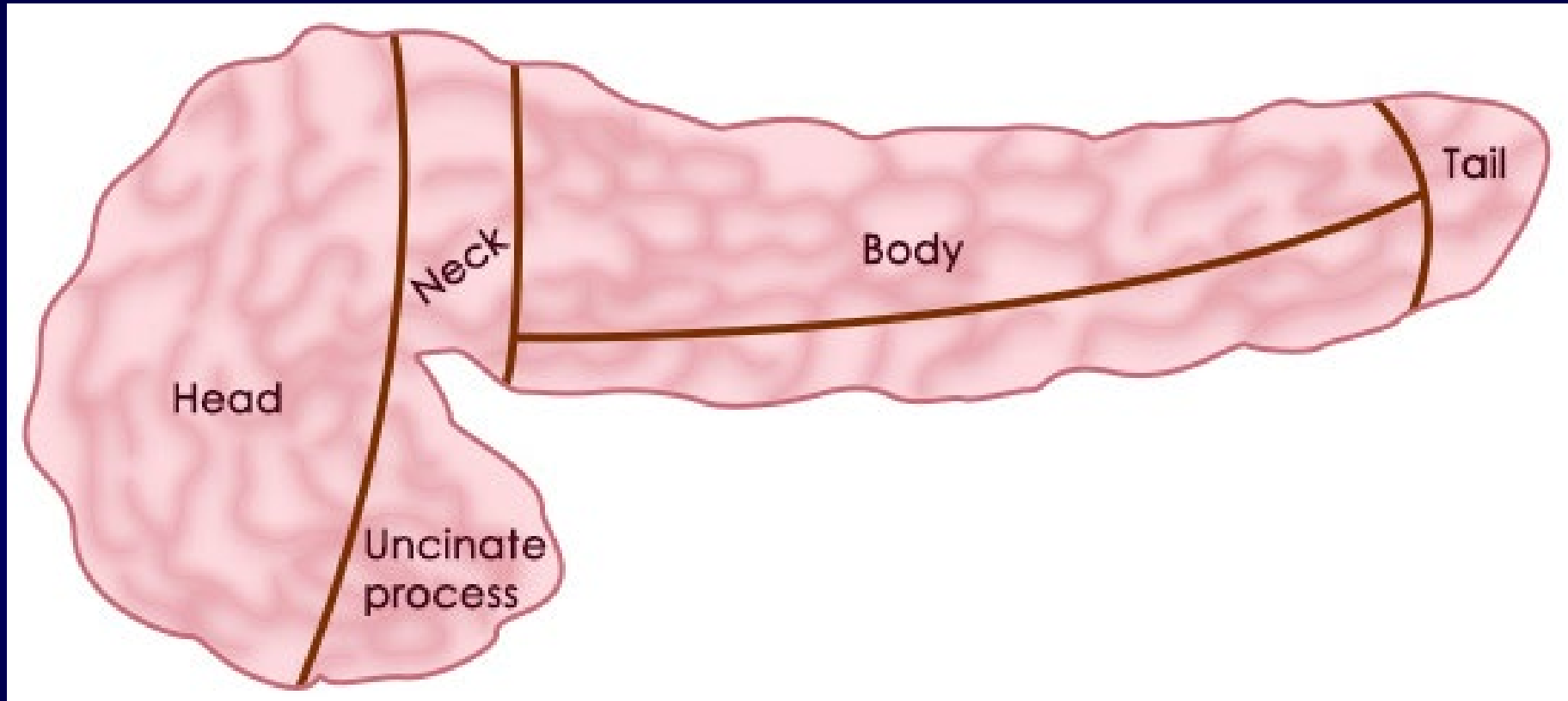
# Pancreas Anatomy



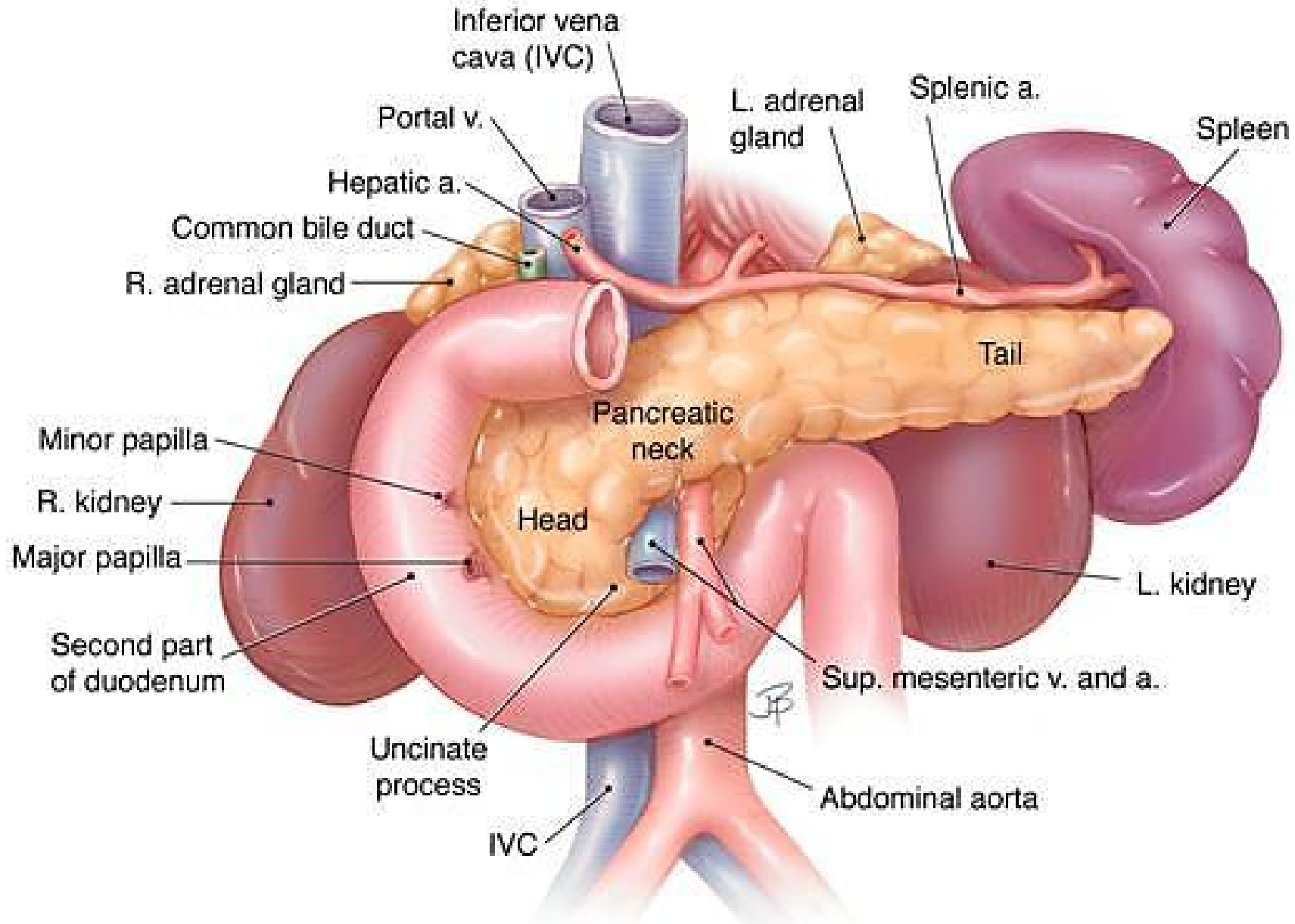
**1: body and tail; 2: neck; 3: head**



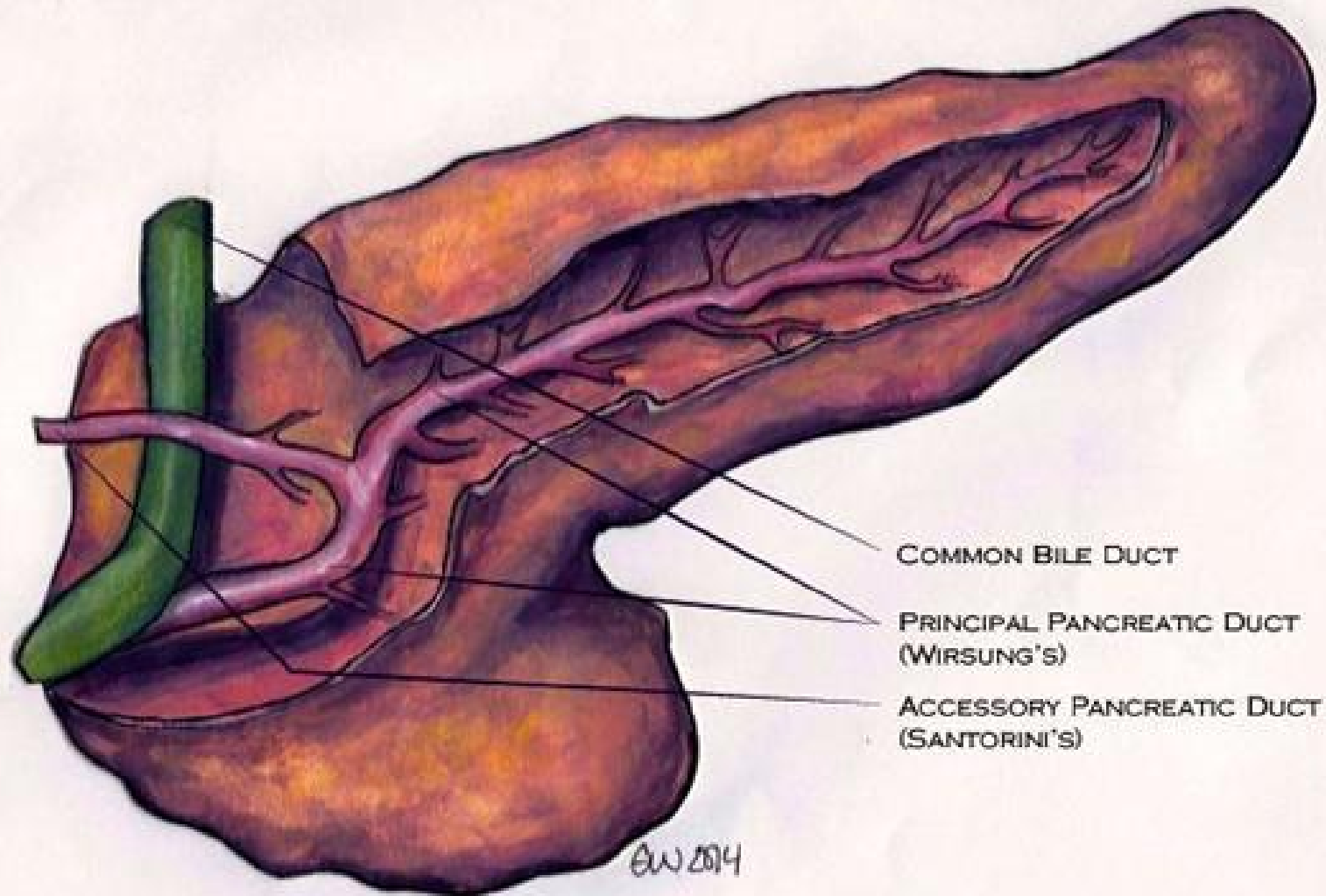
# Pancreas Anatomy



# Relationship with Surrounding Structures

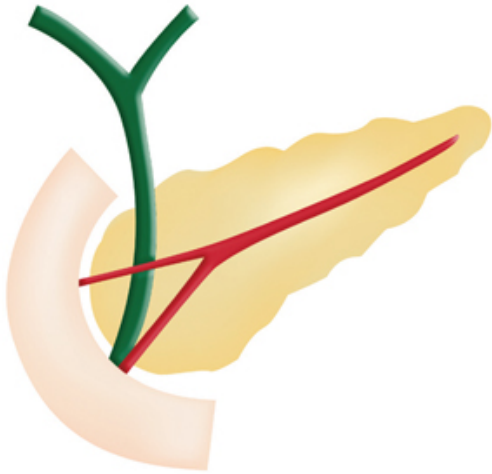


# Normal Pancreatic Duct System



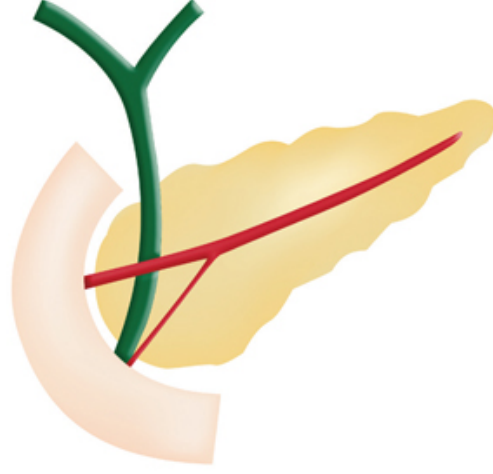
# Variations in Pancreatic Duct

Bifid configuration with dominant duct of Wirsung drainage



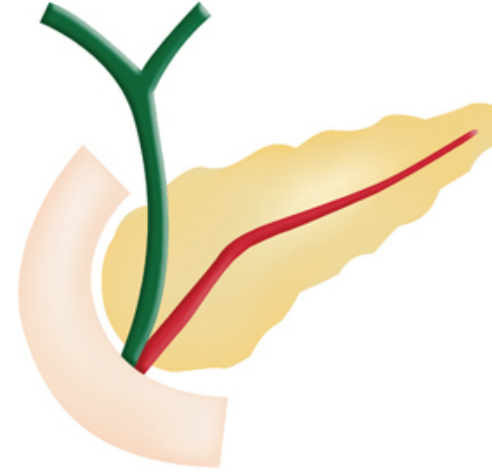
A

Bifid configuration dominant duct of Santorini drainage



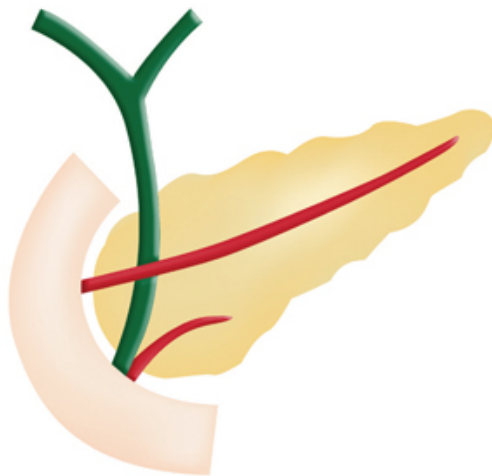
B

Rudimentary non-draining duct of Santorini



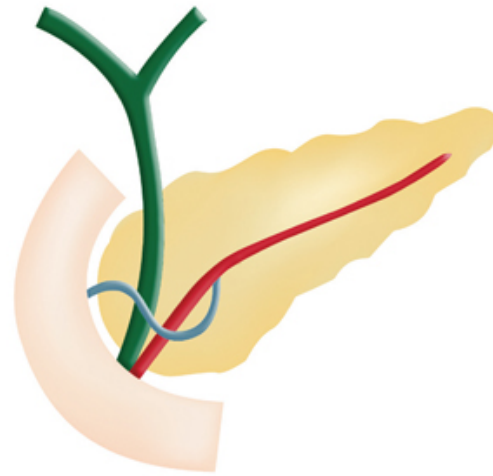
C

Pancreas divisum



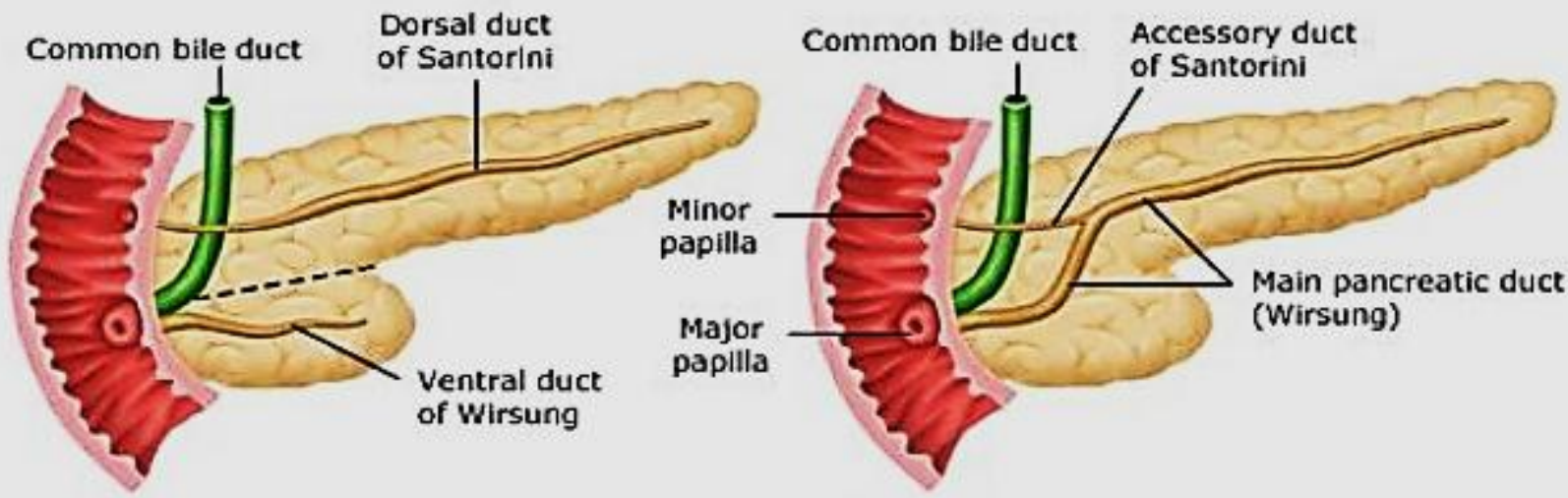
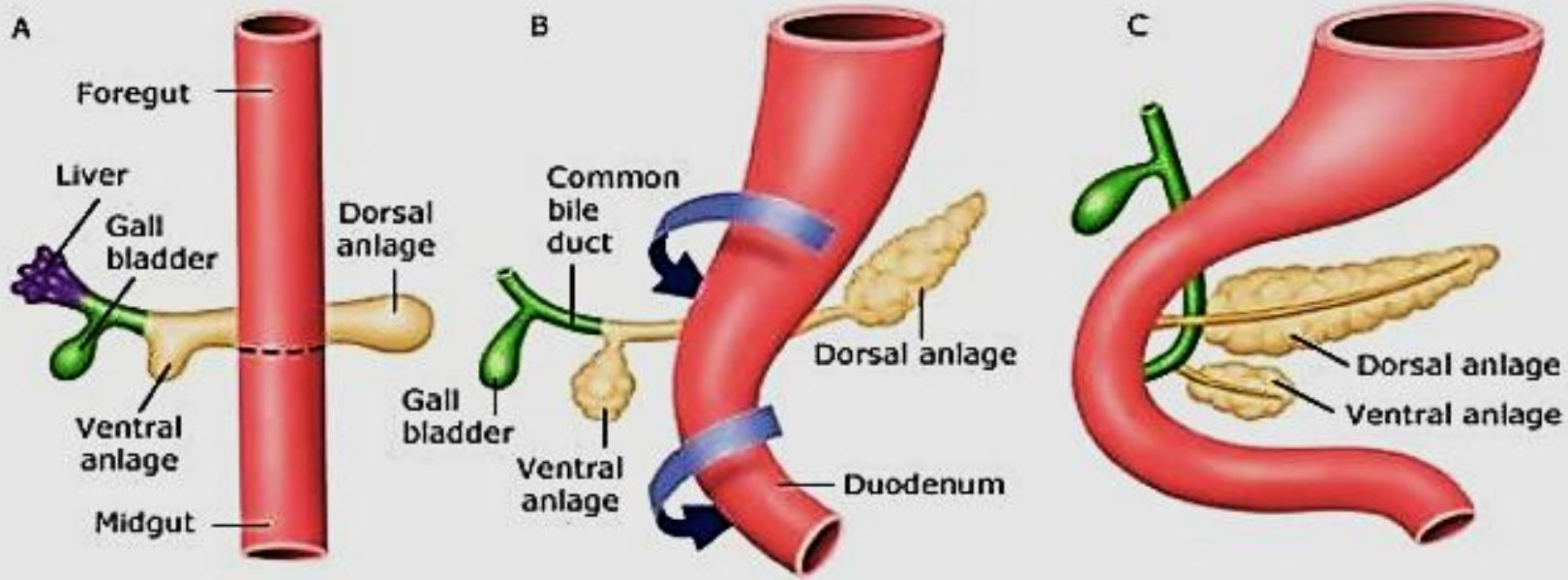
D

Ansa pancreatica



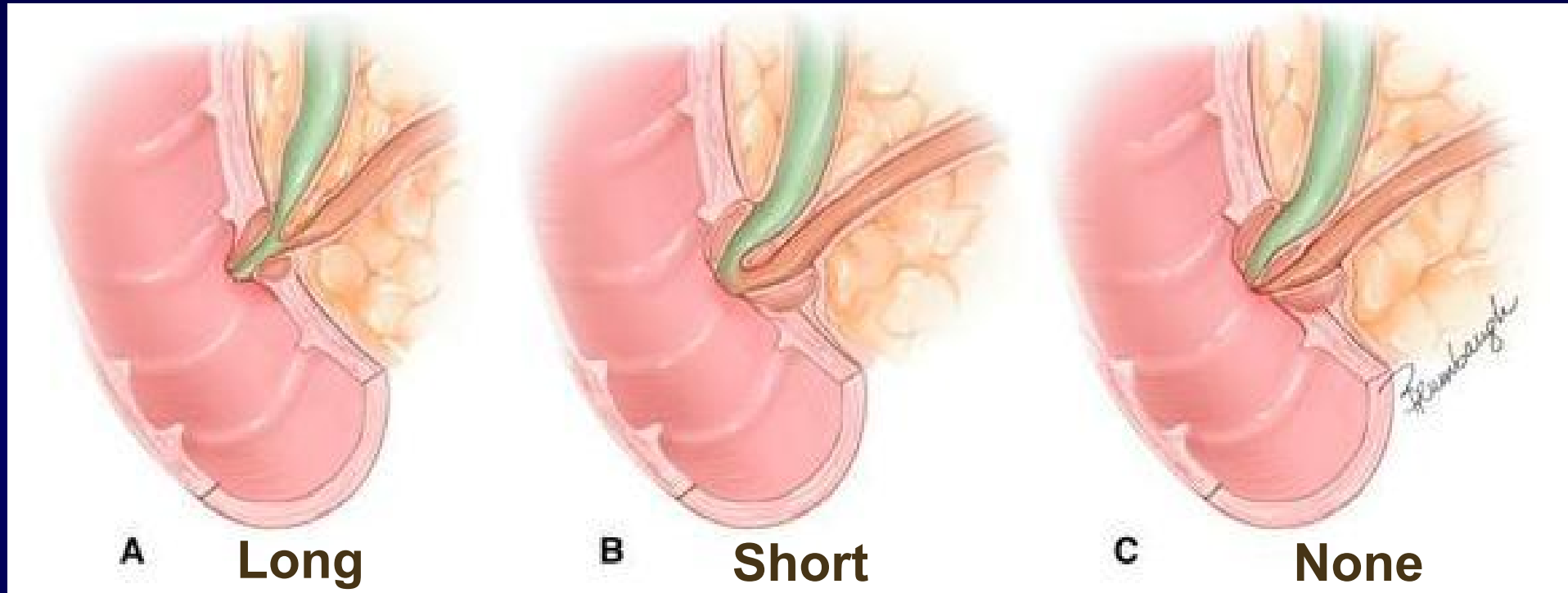
E

# Pancreas Divisum



- Most: no symptom
- A few: repeat pancreatitis, chronic abd pain, a/w adenoma

# Union of CBD and Main PD

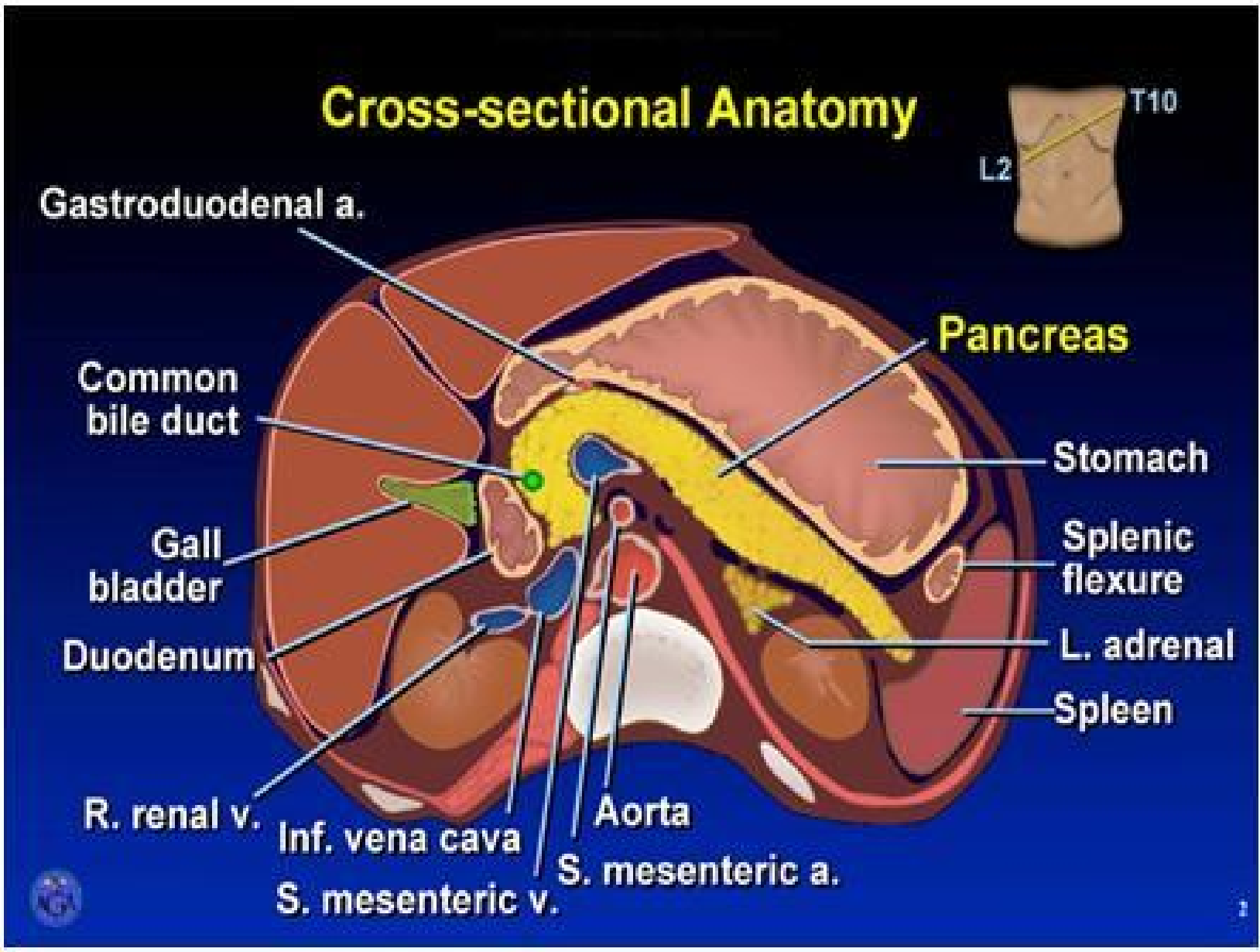


**Common channel:** fused portion of the bile and pancreatic ducts proximal to entry into the duodenum

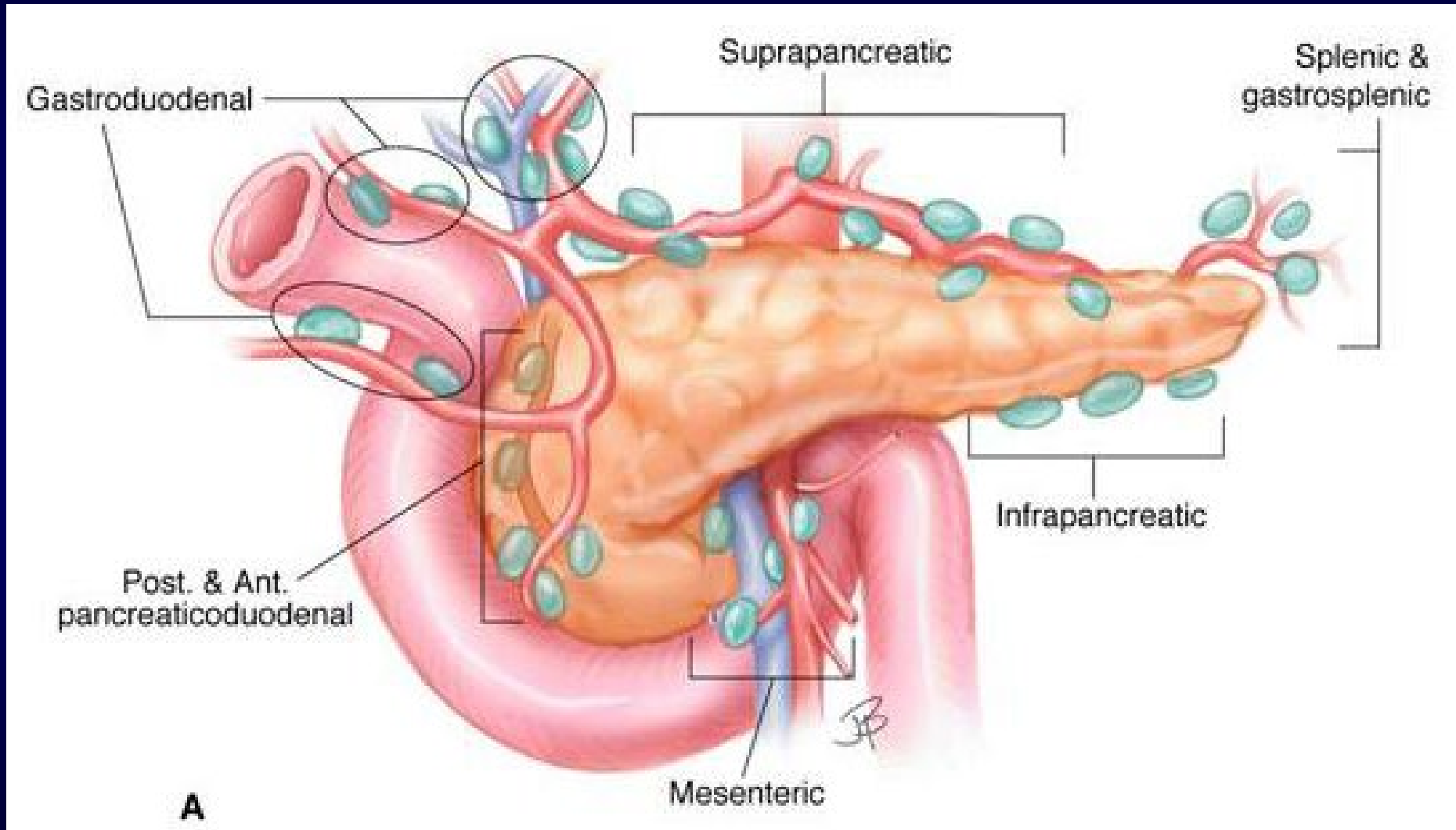
Gallstone → pancreatitis



# Cross Section Anatomy



# Lymph Nodes Draining Pancreas





# Outline

- **Anatomy**
- **Whipple (pancreatoduodenectomy)**
- **Distal pancreatectomy**

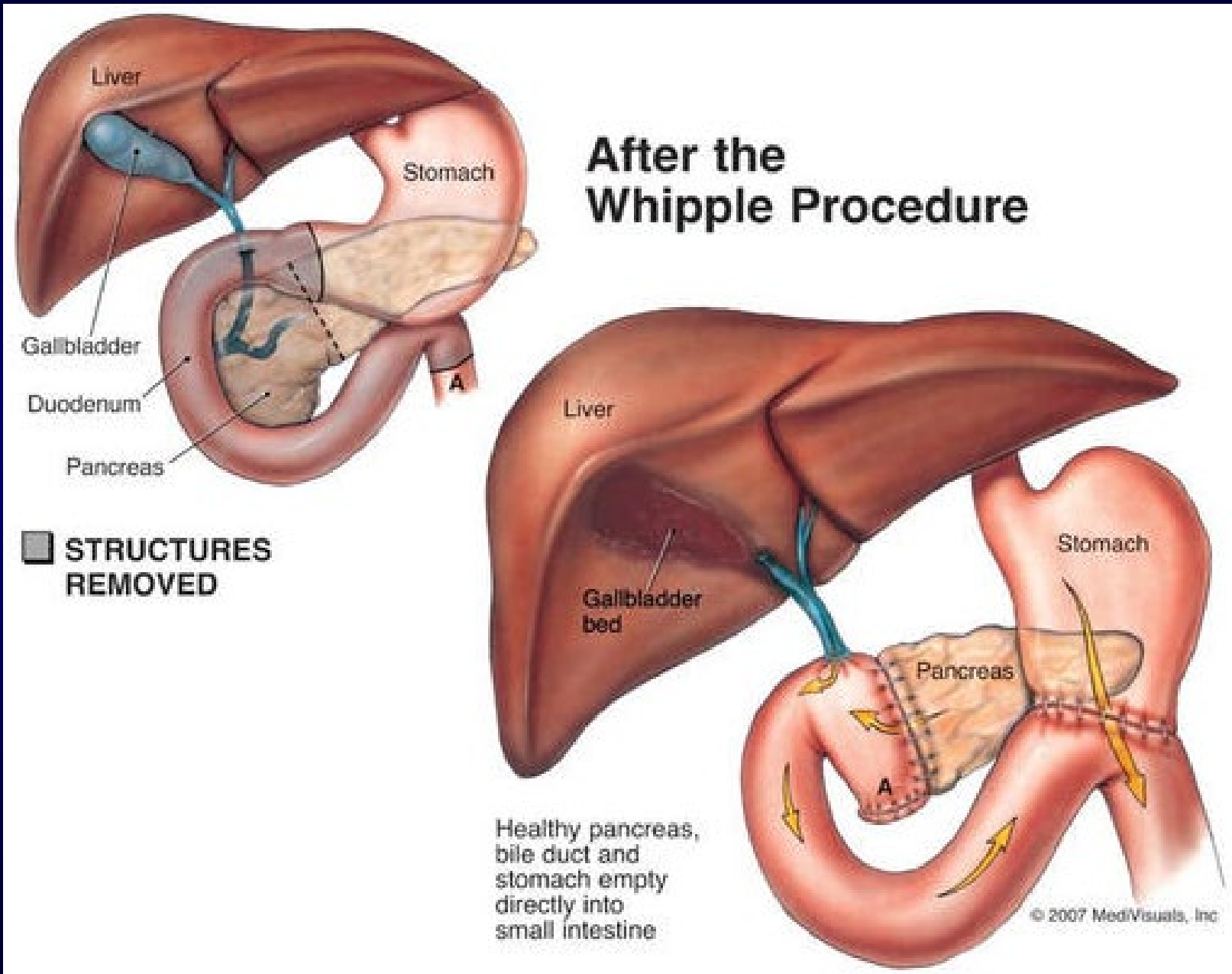
# History of Whipple Procedure

Allen Oldfather Whipple  
(1881-1963)

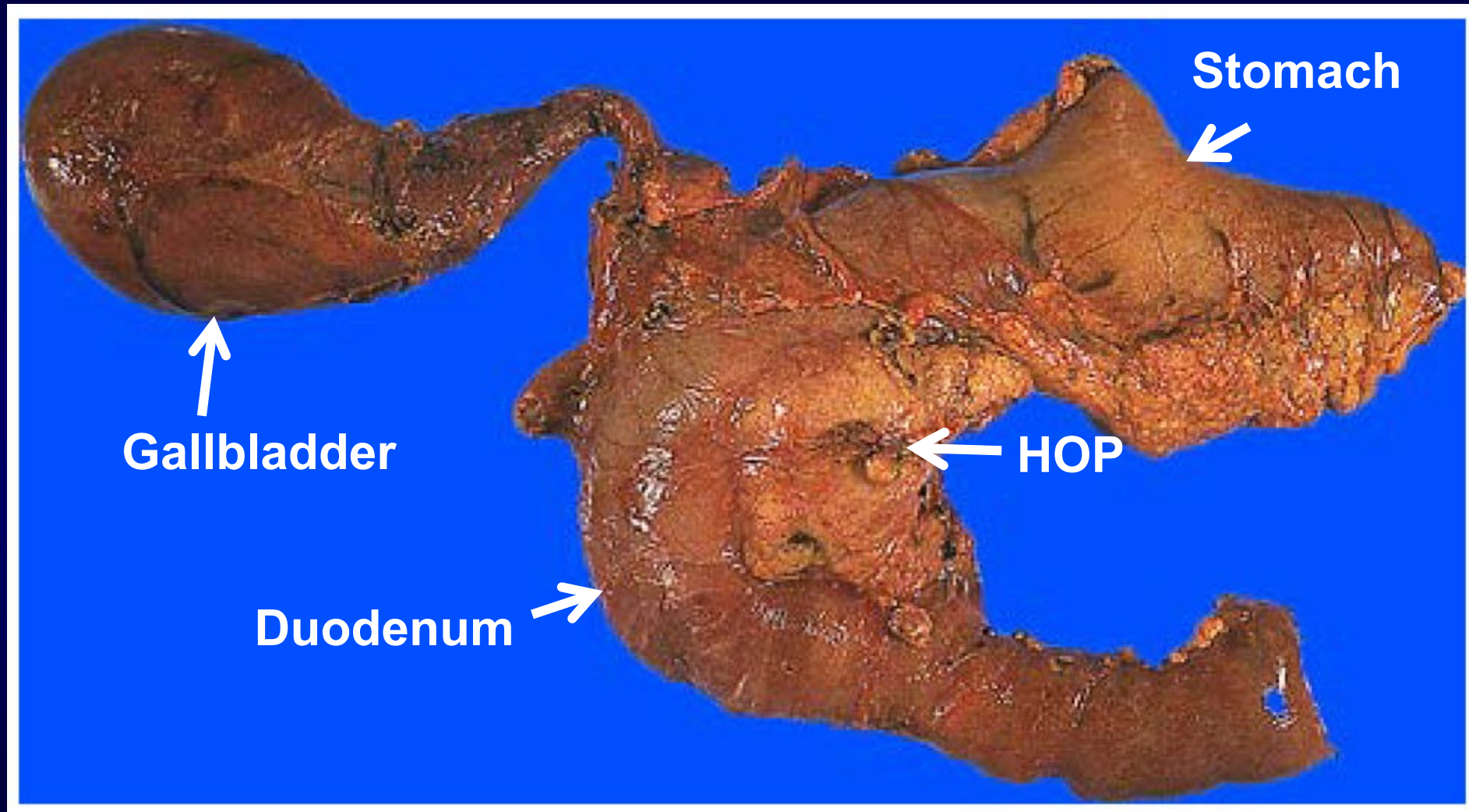


- First Whipple was performed by Codivilla in 1898
- American surgeon who popularized Whipple in the 1930s
- Performed **37** Whipple procedures during his lifetime
- Developed the diagnostic triad for insulinoma known as **Whipple's triad**
- Lifelong friends with **George Hoyt Whipple** who named **Whipple's disease**

# Whipple Procedure

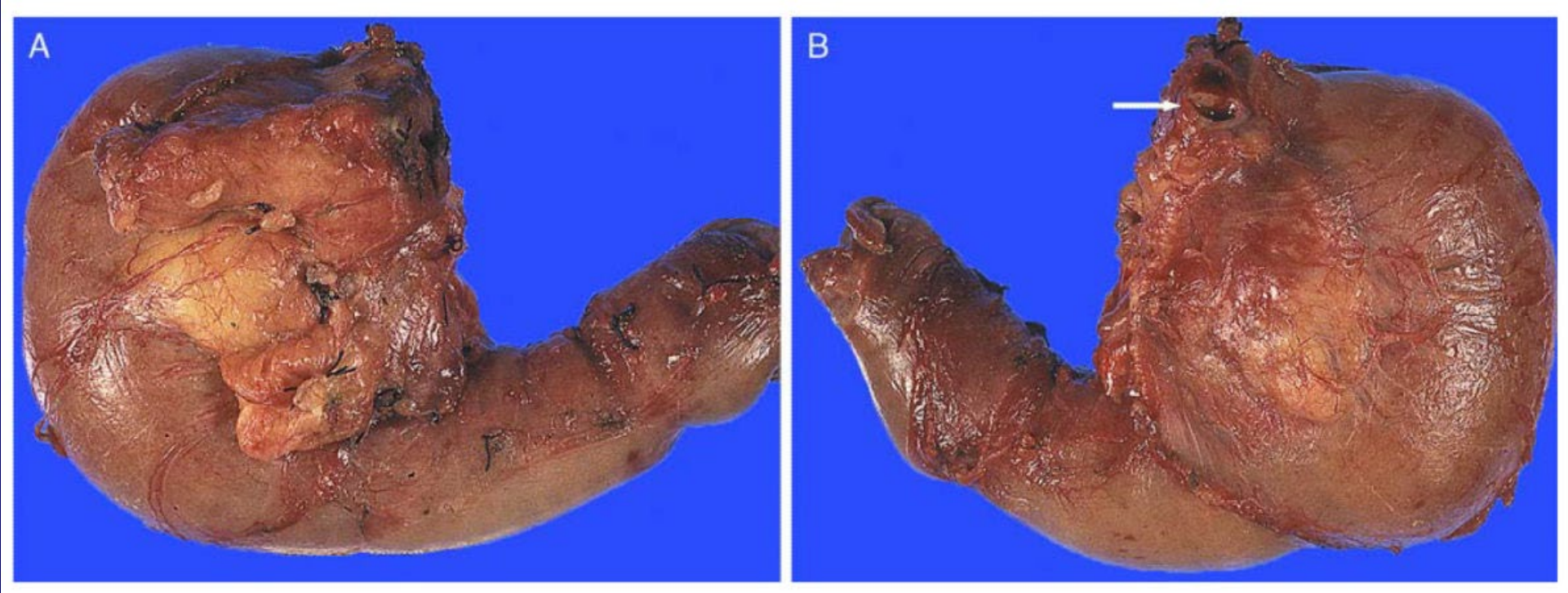


# Anterior of a Whipple Specimen





# Whipple Specimen



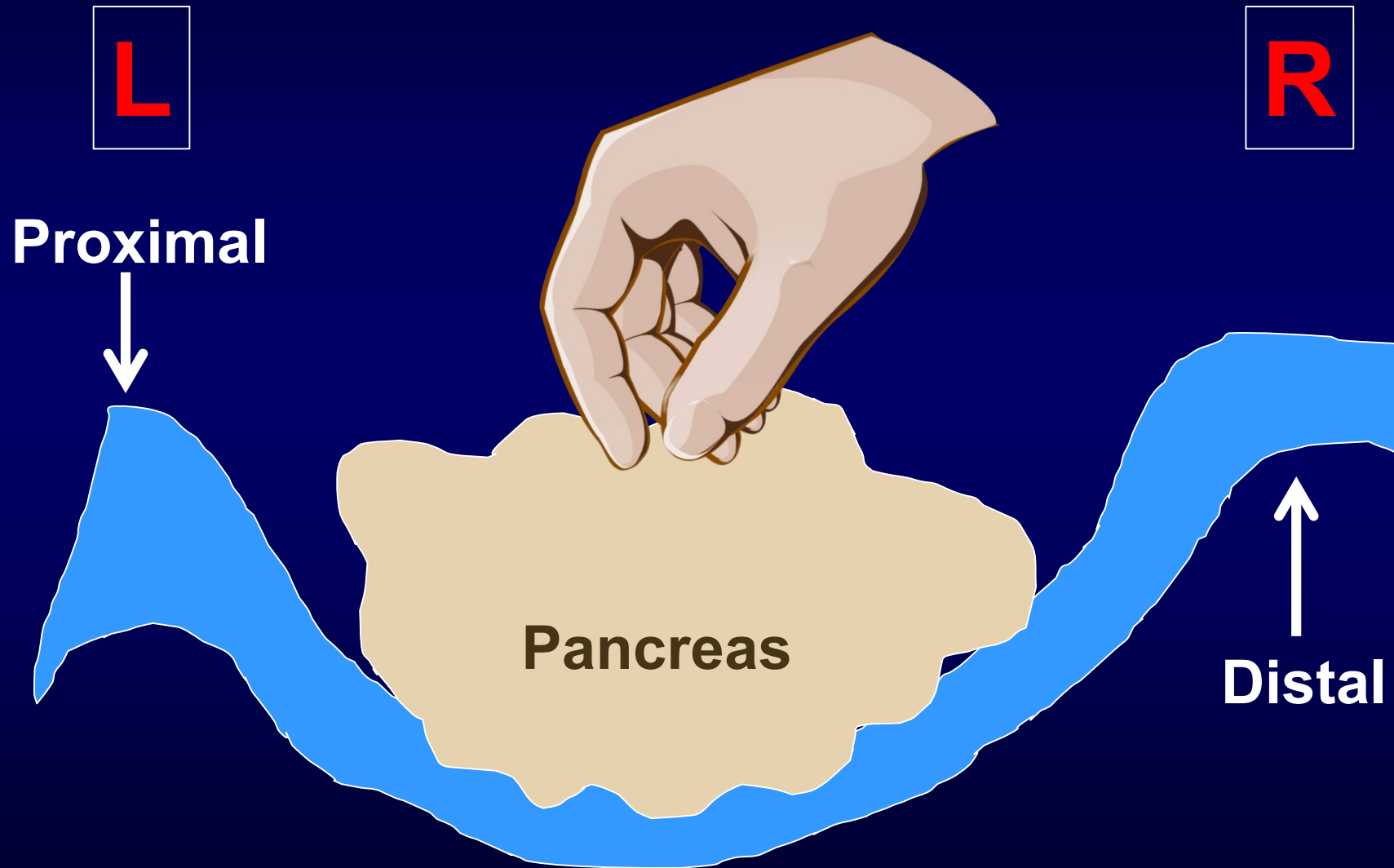
## Anterior

**Adipose tissue**  
**Convex**  
**Irregular transition to duodenum**

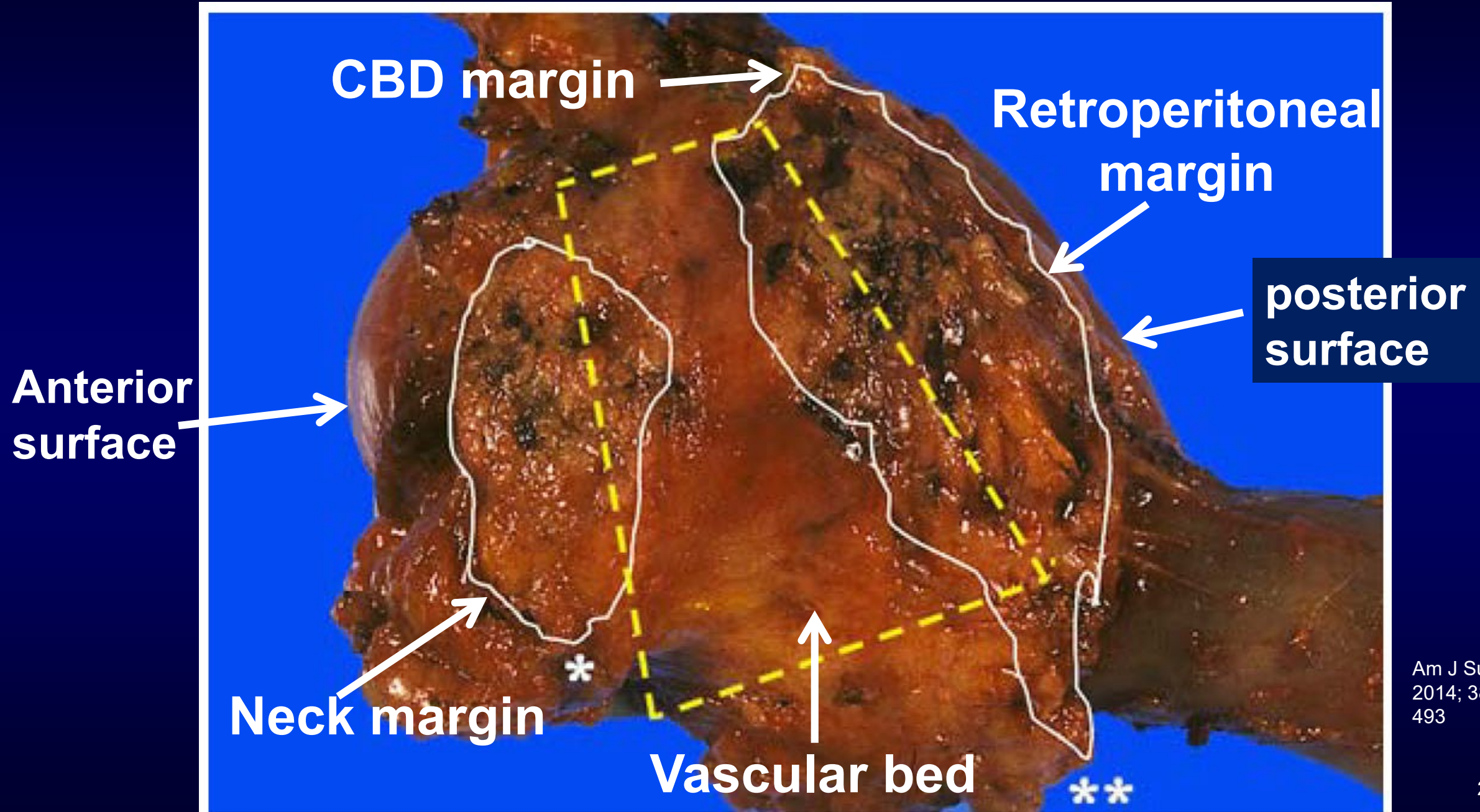
## Posterior

**Smooth**  
**Flat**  
**Smooth transition to duodenum**

# Orientate a Whipple Specimen



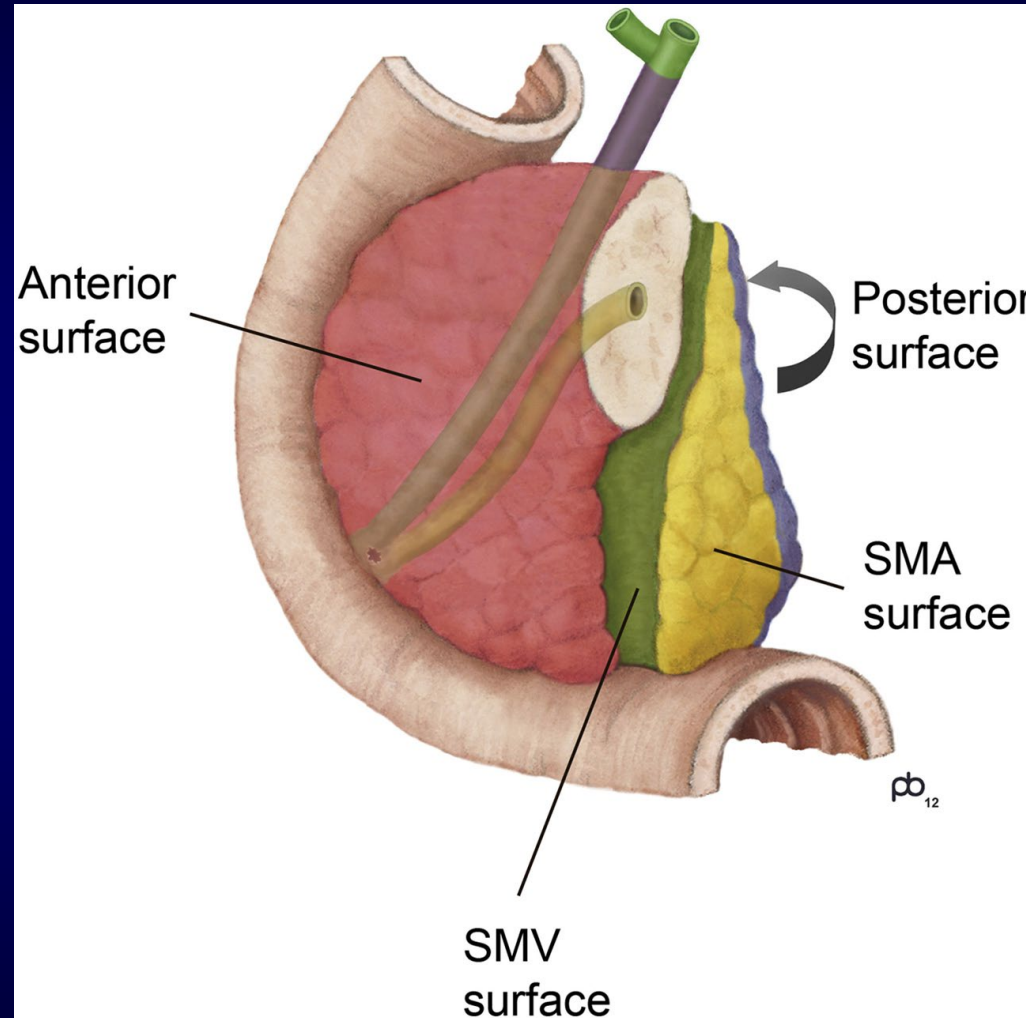
# “Trapezoid” Orientation



Am J Surg Pathol  
2014; 38 (4): 480-493



# Major Pancreatic Surfaces/Margins



← **Retroperitoneal margin**

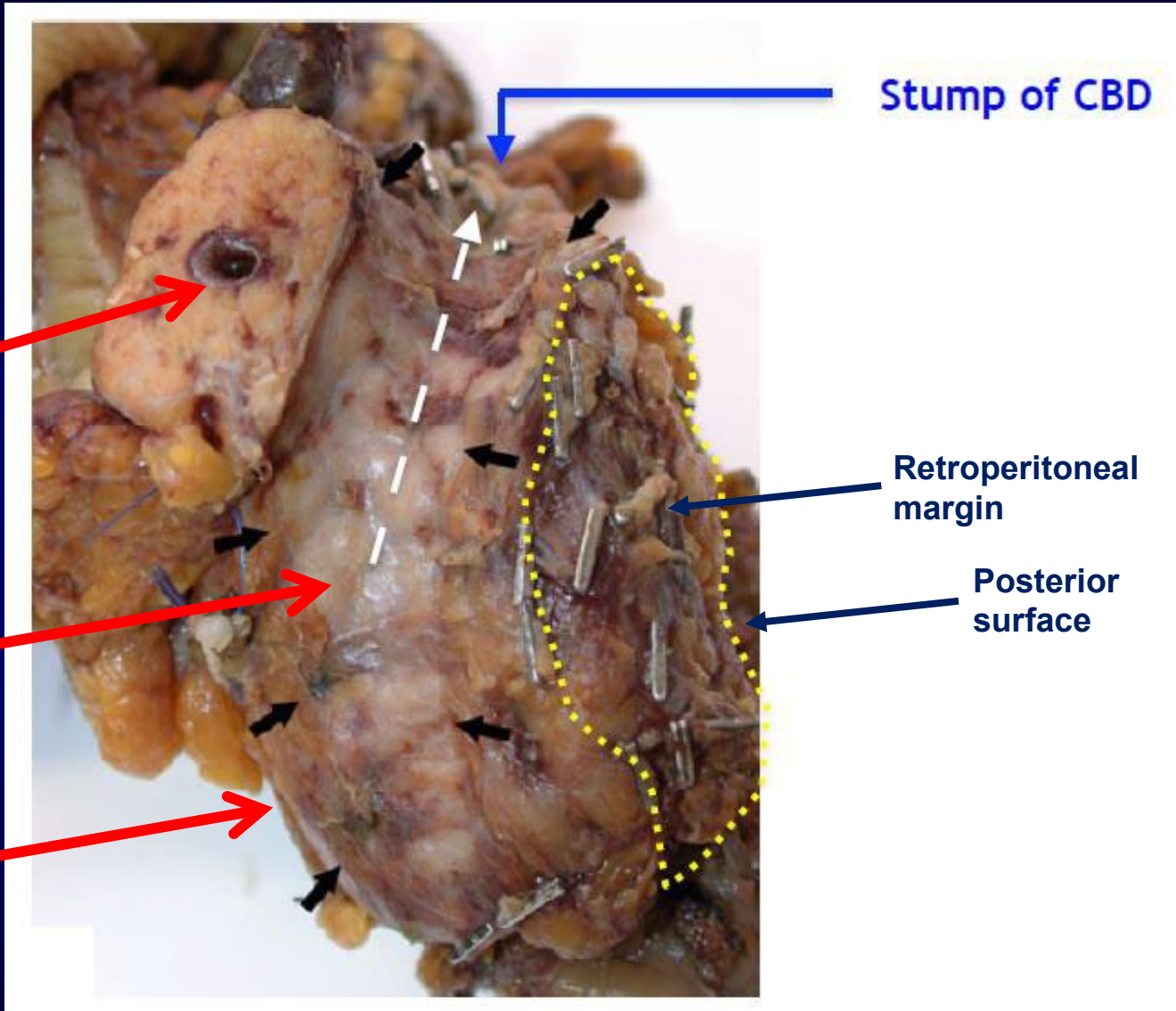
↑ **Vascular groove**



**Pancreatic duct**

**Vascular groove**

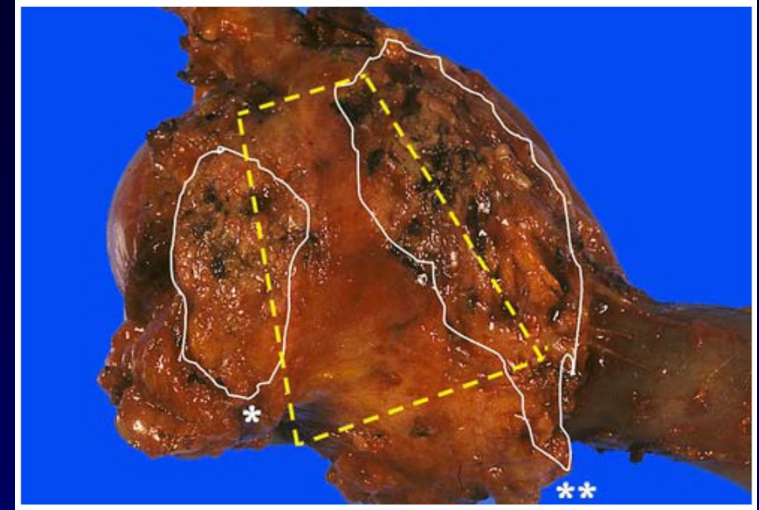
**Anterior surface**



# Before Grossing...

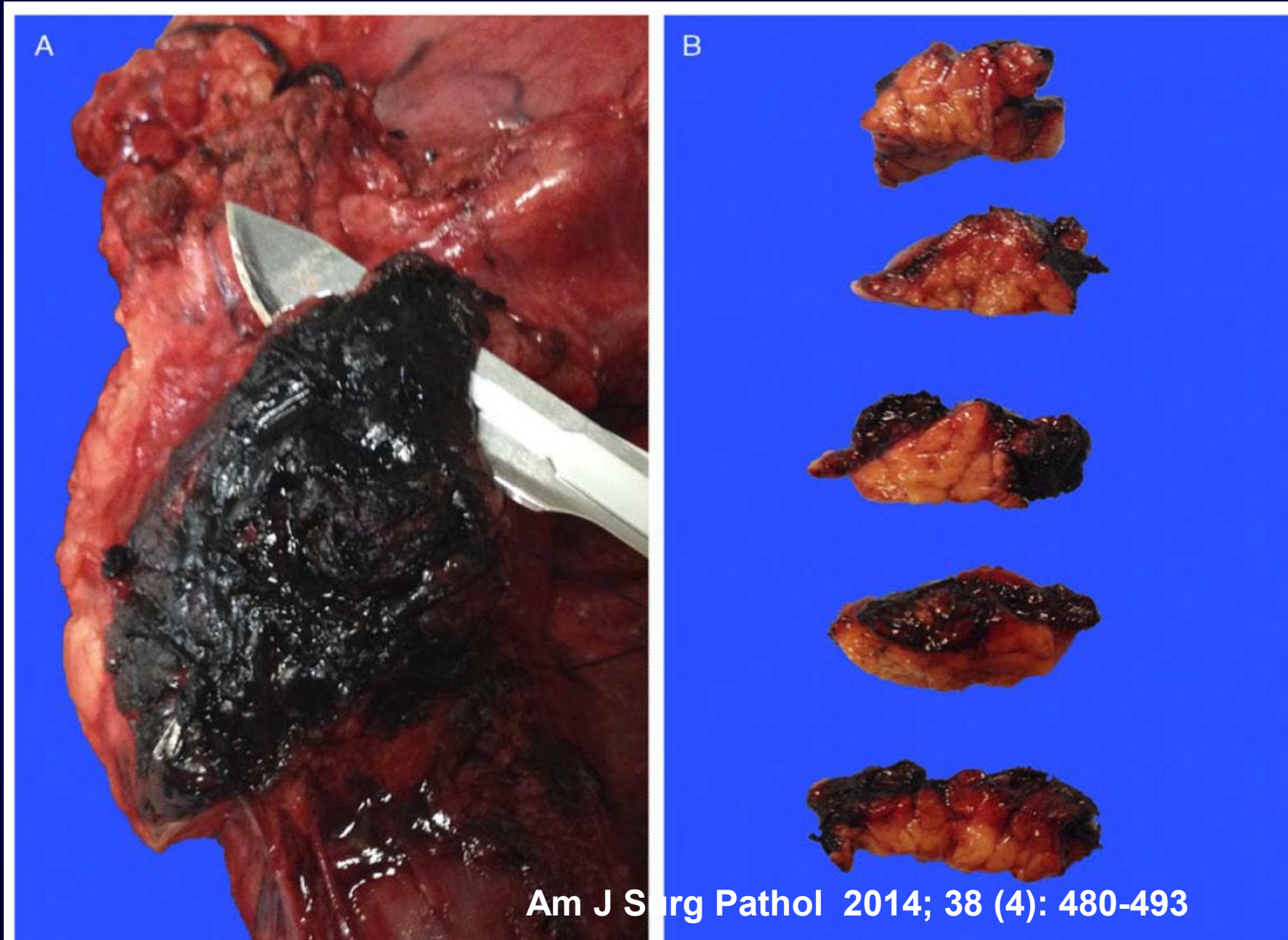
- **Clinical and radiologic findings:**
  - may change approach
  - **Bivalve vs axial technique**
  
- **Examine externally**
  - **Surface involvement**
  - **Location of bulging tumor**
  - **Large vessel: SMV, portal vein etc**
  - **Margins taken**
  - **Tissue procurement**

# Margins



- **Neck margin: shave**
- **CBD margin: shave**
- **Retroperitoneal margin**
- **Other margins (some cases):**
  - **Vascular bed - ink, perpendicular section**
  - **Large vessel - ink, perpendicular section, superior/inferior edges**
  - **Gastric/duodenal margins – only when close to tumor**
  - **Cystic duct - shave**

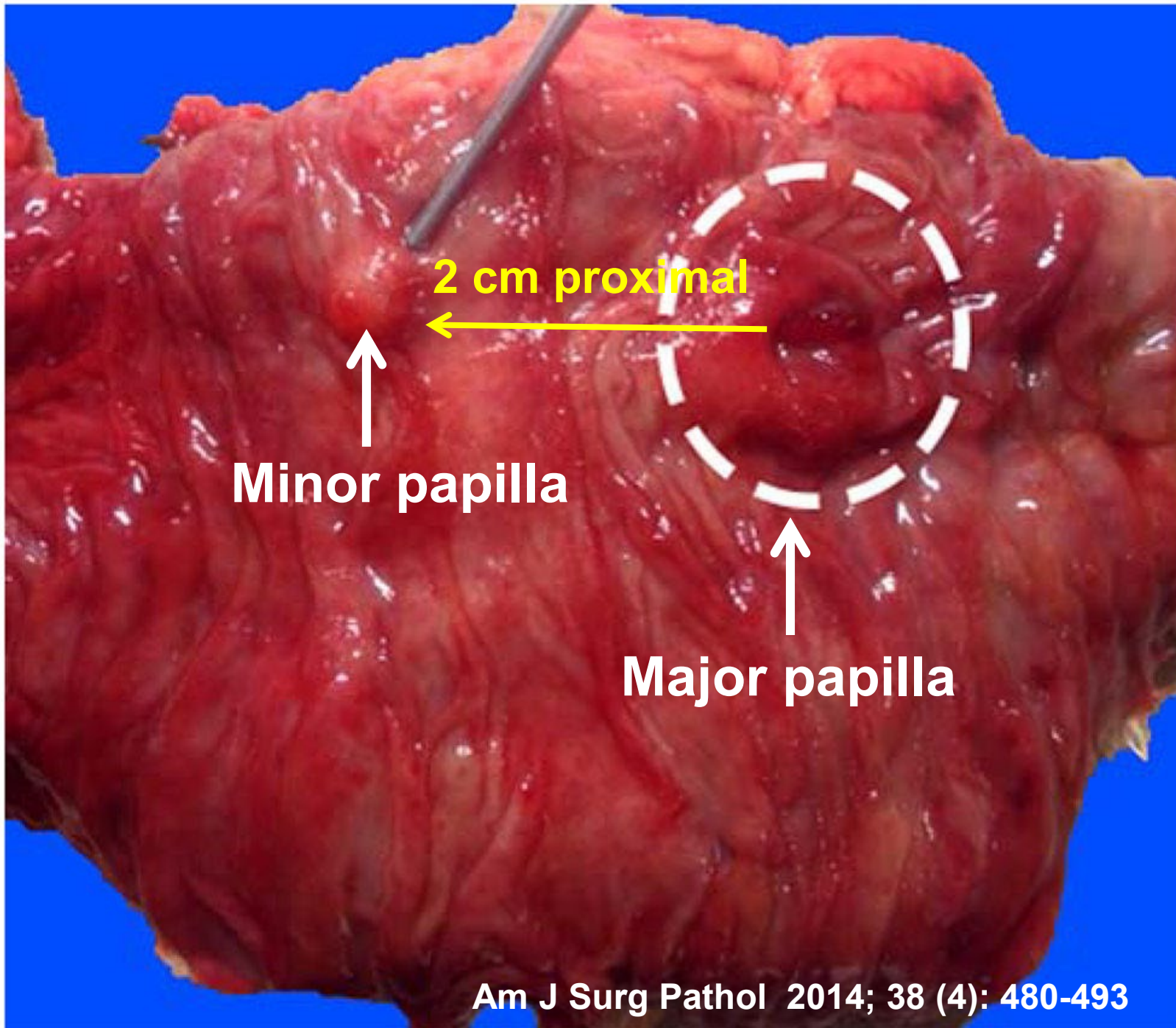
# Retroperitoneal Margin



# Open Duodenum

- **Open from the side opposite from pancreas/ampulla**
- **Examine ampulla and accessory ampulla: ampullary tumor, groove pancreatitis**





# Ampullary Tumors

**Ampullary, NOS**



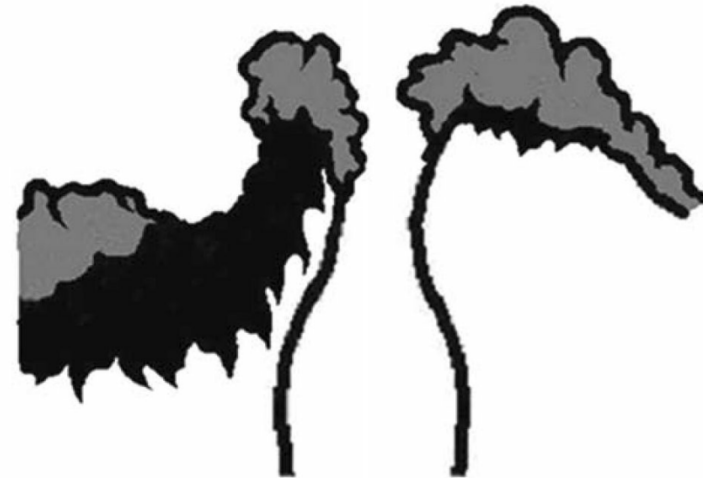
**IAPN-associated**



**Ampullary Ductal**



**Ampullary Duodenal**

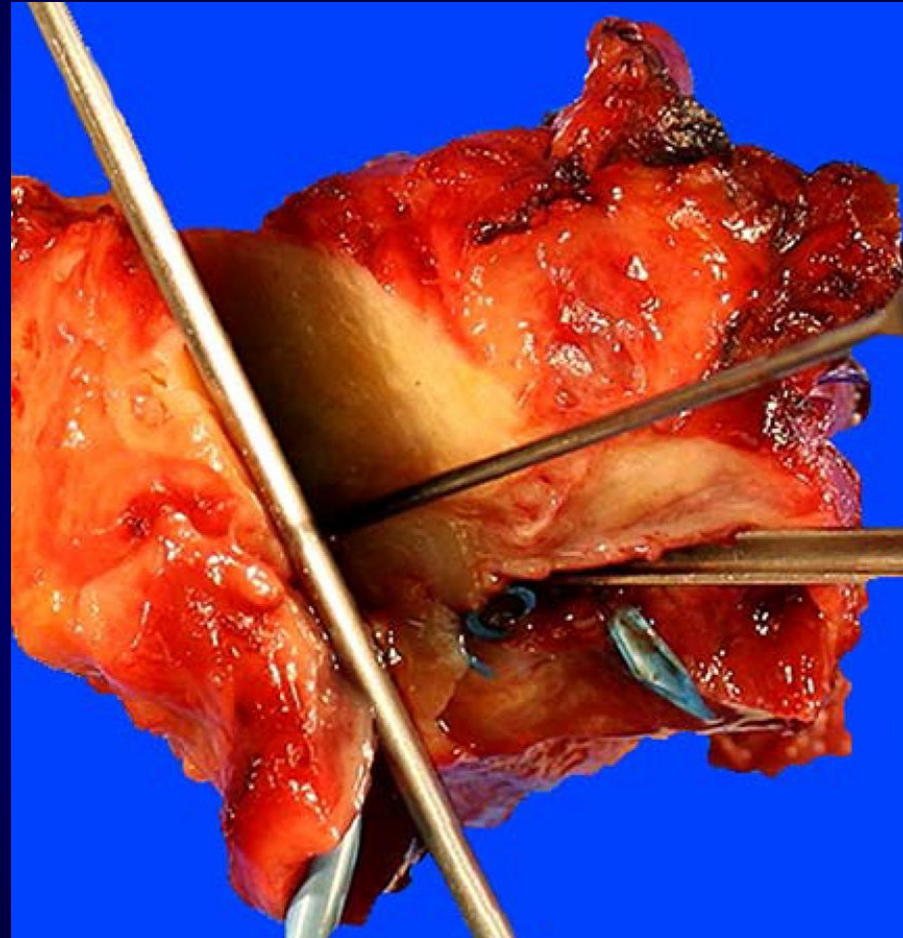
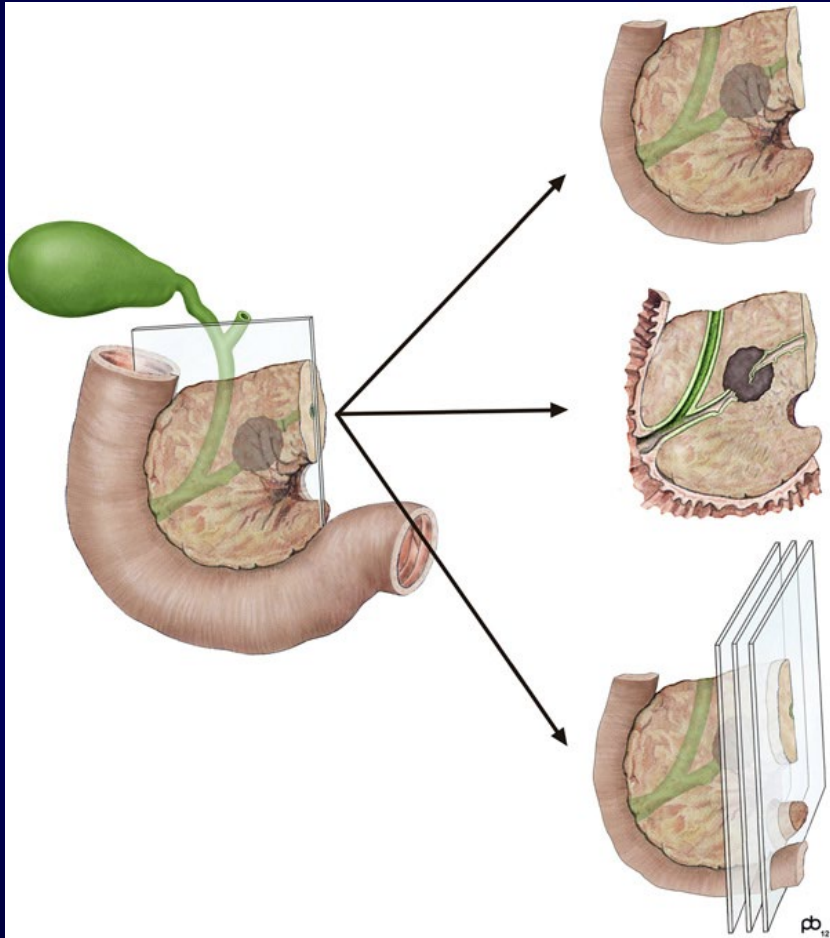


# Whipple Grossing Techniques

- **Bivalve:** default for all, but especially ampullary, duodenal, and bile duct tumors
- **Axial:** pancreas primary tumors (except intraductal/mucinous neoplasms)
- **Bread loaf**



# Bivalve Technique



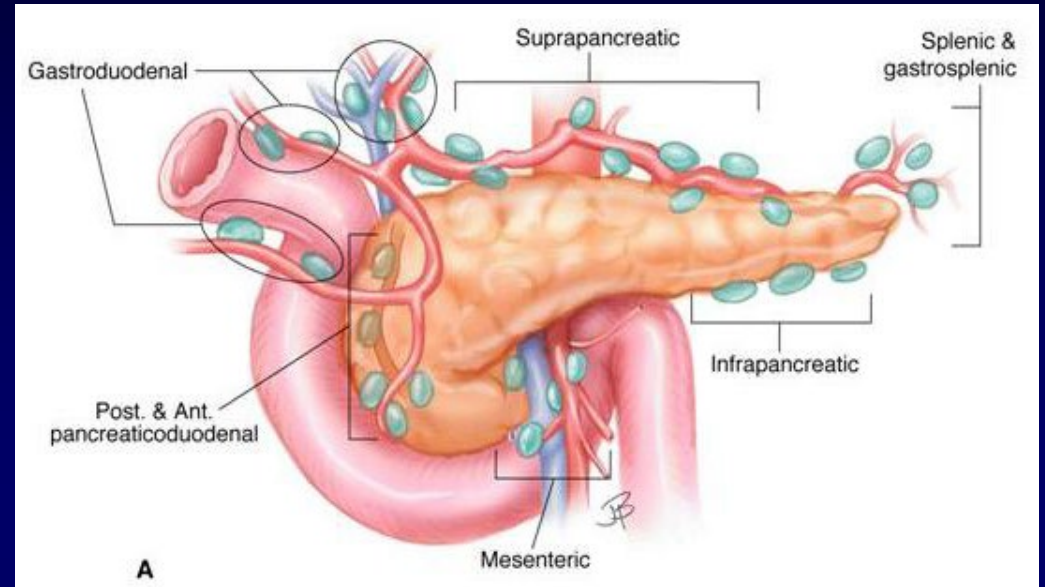
Section after both ducts are probed.

Along main PD/CBD

# Lymph Node Dissection

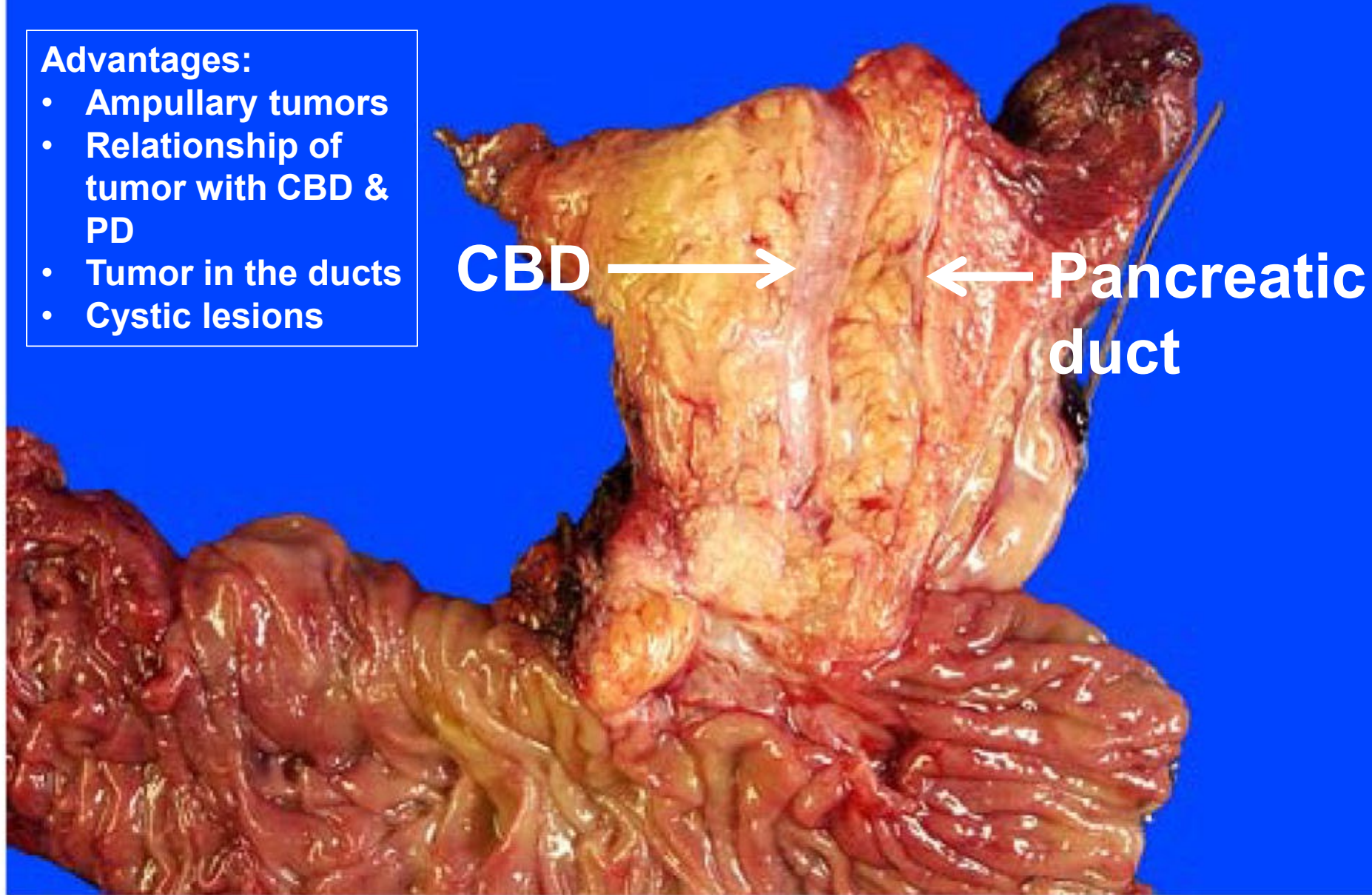
- Orange-peeling method
- Before sectioning HOP
- Groups:

- peri-CBD
- anterior pancreatic
- anterior pancreaticoduodenal
- superior pancreatic
- inferior pancreatic
- posterior pancreatic
- posterior pancreaticoduodenal



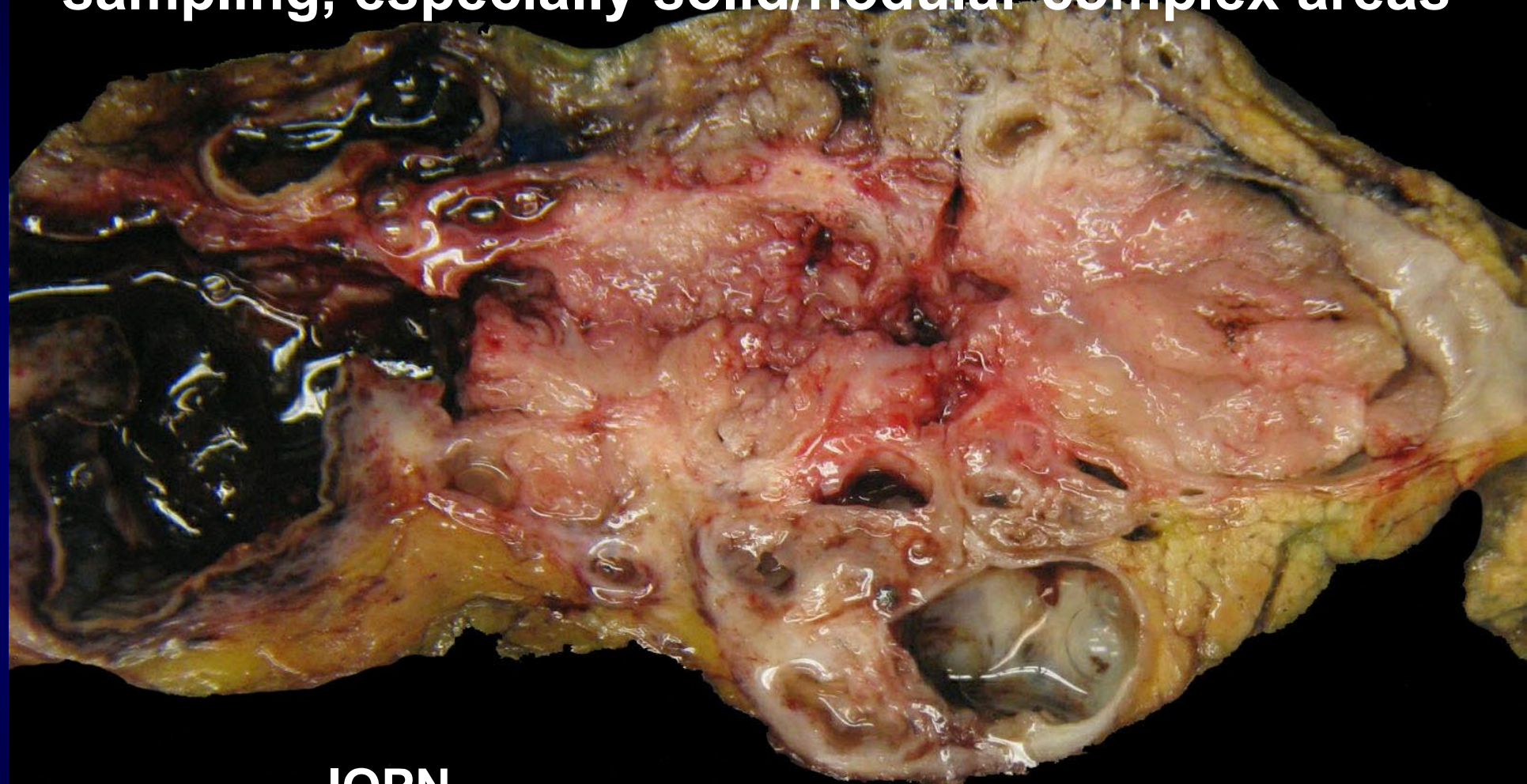
**Advantages:**

- Ampullary tumors
- Relationship of tumor with CBD & PD
- Tumor in the ducts
- Cystic lesions

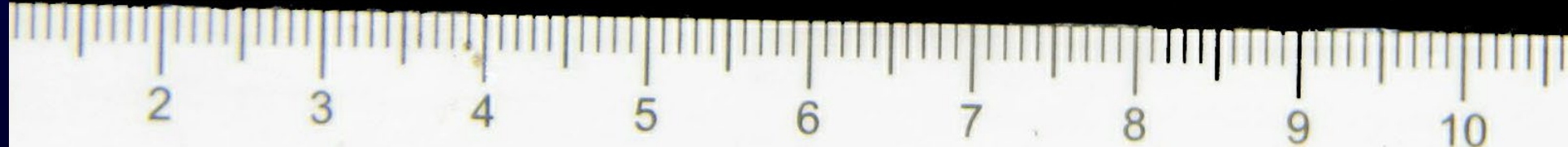




**Mucinous cyst:** relation to main PD, extensive sampling, especially solid/nodular complex areas



**IOPN**



# Sectioning of Pancreas

- **PNET, SPN, ACC: well-demarcated fleshy**
- **Ampullary CA: bulk of tumor (>75%) in ampulla**
  - **preinvasive lesion is the bulk in 1/3**
  - **Separate preinvasive, invasive**
- **CBD CA (5%): bulk is around CBD, rely on gross**

# Record:

- **Note location of the bulk of the tumor:** pancreas vs ampulla vs bile duct vs duodenum
- Tumor size in 3 dimensions
- Distance to margins/surfaces/vessels
- Involvement of ampulla, duodenum, peripancreatic adipose, bile duct, vessels, etc
- **Cyst:** unilocular/multilocular, papillations, solid component, thick septa, mucinous/serous fluid, relationship with the main and branch PD

# What is important for staging/template?

- **Site**

## **Pancreas tumor:**

- **Size**
- **Lymph node**
- **Other component**
- **Extension**
- **Margins:  $\leq 1$  mm = positive margin**

# Sections

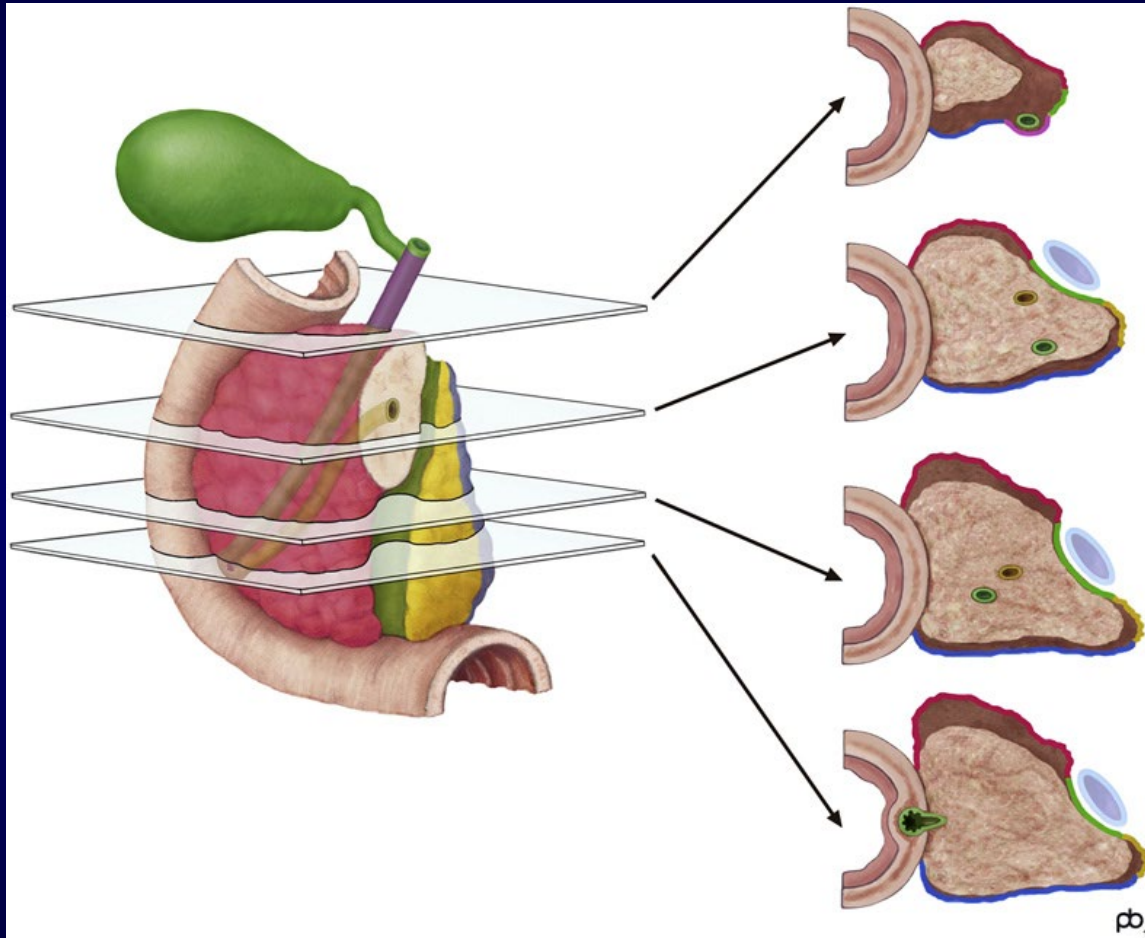
- **Tumor to closest margins/surfaces, ampulla, common bile duct, duodenum, pancreatic duct, other involved organs or structures**
- **Treated PDAC: submit entire tumor bed**
- **Mucinous cyst:**
  - **Extensive sampling/complete submission**
  - **Focus on solid area**



# Other Gross Considerations

- **CBD and PD; Main and branch PD**
- **Indistinguishable under microscope**
- **Depending on gross**
- **Ink may help**

# Axial Technique



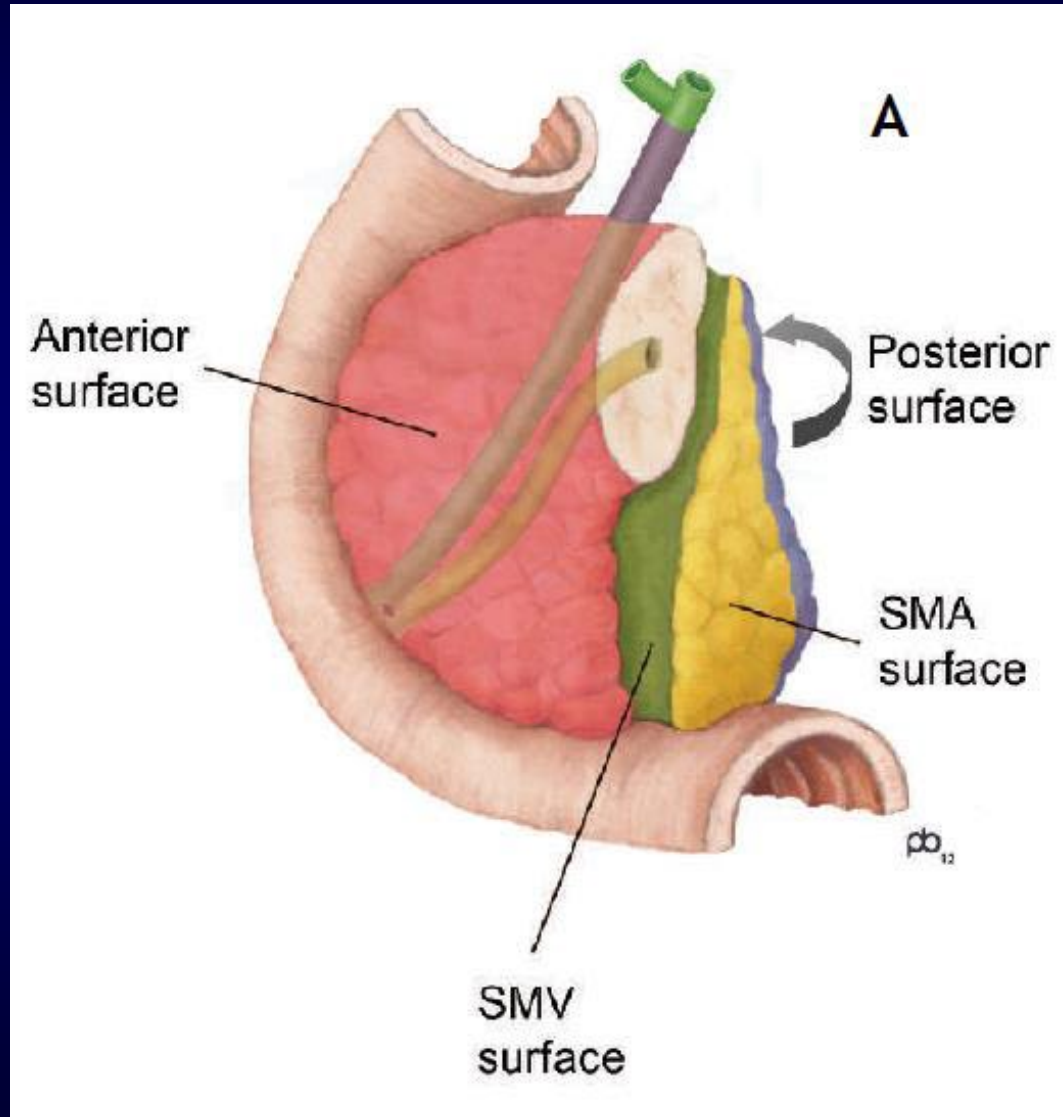
Known pancreatic primary tumors

**Exception:** intraductal or mucinous neoplasms

Not for bile duct, duodenal, or ampullary tumors

Perpendicular to longitudinal axis of descending duodenum

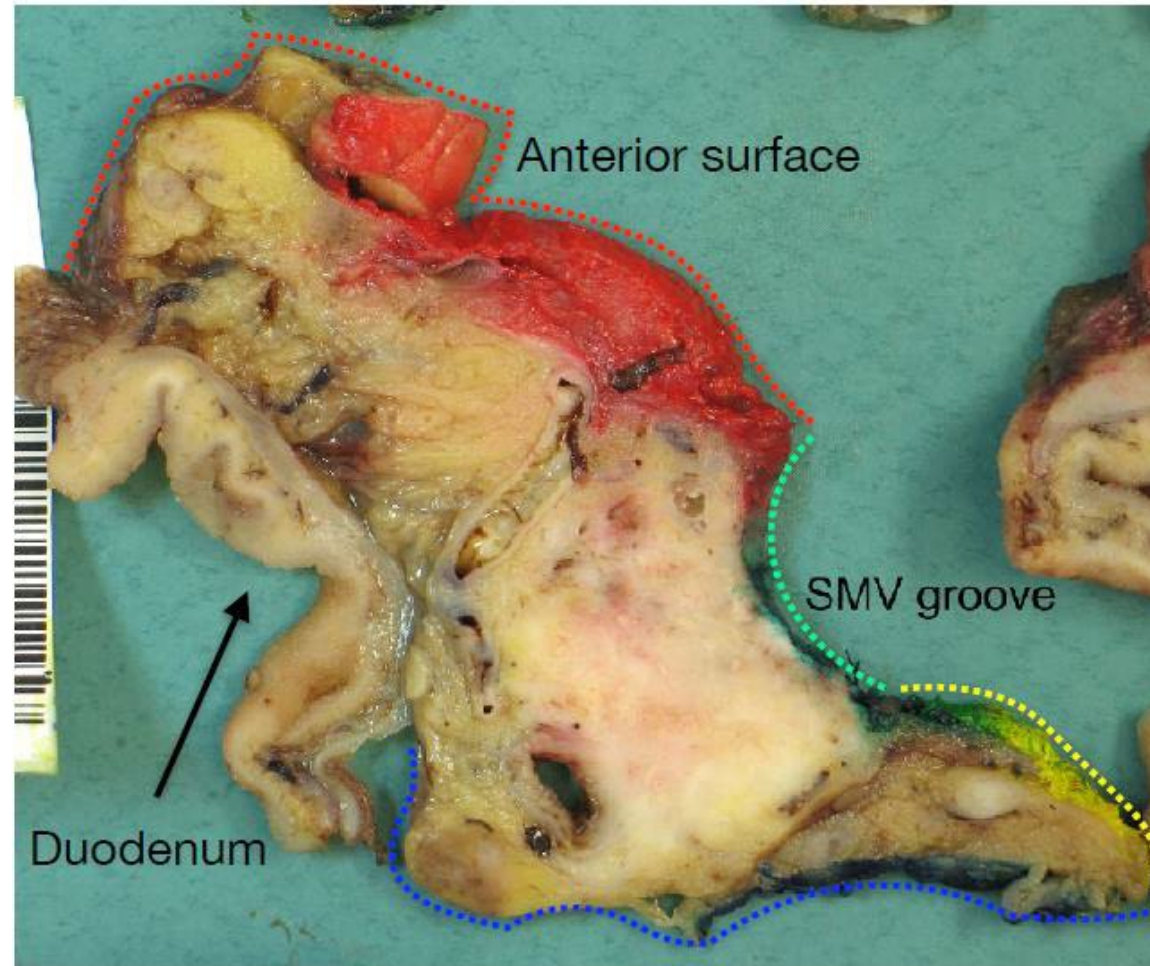
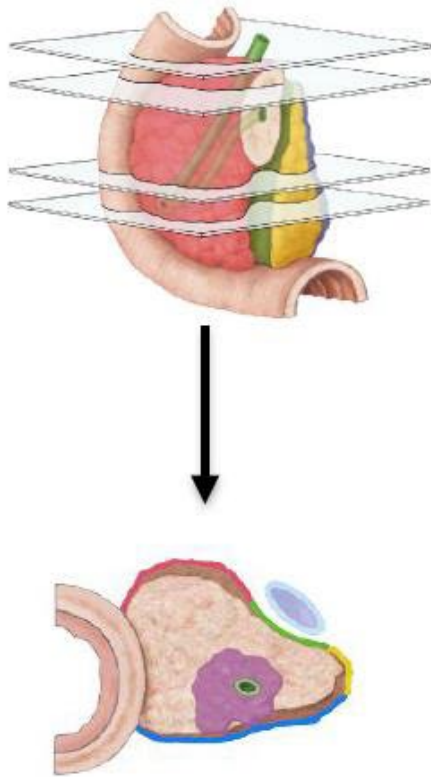
# Inking



**Leave LN en bloc**

**Remove duodenum  
and stomach not  
attached to pancreas**

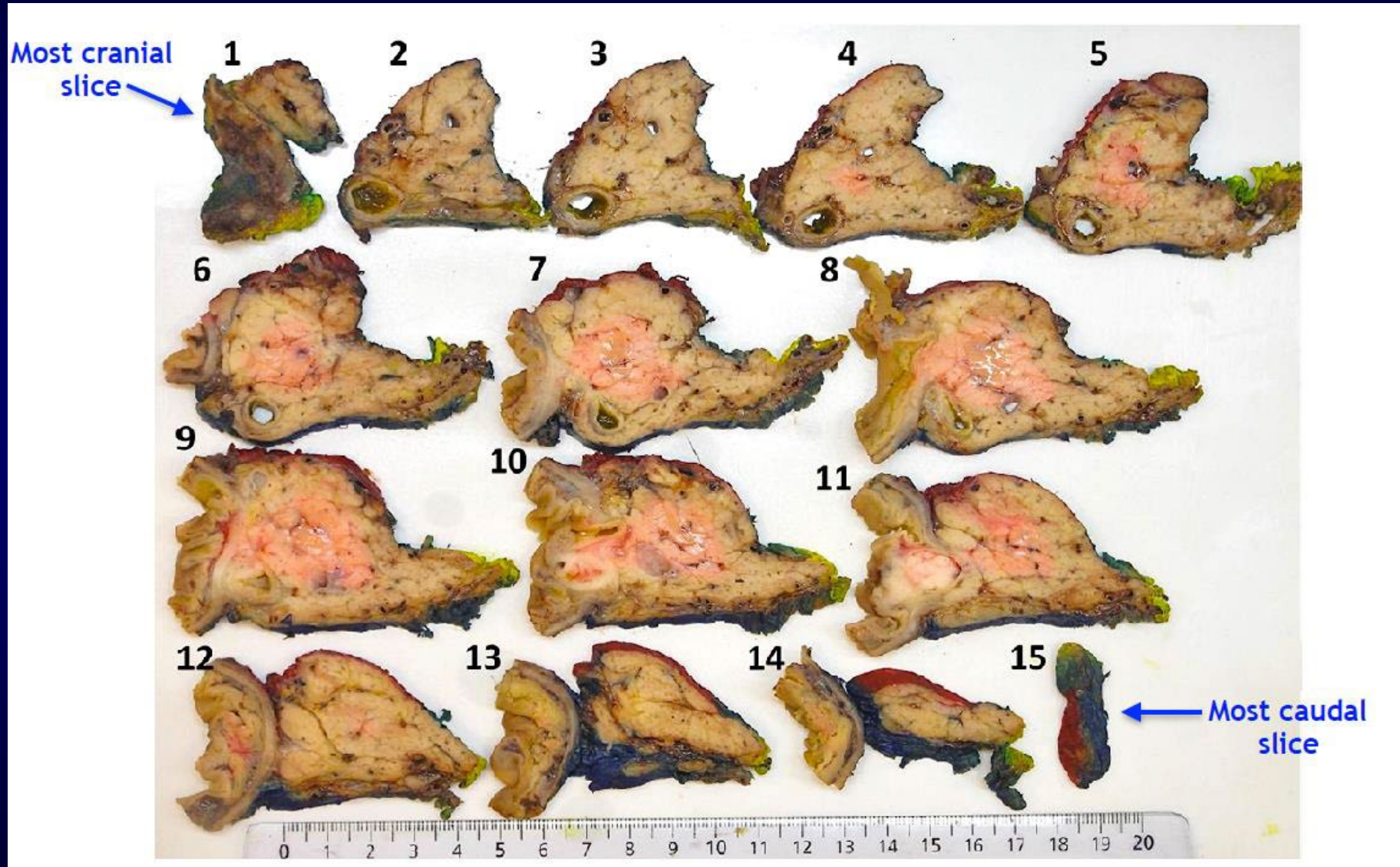
# Sectioning of Pancreas



Posterior surface



# Sectioning of Pancreas



Take picture

# Record:

- **Note location of the bulk of the tumor:**  
pancreas vs ampulla vs bile duct vs duodenum
- Tumor size in 3 dimensions
- Distance to margins/surfaces/vessels
- Involvement of ampulla, duodenum, peripancreatic adipose, bile duct, vessels, etc
- **Cyst: unilocular/multilocular, papillations, solid component, thick septa, mucinous/serous fluid, relationship with the main and branch PD**

# Sections

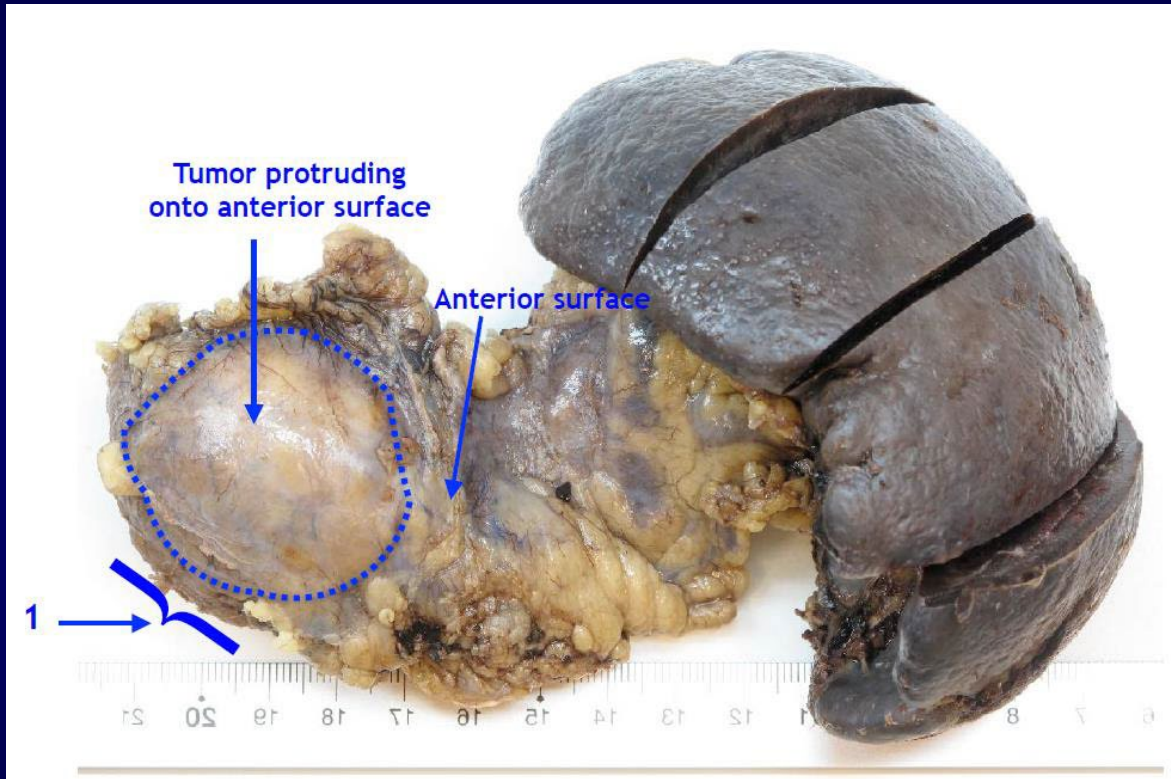
- In sequential order of slices
- Include **2 reference points** in each block: **inked surface, duodenum, ampulla, etc.**
- Tumor to closest margins, ampulla, common bile duct, duodenum, vascular groove, other involved organs or structures
- **PDAC: submit entire pancreas or tumor bed**
- **All lymph nodes: >12 required**

# Outline

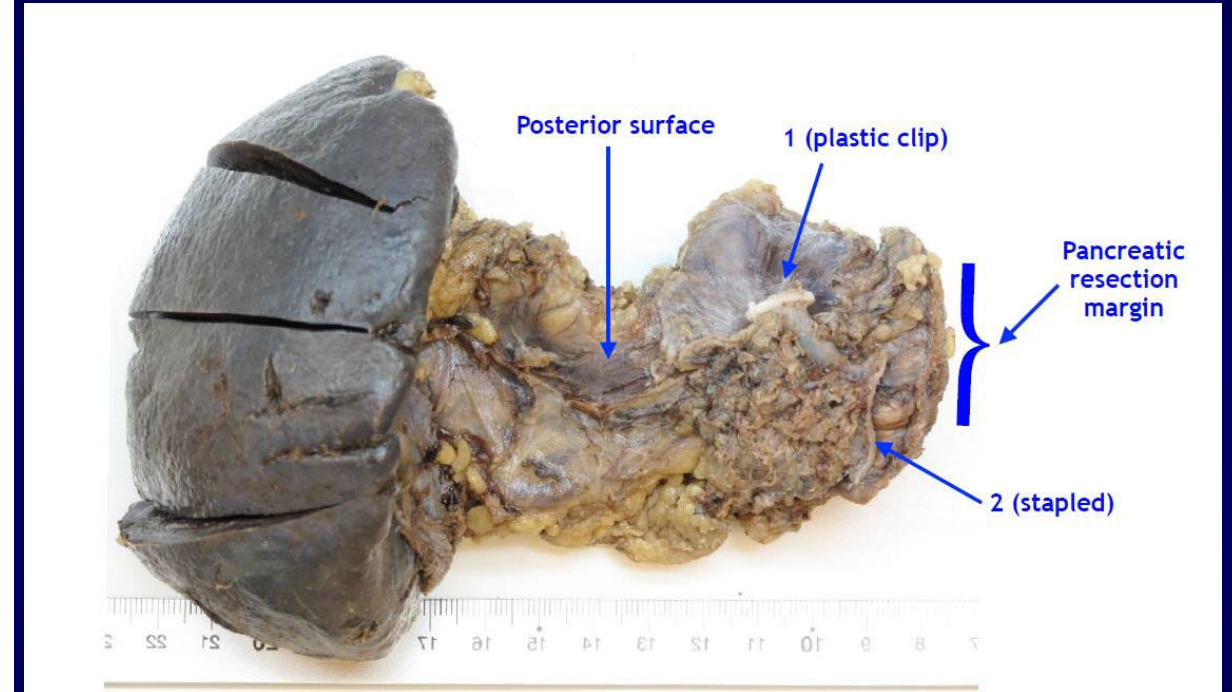
- **Anatomy**
- **Whipple (pancreatoduodenectomy)**
- **Distal pancreatectomy**



# Distal Pancreatectomy Orientation



**Anterior: smooth**



**Posterior: fibrous**

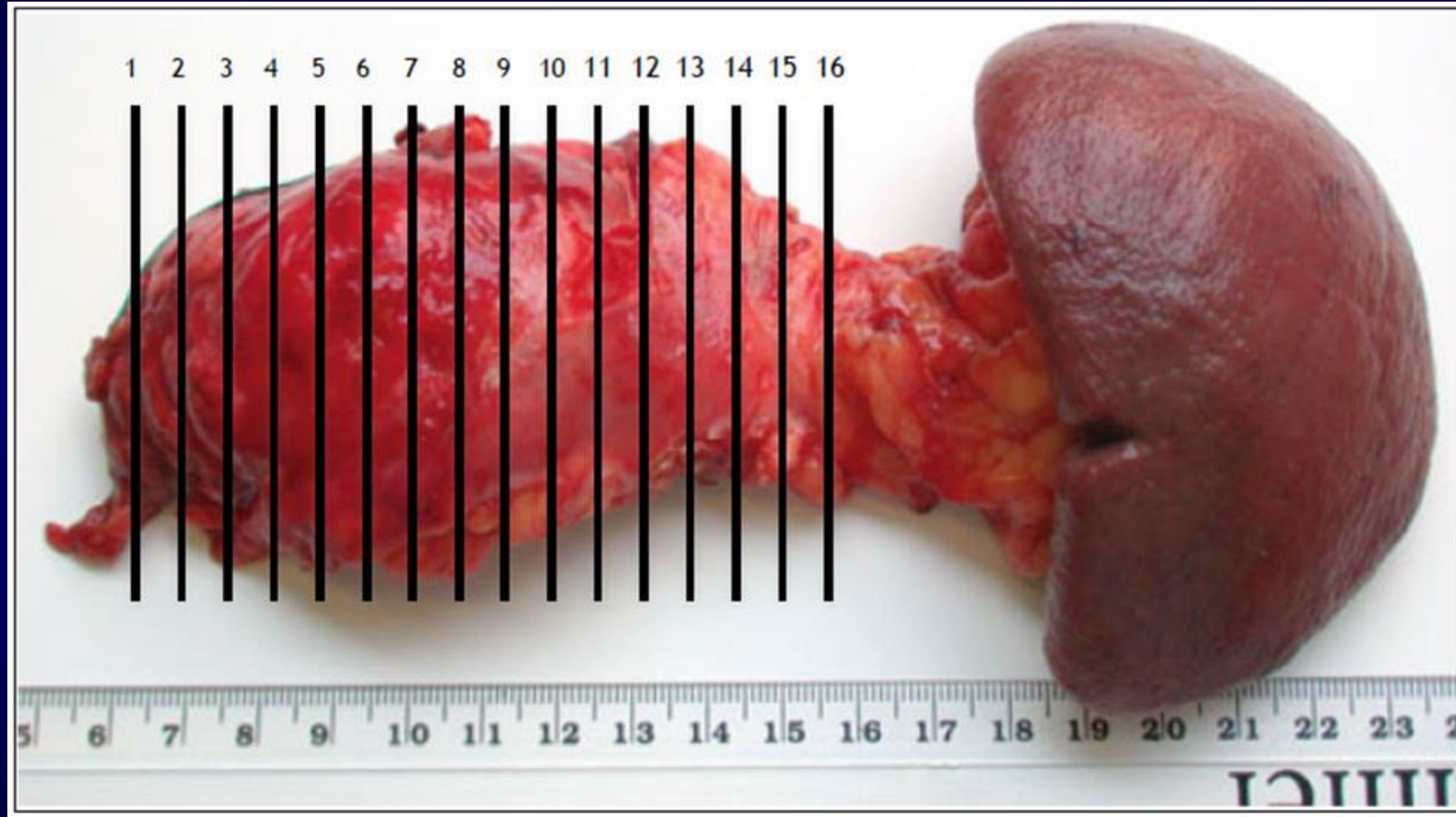
# Ink:

- Anterior surface
- Posterior surface
- Proximal pancreatic margin

# Take margin:

- Proximal pancreatic margin: en face
- **If tumor is close to margin:** shave 3-5 mm section followed by serial radial sections and submit in total (**similar to the retroperitoneal margin**)

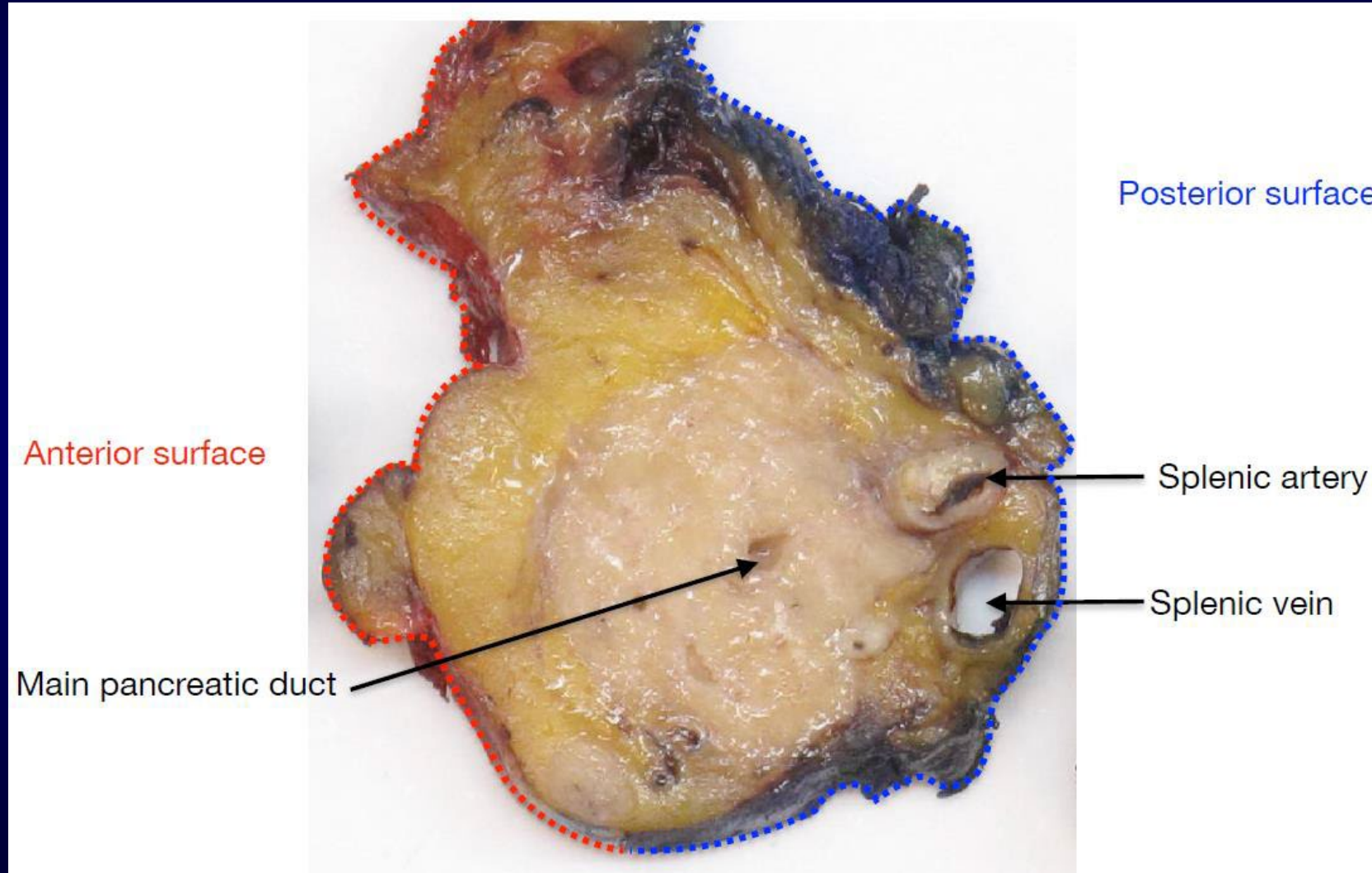
# Sectioning of Pancreas



**Perpendicular to longitudinal axis**

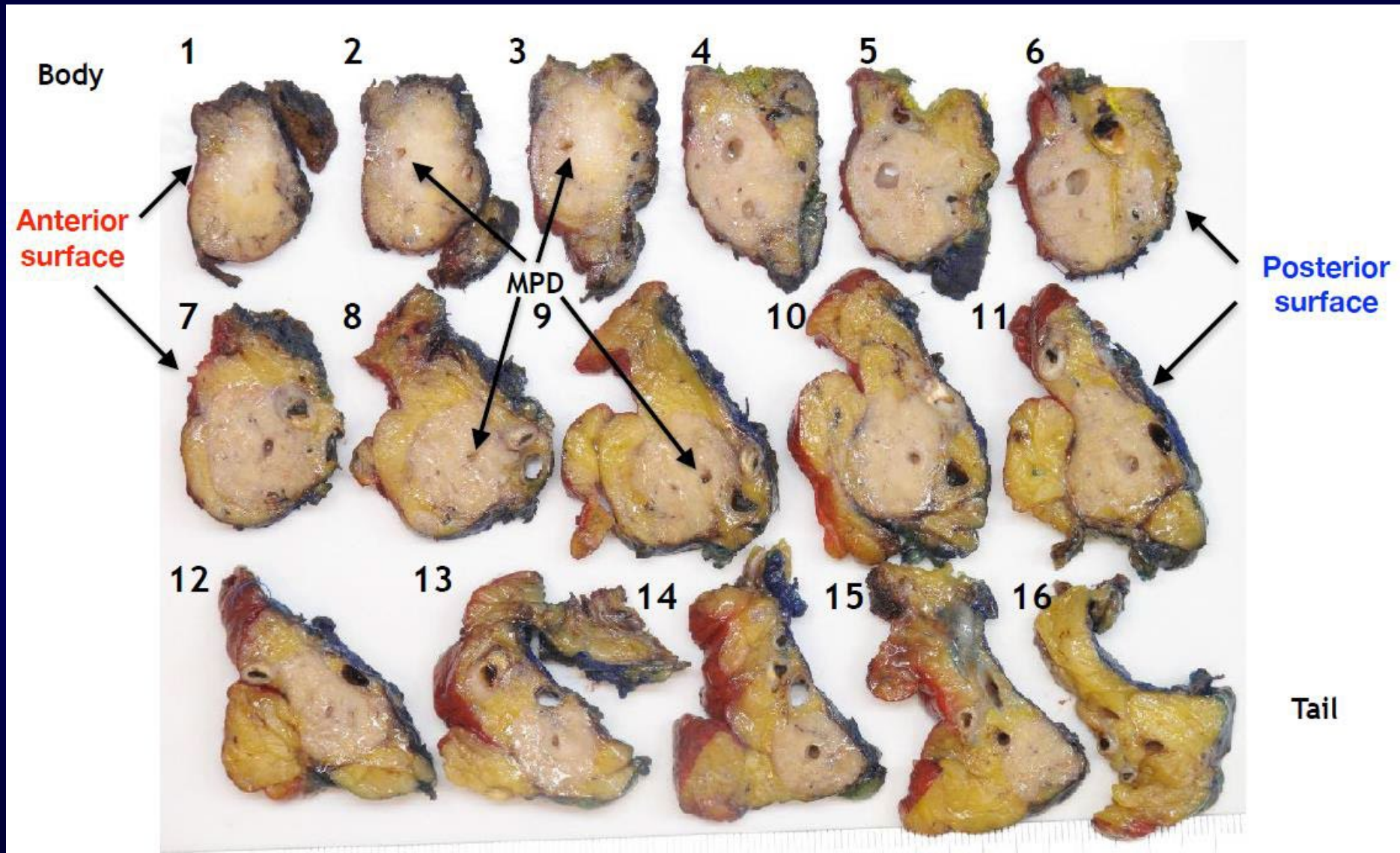


# Sectioning of Pancreas



**Take  
picture**

# Sectioning of Pancreas



**Take picture**



# Record:

- **Tumor size in 3 dimensions**
- **Location**
- **Distance to margins/surfaces/vessels**
- **Extension: peripancreatic fat, spleen, vessels, other organs**

# Sections

- In sequential order of slices
- Include **2 reference points** in each block:  
**inked surface, artery, vein, etc.**
- Tumor to surfaces, splenic artery/vein,  
other involved organs or structures
- **PDAC: submit entire tumor bed**
- All lymph nodes

# What is important for staging/template?

- **Site:** BD, ampulla, pancreas

## Pancreas tumor:

- **Size**
- **Lymph node**
- **Margins:**  $\leq 1$  mm = positive margin
- **Extension**
- **Other component:** IPMN etc

# Thank you!

