Pancreatobiliary Frozen Section Nightmares

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Objectives

• Briefly give an overview or perspective of pancreatic cancer.
• Review the appropriate margins to be taken for frozen section from pancreatobiliary specimens.
• Examine the histopathology of pancreatobiliary margins on frozen section.
• Discuss some of the difficulties ("gray areas") in assessing pancreatobiliary margins.

Last 40 Years

Breast Cancer 5-Year Survival Rate Trend

- Breast cancer survival rates have increased significantly.
- Breakthroughs in early detection deserve much credit.

Leukemia 5-Year Survival Rate Trend

- Clinical trials have helped turn the odds in favor of those with leukemia.

Pancreatic Cancer 5-Year Survival Rate Trend

- Of the 10 most lethal cancers, pancreatic cancer remains the only one with a single-digit survival rate.
4th Leading cause of cancer deaths in the United States.
1st Mortality rate among all major cancers.
94% Die within 5 years of being diagnosed.
74% Die within the first year of diagnosis.
55% Increase in new pancreatic cancer cases projected over the next 2 decades.
0 Early detection methods and successful treatment options have been discovered.

20% Surgically resectable and considered the only chance for a cure.
Vascular groove
Uncinate process

Adapted from http://pathology.jhu.edu/pc/professionals/index.php
Pancreatic Neck Margin

Bile Duct Margin

Gallbladder

Pancreas

Duodenum

Proximal Duodenal Margin

Adapted from http://pathology.jhu.edu/professionals/index.php
Frozen Section Histology
Pancreatic Neck Margins - Artifacts

- Tissue folding
- Over staining (hematoxylin)
- Over staining (eosin)
Frozen Section Histology
Pancreatic Neck Margins - Artifacts

- Tissue folding
- Over staining (hematoxylin)
- Over staining (eosin)
- Cauterization
- Drying

- Thick sections
Frozen Section Histology
Pancreatic Neck Margins - Artifacts

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- Over staining (hematoxylin)
- Over staining (eosin)
- Cauterization
- Drying
- Thick sections
- Air bubbles

Frozen Section Histology
Pancreatic Neck Margins – Normal Pancreas

Frozen Section Histology
Pancreatic Neck Margins – Chronic Pancreatitis

Variable lobules
Frozen Section Histology
Pancreatic Neck Margins – Chronic Pancreatitis

Normal Pancreas
Chronic Pancreatitis
Variable lobules
Interlobular fibrosis
(absence of glands)
Acinar loss
Frozen Section Histology
Pancreatic Neck Margins – Chronic Pancreatitis

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Ductal changes - Reactive

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**Frozen Section Histology**

*Pancreatic Neck Margins – Chronic Pancreatitis*

- Normal Pancreas
- Chronic Pancreatitis
- Variable lobules
- Interlobular fibrosis (absence of glands)
- Acinar loss
- Ductal changes
  - Reactive
  - Open lumen
  - Absence of luminal debris
  - Remains within the lobule

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**Frozen Section Histology**

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- Acinar loss
- Ductal changes
  - Reactive
  - Open lumen
  - Absence of luminal debris
  - Remains within the lobule
  - Squamous metaplasia
  - Intraluminal concretions

**Frozen Section Histology**

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- Chronic Pancreatitis
- Variable lobules
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- Acinar loss
- Ductal changes

**Frozen Section Histology**

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- Chronic Pancreatitis
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- Interlobular fibrosis (absence of glands)
- Acinar loss
- Ductal changes
- Islets of Langerhans
  - Aggregation
Frozen Section Histology
Pancreatic Neck Margins – Chronic Pancreatitis

Normal Pancreas
Chronic Pancreatitis
Variable lobules
Interlobular fibrosis (absence of glands)
Acinar loss
Ductal changes
Islets of Langerhans
- Aggregation
- Fusion
- Myxoid change

- Pseudoglandular appearance
Frozen Section Histology
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- Chronic Pancreatitis
- Variable lobules
- Interlobular fibrosis (absence of glands)
- Acinar loss
- Ductal changes
- Islets of Langerhans
  - Aggregation
  - Fusion
  - Myxoid change
  - Pseudoglandular appearance
  - Persistence of reticular architecture

Frozen Section Histology
Pancreatic Neck Margins - Adenocarcinoma

- Haphazard growth

Frozen Section Histology
Pancreatic Neck Margins - Adenocarcinoma

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Frozen Section Histology
Pancreatic Neck Margins - Adenocarcinoma

Haphazard growth
Glands in interlobular septa
Frozen Section Histology
Pancreatic Neck Margins - Adenocarcinoma

Haphazard growth
Glands in interlobular septa
Growth near muscular vessels
Growth near muscular vessels
Growth near nerves
Frozen Section Histology
Pancreatic Neck Margins - Adenocarcinoma

Haphazard growth
Glands in interlobular septa
Growth near muscular vessels
Growth near nerves
Lymphovascular and perineural invasion
Frozen Section Histology
Pancreatic Neck Margins - Adenocarcinoma

Haphazard growth
Glands in interlobular septa
Growth near muscular vessels
Lymphovascular and perineural invasion

Luminal necrosis or debris
Frozen Section Histology
Pancreatic Neck Margins - Adenocarcinoma

- Haphazard growth
- Glands in interlobular septa
- Growth near muscular vessels
- Growth near nerves
- Lymphovascular and perineural invasion
- Luminal necrosis or debris
- Incomplete glands

4:1 nuclear variability
Frozen Section Histology
Pancreatic Neck Margins - Adenocarcinoma

Haphazard growth
Glands in interlobular septa
Growth near muscular vessels
Growth near nerves
Lymphovascular and perineural invasion
Luminal necrosis or debris
Incomplete glands
4:1 nuclear variability

Frozen Section Histology
Bile Duct Margins - Normal

Normal Bile Duct
Frozen Section Histology

Bile Duct Margins - Artifact

- Tissue folding
- Over staining (hematoxylin)
- Over staining (eosin)
- Cauterization
- Drying
- Thick sections
- Air bubbles

Frozen Section Histology

Bile Duct Margins - Normal

Frozen Section Histology

Bile Duct Margins - Normal
Frozen Section Histology  
*Bile Duct Margins - Adenocarcinoma*

- Perineural invasion

Involvement of periductular soft tissue
Frozen Section Histology
Proximal Duodenal Resection Margins - Normal

Frozen Section Histology
Proximal Duodenal Resection Margins - Adenocarcinoma

Frozen Section Histology

• Proper appreciation of normal anatomy, histology and non-neoplastic pathology
• Features supporting a diagnosis of adenocarcinoma
  - Haphazard growth pattern
  - Glands within interlobular septa
  - Growth of glands near muscular vessels and nerves
  - Lymphovascular and perineural invasion
  - Incomplete glands
  - Necrotic glandular debris
  - Nuclear variation, 4:1
Challenging Issues

- The presence of pancreatic intraepithelial neoplasia (PanIN) and intraductal papillary mucinous neoplasms (IPMN) at the pancreatic neck margin
- Dysplasia at the bile duct margin
- Acellular mucin present within the pancreatic parenchymal margin
- Adenocarcinoma within a lymph node at a margin
- Lymphovascular or perineural invasion within the peripancreatic soft tissue at the pancreatic neck margin
- Incidentalomas

Pancreatic Intraepithelial Neoplasia (PanIN)

Pancreatic Intraepithelial Neoplasia (PanIN)
Pancreatic Intraepithelial Neoplasia (PanIN)

Intraductal Papillary Mucinous Neoplasm (IPMN)
Intraductal Papillary Mucinous Neoplasm (IPMN)

Biliary Dysplasia at the Bile Duct Margin
Biliary Dysplasia at the Bile Duct Margin

The Presence of Acellular Mucin
The Presence of Acellular Mucin

Colloid Carcinoma
The Presence of Acellular Mucin
Neoadjuvant Chemotherapy

Histologic Grading of the Extent of Residual Carcinoma Following Neoadjuvant Chemoradiation in Pancreatic Ductal Adenocarcinoma
A Predictor for Patient Outcome

Adenocarcinoma within a Lymph Node at a Margin
Adenocarcinoma within a Lymph Node at a Margin

Intraneural or Perineural Invasion within the Peripancreatic Soft Tissue
Intraneural or Perineural Invasion within the Peripancreatic Soft Tissue

Incidental Lesions

Incidental Lesions
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