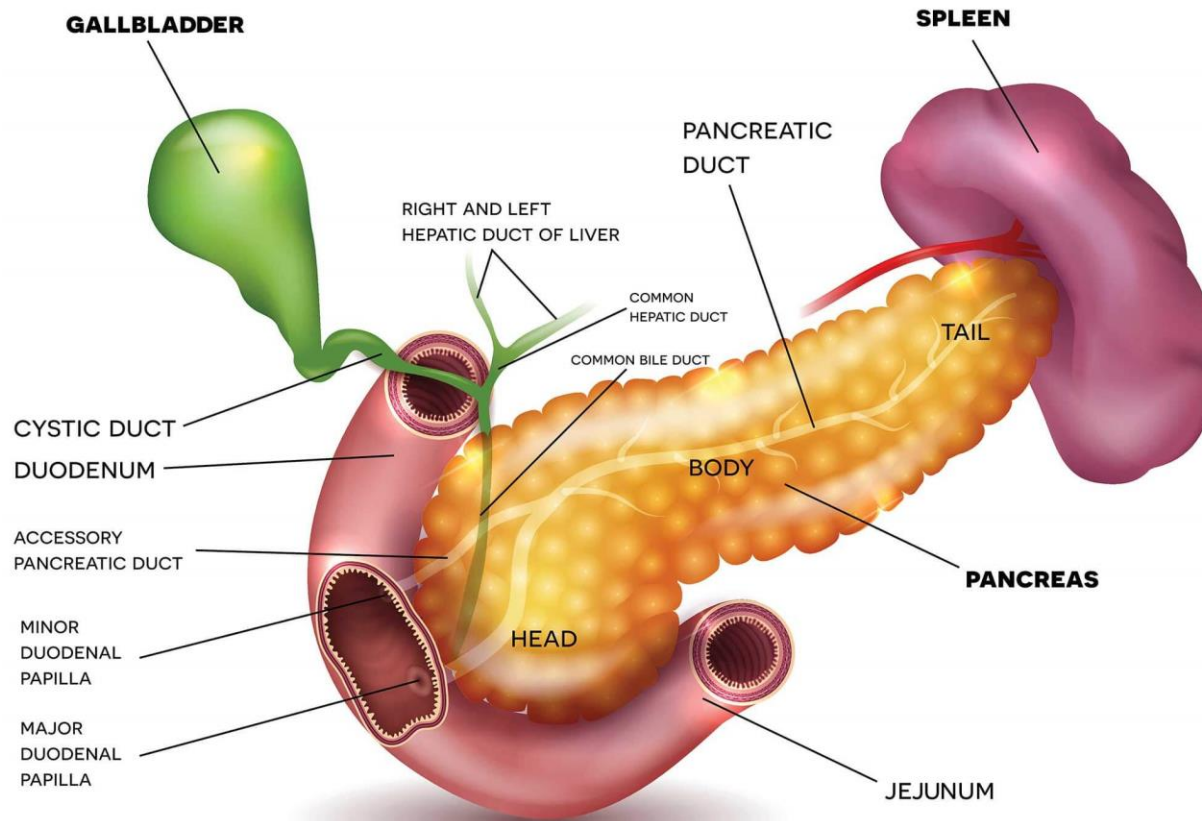


Surgery for Pancreatic Cancer

A Kanwar, D Stell

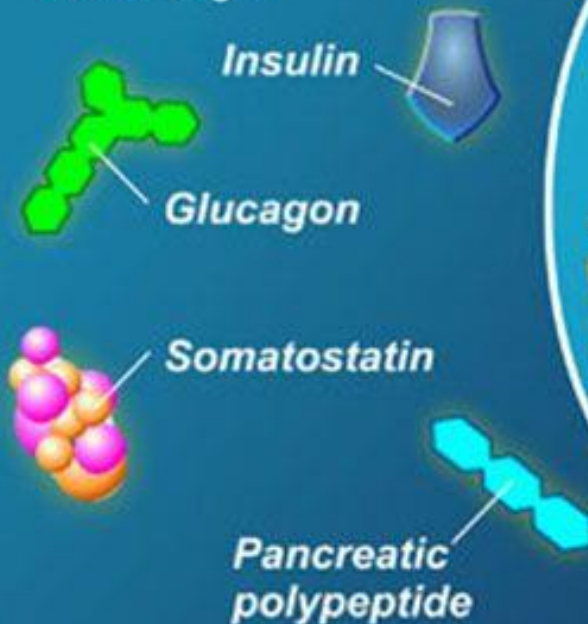
Dept of HPB Surgery, Derriford Hospital, Plymouth

PANCREAS



Endocrine

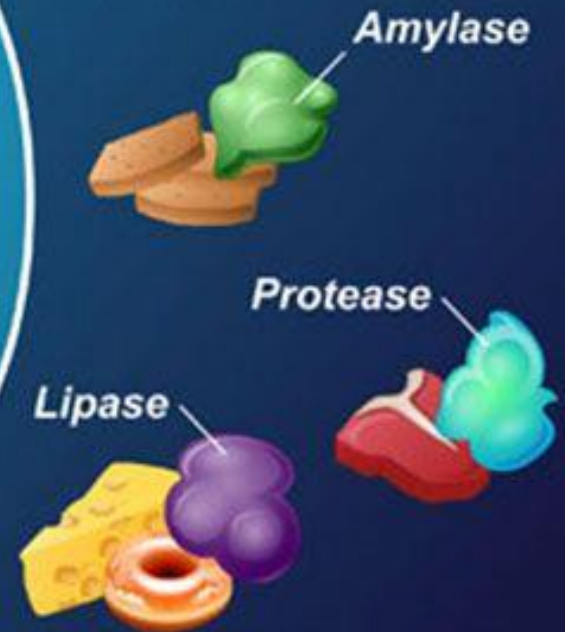
The pancreas produces hormones that regulate blood sugar



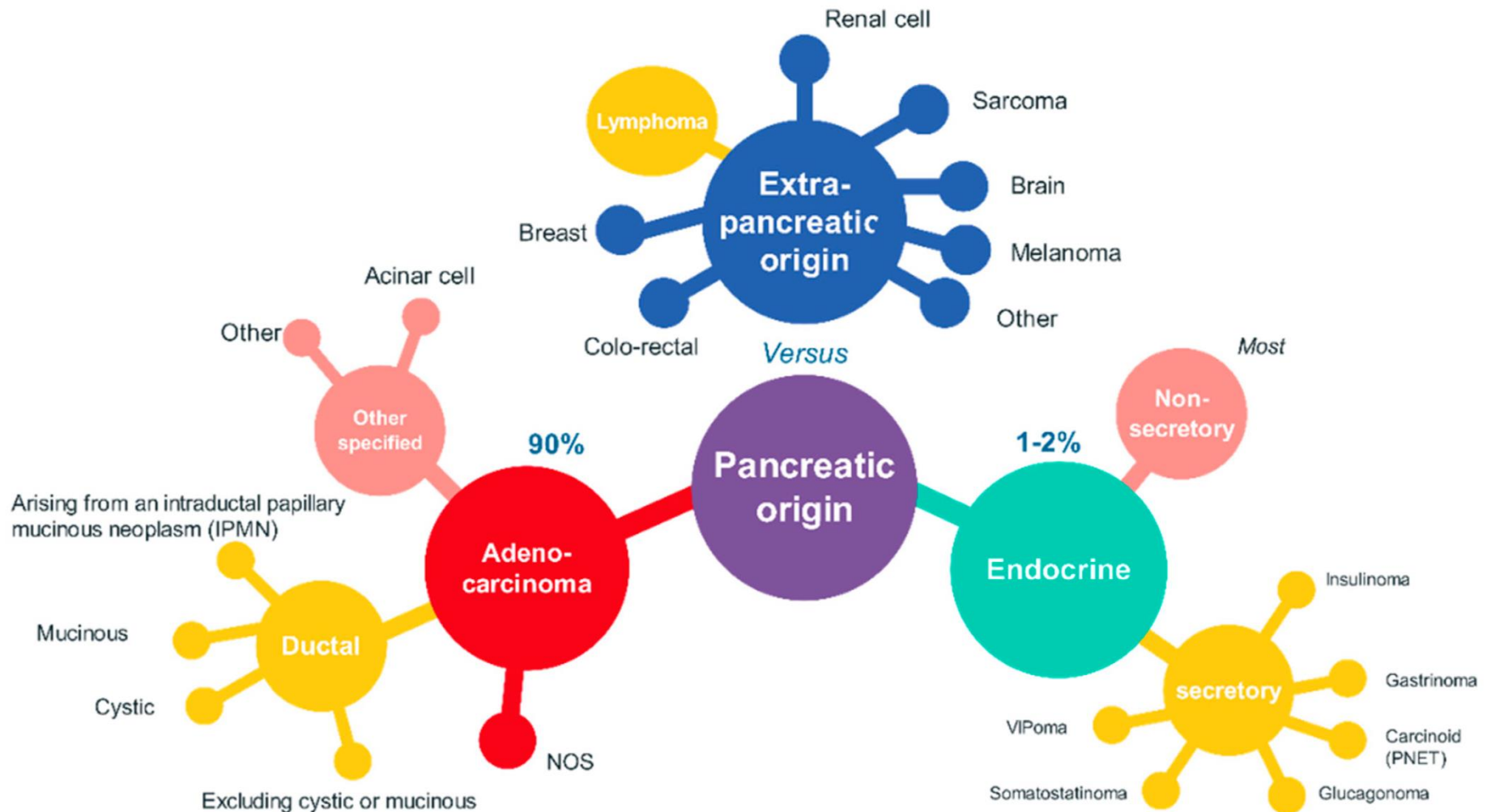
Healthy pancreas

Exocrine

The pancreas produces enzymes that help digest our food



Types of Pancreatic Cancers



Cases

10,257



New cases of
pancreatic cancer,
2015-2017, UK

Deaths

9,421



Deaths from
pancreatic cancer,
2016-2018, UK

Survival

5%



Survive pancreatic
cancer for 10 or more
years, 2013-17,
England and Wales

Prevention



Preventable cases of
pancreatic cancer, UK

Surgery

10%



Pancreatic cancer
patients who have
surgery to remove
their tumour

Chemotherapy

28%



Pancreatic cancer
patients who have
curative or palliative
chemotherapy

Radiotherapy

5%



Pancreatic cancer
patients who have
curative or palliative
radiotherapy

PANCREATIC CANCER

16 WARNING SIGNS YOU SHOULD KNOW

PANCREATIC
CANCER
ACTION
NETWORK

SYMPTOMS

Pancreatic cancer may cause only vague symptoms. If you are experiencing one or more of these unexplained symptoms, the Pancreatic Cancer Action Network urges you to see your doctor.



Abdominal or
mid-back pain



Loss of
appetite



Jaundice



Weight loss



Nausea



Change in stool



Recent onset
diabetes

RISK FACTORS

The exact causes of pancreatic cancer are not yet well understood, but research studies have identified certain risk factors.



Family History

Risk increases if multiple first-degree relatives had the disease or if any were diagnosed under 50.



Diet

A diet high in red and processed meats may increase risk. A diet high in fruits and vegetables may decrease risk.



Obesity

Obese people have a 20 percent increased risk of developing the disease, compared with people of a normal weight.



Race

African Americans and Ashkenazi Jews have a higher incidence of pancreatic cancer.



Smoking

Smoking may cause about 20-30 percent of all exocrine pancreatic cancer cases.



Gender

Slightly more men are diagnosed with pancreatic cancer than women.



Age

The chance of developing pancreatic cancer increases with age.



Diabetes

Long-standing (over 5 years) diabetes increases risk.



Pancreatitis

Chronic pancreatitis increases risk. Risk is even higher for people with hereditary pancreatitis.

- 10th most common cancer in the UK.
- 6th most common cause of cancer death in the UK

Investigations

- **Pancreatic protocol CT scan** including chest, abdomen and pelvis.
- **FDG-PET**(Fluorodeoxyglucose-positron emission tomography) CT for patients who will be having cancer treatment.
- If more information is needed consider:
 - ERCP +/- stenting to relieve jaundice +/- brushings
 - MRI, for cystic pancreatic lesions or for suspected liver metastases
 - EUS (Endoscopic Ultrasound) +/- FNA, if unclear
 - Laparoscopy with laparoscopic ultrasound, for suspected small-volume peritoneal and/or liver metastases, if resectional surgery is a possibility.
- Tissue diagnosis is usually not necessary to for surgery, but is generally required for Chemotherapy

The 'double-duct' sign



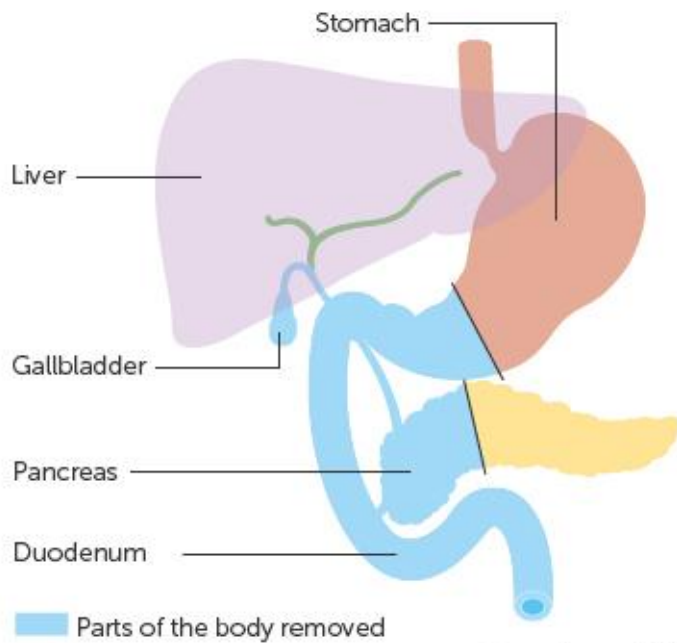
Treatments for pancreatic cancer

- Depends on:
 - Type of pancreatic cancer
 - Location
 - Extent of disease spread
 - Physical fitness
- It may include surgery, chemotherapy, radiotherapy and supportive care.

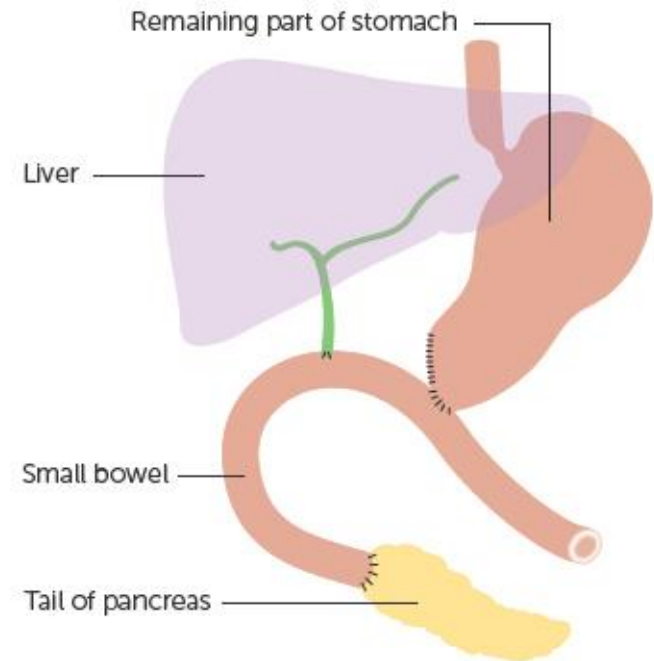
Types of surgery for pancreatic malignancy

- Potentially curative surgery
 - When it's possible to remove (resect) all the macroscopic visible disease
- Palliative surgery
 - Disease is too widespread
 - Surgery is done to relieve symptoms or to prevent certain complications like a blocked bile duct or intestine
 - Goal is not the cure

Whipple's procedure



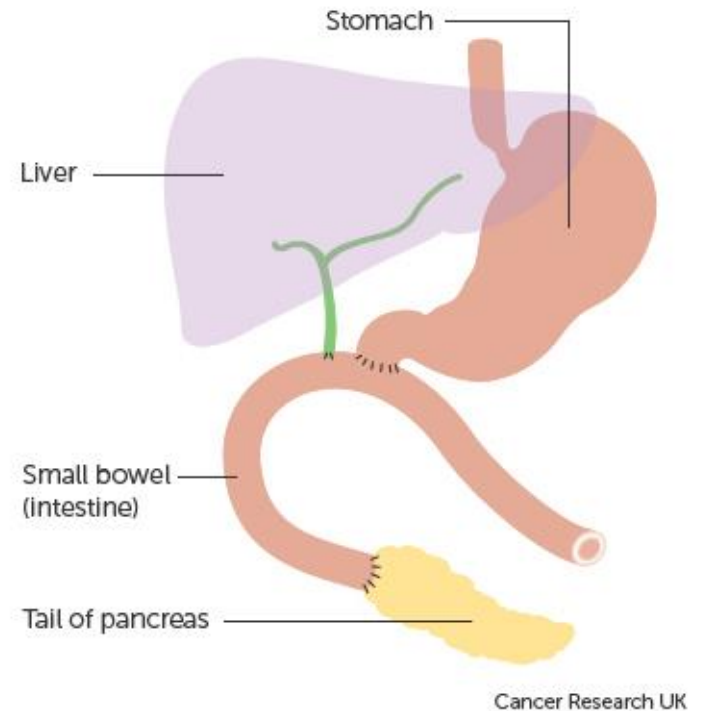
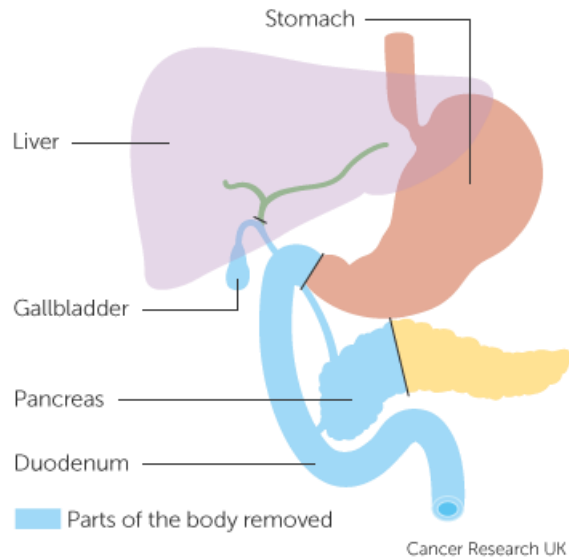
Cancer Research UK



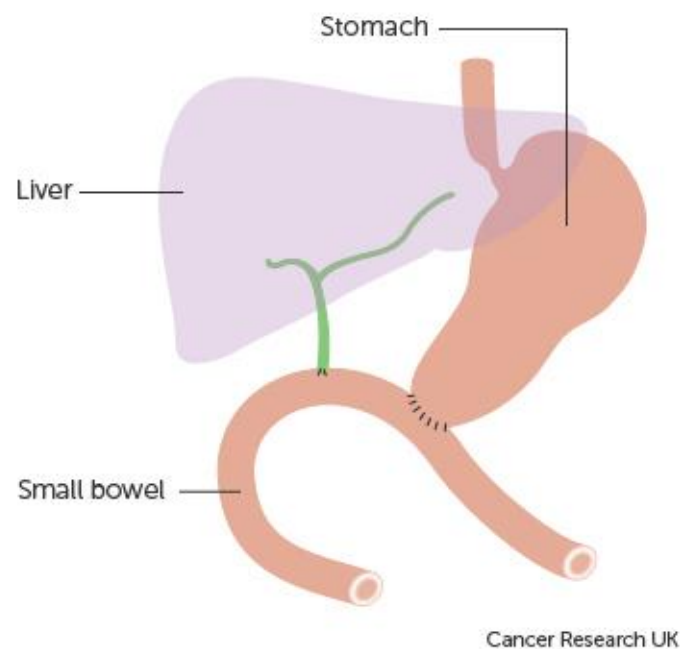
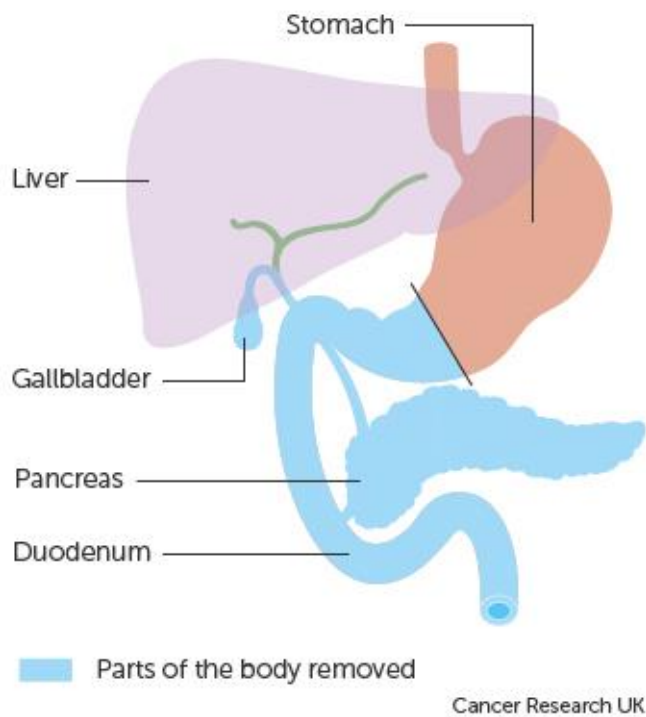
Cancer Research UK



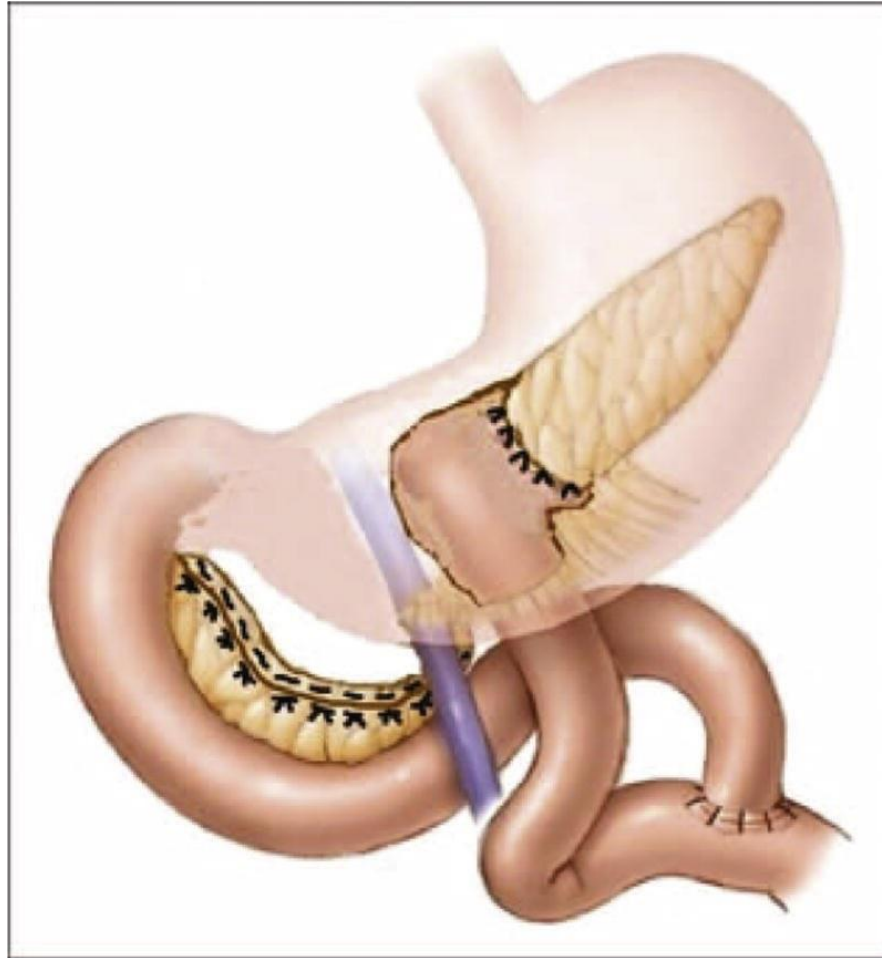
Pylorus preserving pancreaticoduodenectomy (PPPD)



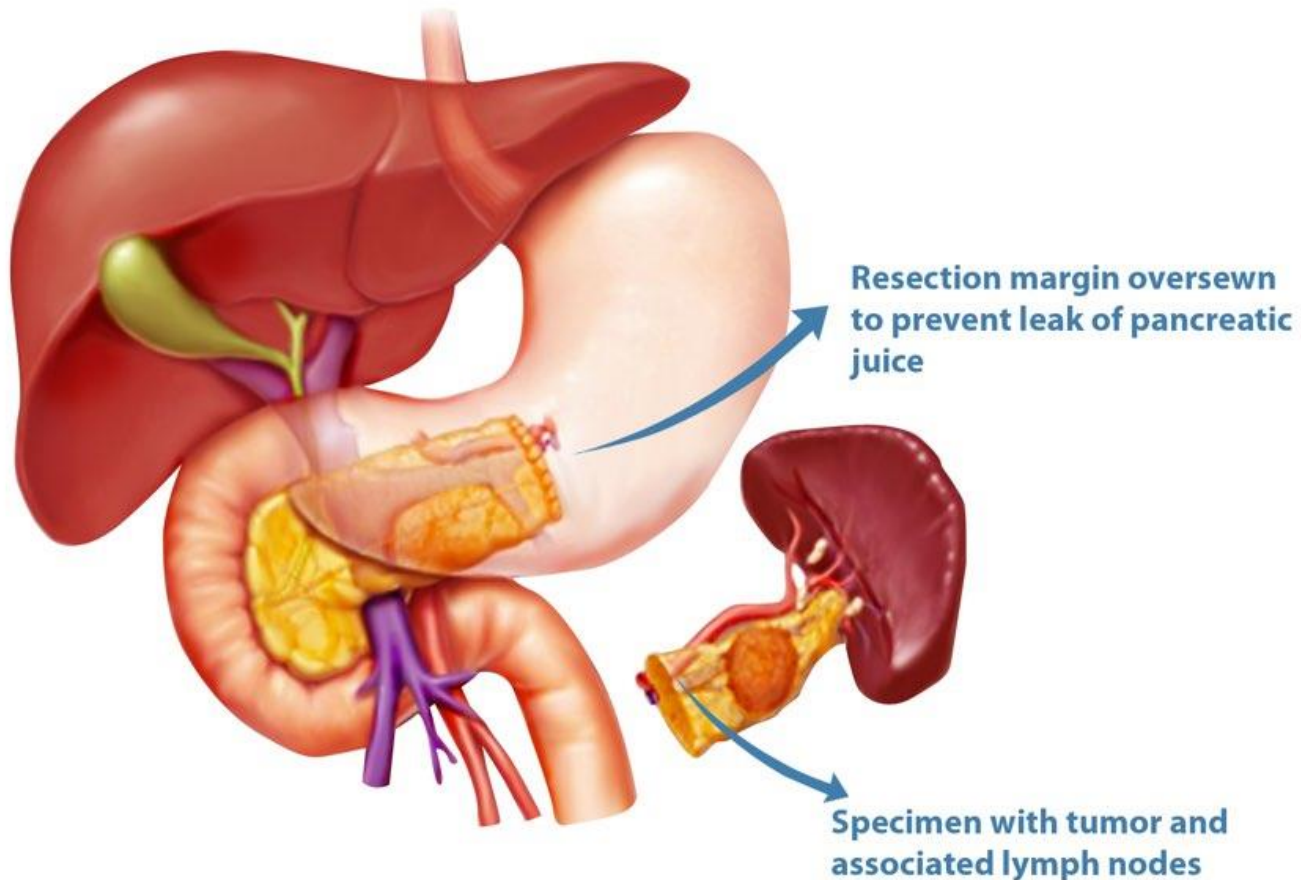
Total Pancreatectomy



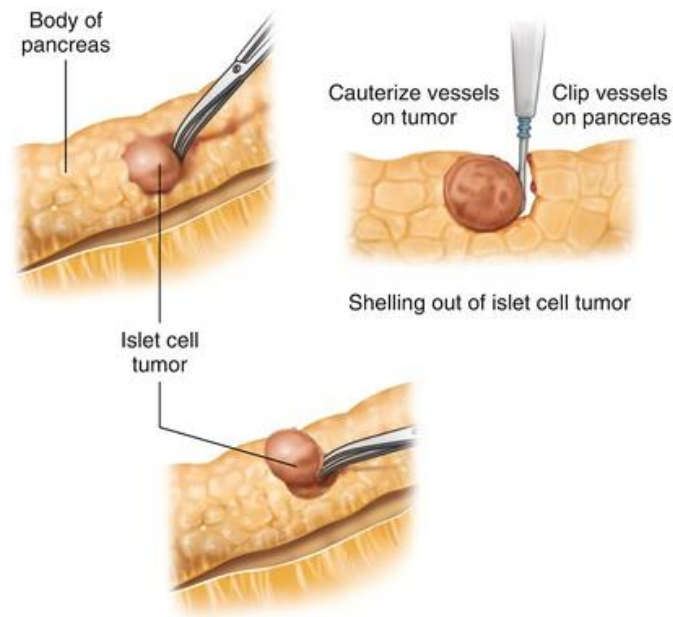
Central Pancreatic resection with Roux-en-Y anastomosis



Distal Pancreatectomy and Splenectomy (usually Laparoscopic)



Pancreatic Enucleation of Tumors



Palliative Procedures

Duodenal bypass

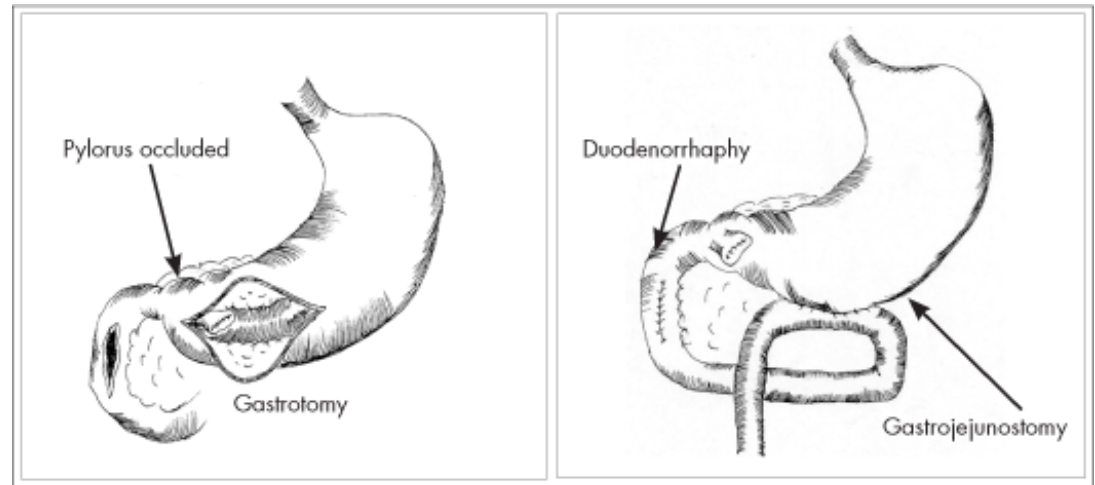


Figure 1. Pyloric exclusion procedure.¹²

Biliary bypass



Duodenal stents for Gastric Outlet obstruction

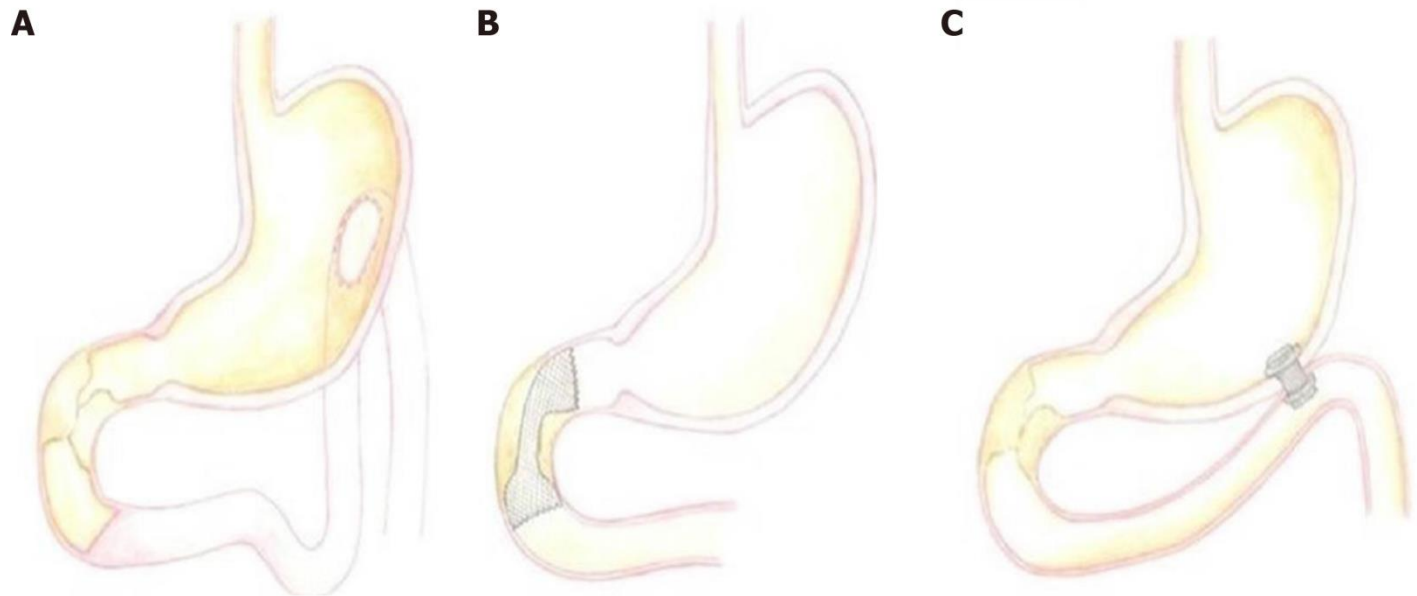
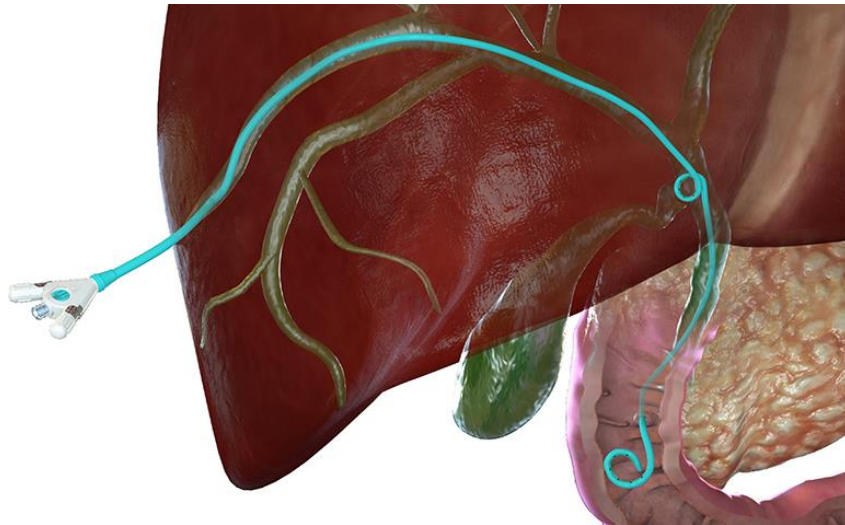


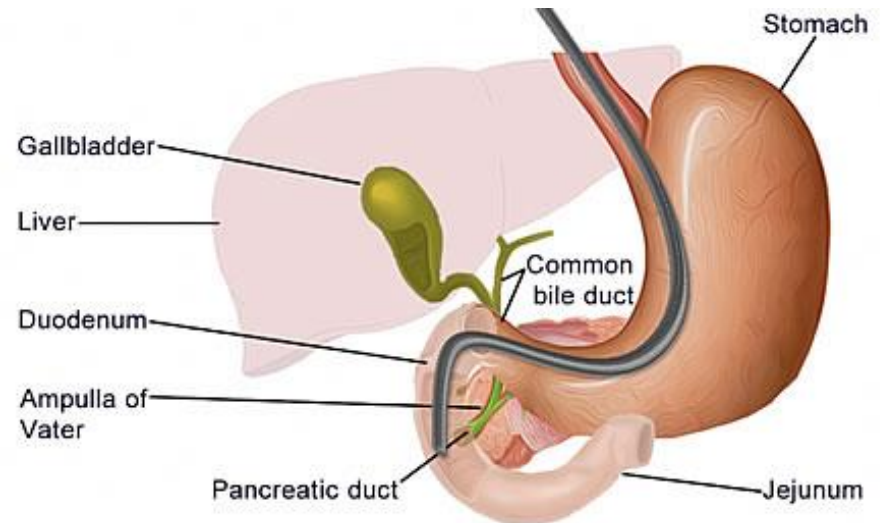
Figure 2 Graphic representation of the main approaches applied to manage malignant gastric outlet obstruction. A: Surgical gastrojejunostomy; B: Endoscopic enteral stenting with self-expanding metal stents; C: Endoscopic ultrasound-guided gastroenterostomy.

Palliative Biliary Stents

Percutaneous Transhepatic Cholangiogram (PTC)



Endoscopic Retrograde Cholangio Pancreaticography (ERCP)



Common Controversies

Pre-operative biliary drainage for obstructive jaundice

Yuan Fang ¹, Kurinchi Selvan Gurusamy, Qin Wang, Brian R Davidson, He Lin, Xiaodong Xie, Chaohua Wang

- Analysed 6 trials (n=520)
- Pre-op bili 40-250 in 1 trial and between 100 -172 in others
- Pre-operative biliary drainage did not appear to be beneficial to the patients.
- It may increase serious adverse events and could add to the cost of the health care.
- Our practice is to avoid stenting if bili is likely to stay below 200-230 before surgery (logistically very difficult to achieve)

Standard Whipple versus PPPD

Comparison of the stomach-preserving versus classic 'Whipple' operation
for people with cancer of the pancreas or the periampullary region



Published:

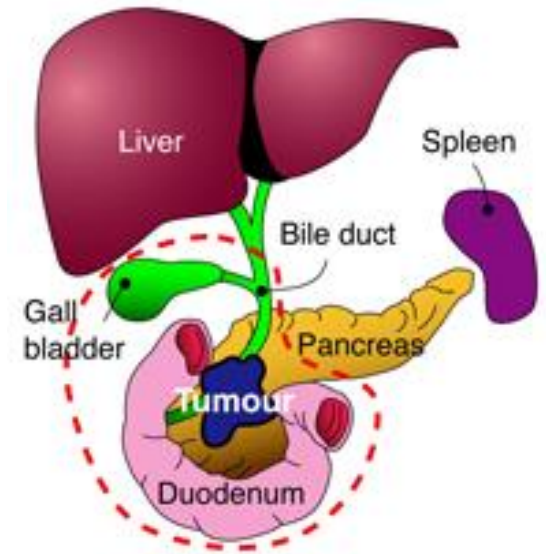
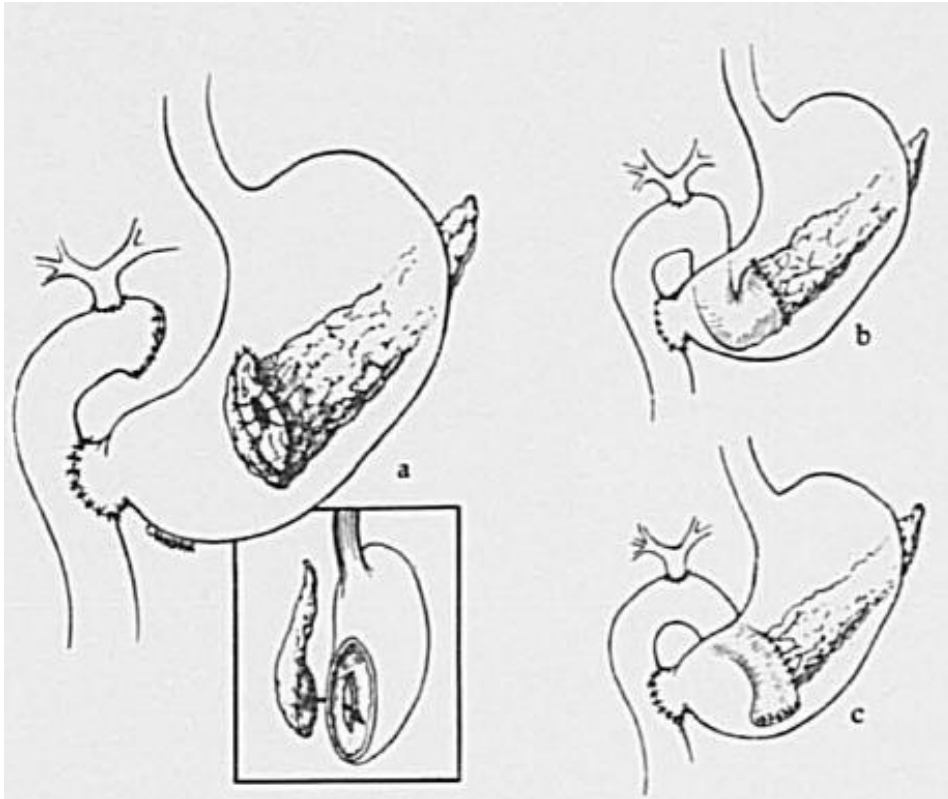
16 February 2016

Authors:

Hüttner FJ, Fitzmaurice C,
Schwarzer G, Seiler CM, Antes G,
Büchler MW, Diener MK

- 8 RCT's
- N=512
- No relevant differences in mortality, morbidity, and survival.
- Significantly lesser operating time, intr-op blood loss and blood transfusions in PPPD – but low quality evidence.
- Our practice is standard Whipple's

Pancreatic-enteric anastomosis options – PG or PJ?



- Pancreatico-jejunostomy
- Pancreatico-gastrostomy

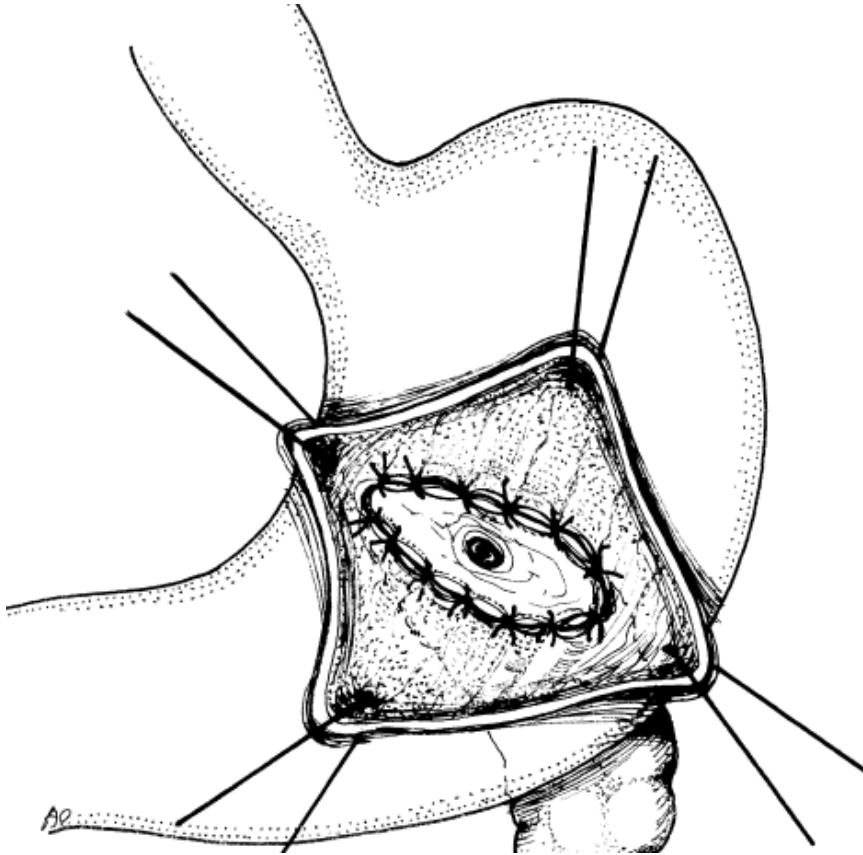
Pancreatojejunostomy versus pancreaticogastrostomy reconstruction for the prevention of postoperative pancreatic fistula following pancreaticoduodenectomy

Yao Cheng, Marta Briarava, Mingliang Lai, Xiaomei Wang, Bing Tu, Nansheng Cheng, Jianping Gong, Yuhong Yuan, Pierluigi Pilati,  Simone Mocellin Authors' declarations of interest

Version published: 12 September 2017 [Version history](#)

- 10 RCT's
- N=1629
- No reliable evidence to support the use of pancreatojejunostomy over pancreaticogastrostomy.
- Our standard practice is PG

Posterior pancreatico-gastrostomy



Theoretical advantages:

- Low gastric pH
- No enterokinase
- NG tube (decompression)

Morbidity/Mortality of Whipples procedures

Median LOS = 11 days (range 7-83)

Leak rate (clinically significant) 13/129 (10%)

Mortality n=8 (6.2%)

	n	Leak rate	Mortality
PJ	91	13 (15%)	7 (7.7%)
PG	38	2 (5%)	1 (2.6%)

n=129

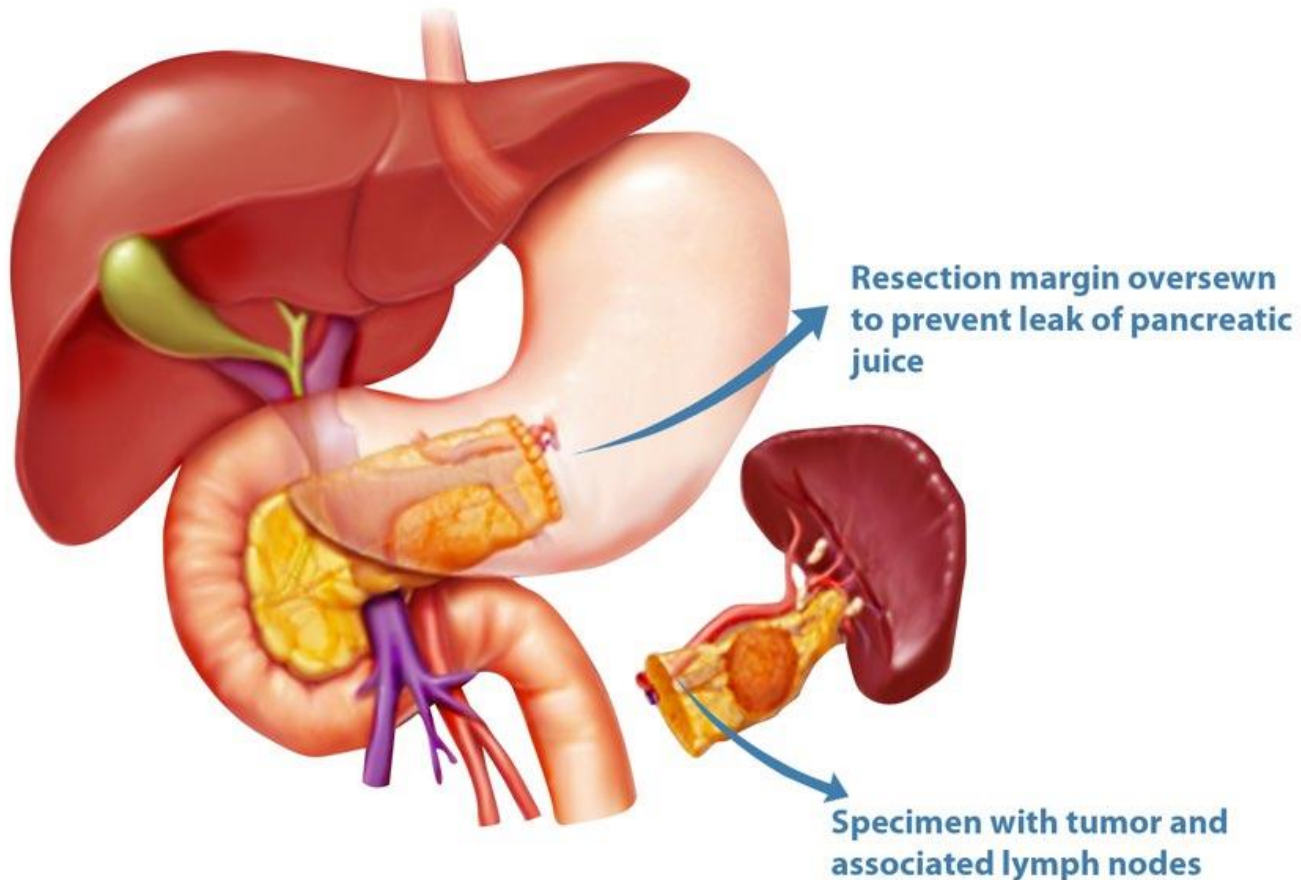
Role of extended lymphadenectomy ?

- Rationale
 - Removing all peri-pancreatic tissues and LNs that carry tumour cells should translate into better survival


Role of extended lymphadenectomy ?

- 2 randomized trials
- European lymphadenectomy study group (40 vs. 41 patients)
- Johns Hopkins group (146 vs. 148 patients)
- No survival benefit with extended lymphadenectomy
- No substantial evidence for routine use of extended lymphadenectomy for pancreatic cancer
 - Pedrazzoli P et al., Ann Surg 1998;228:508-517.
 - Yeo CJ et al., Ann Surg 2002; 236:355-368.

Distal Pancreatectomy and Splenectomy (Laparoscopic vs Open)



Comparison of the duration of hospital stay after laparoscopic or open distal pancreatectomy: randomized controlled trial

B. Björnsson¹ , A. Lindhoff Larsson¹, C. Hjalmarsson^{2,3}, T. Gasslander¹ and P. Sandström¹

¹Department of Surgery and Clinical and Experimental Medicine, Linköping University, Linköping, ²Department of Surgery, Blekinge Hospital, Karlskrona, and ³Department of Clinical Sciences, Lund University, Lund, Sweden


BMJ 2020; **107**: 1281–1288

Table 2 Primary and secondary outcomes

	LDP (n = 29)	ODP (n = 29)	P†
Primary outcome			
Postoperative stay at hepatopancreatobiliary centre (days)*	5 (4–5)	6 (5–7)	0.002
Secondary outcomes			
Discharge to home	14	14	1.000
Postoperative stay, including referral hospital (days)*	6 (5–8)	8 (6–10)	0.007
Readmission	4	6	0.487‡
Total postoperative hospital stay (90 days) (days)*	6 (5–9)	8 (7–13)	0.008
Time to functional recovery (days)*	4 (2–6)	6 (4–7)	0.007

*Values are median (i.q.r.). LDP, laparoscopic distal pancreatectomy; ODP, open distal pancreatectomy. †Mann–Whitney *U* test, except ‡ χ^2 test.

Comparison of the duration of hospital stay after laparoscopic or open distal pancreatectomy: randomized controlled trial

B. Björnsson¹ , A. Lindhoff Larsson¹, C. Hjalmarsson^{2,3}, T. Gasslander¹ and P. Sandström¹

¹Department of Surgery and Clinical and Experimental Medicine, Linköping University, Linköping, ²Department of Surgery, Blekinge Hospital, Karlskrona, and ³Department of Clinical Sciences, Lund University, Lund, Sweden

BJS 2020; 107: 1281–1288

Table 3 Intraoperative and postoperative outcomes

	LDP (n = 29)	ODP (n = 29)	P†
Duration of surgery (min)*	120 (105–140)	120 (103–149)	0.482‡
Estimated blood loss (ml)*	50 (25–150)	100 (100–300)	0.018‡
Additional resection	2	4	0.389
Splenectomy	19	23	0.240
Clavien–Dindo complications at 90 days (≥ grade III)	4	8	0.195
IIIa	4	5	
IIIb	0	1	
IVa	0	1	
IVb	0	0	
V	0	1	
Postoperative pancreatic fistula	9	11	0.581
Grade B	9	10	
Grade C	0	1	
Postoperative delayed gastric emptying	1	5	0.085
Grade A	1	2	
Grade B	0	1	
Grade C	0	2	
Postpancreatectomy haemorrhage	1	0	0.313
Grade A	1	0	
Grade B	0	0	
Grade C	0	0	

*Values are median (i.q.r.). LDP, laparoscopic distal pancreatectomy; OPD, open distal pancreatectomy. † χ^2 or Fisher's exact test, except ‡ Mann–Whitney U test.

Palliative biliary stents for obstructing pancreatic carcinoma

[Alan C Moss](#), [Eva Morris](#), and [Padraic MacMathuna](#)[✉]

[Cochrane Database Syst Rev](#). 2006 Apr; 2006(2): CD004200.

Published online 2006 Apr 19. doi: [10.1002/14651858.CD004200.pub4](https://doi.org/10.1002/14651858.CD004200.pub4)

- 29 Trials
- n=1700
- Endoscopic metal stents are the intervention of choice at present in patients with malignant distal obstructive jaundice due to pancreatic carcinoma.
- In patients with short predicted survival, their patency benefits over plastic stents may not be realised.

Post-op Complications of Pancreatic Surgery

Incidence of complications following pancreatic resectional surgery in the absence of any preventative treatment—placebo groups from randomised multicentre trials⁴

Localised complications	Incidence (%)	General complications	Incidence (%)
Pancreatic fistula	23.4	Sepsis	3.6
Fluid collection	8.8	Respiratory failure	3.3
Anastomosis leakage	4.0	Death	3.3
Bleeding	4.3	Shock	2.4
Abscess	3.1	Renal failure	1.5
Postoperative pancreatitis	2.9		

Gouillat C, Gigot J. Pancreatic surgical complications—the case for prophylaxis
Gut 2001;**49**:iv29-iv35.

Common Complications Associated with Pancreatectomy

Study	N	Patients with Complications N (%)	Fistula N (%)	Intraabdominal Collection or Abscess N (%)	DGE N (%)	Hemorrhage N (%)	Wound Infection N (%)	Reoperation Rate N (%)
Pancreaticoduodenectomy								
Buchler et al, 2000	331	127 (38)	7 (2)	4 (1)	54 (16)	12 (4)	13 (4)	13 (4)
Muscari et al, 2006	300	117 (39)	50 (17)	15 (5)	—	18 (6)	—	—
Winter et al, 2006	1175	415 (35)	52 (4)	38 (3)	161 (14)	—	91 (8)	35 (3)
Reid-Lombardo et al, 2007*	1507	—	196 (13)	97 (6)	187 (12)	54 (4)	—	53 (4)
Mezhir et al, 2009†	340	147 (43)	20 (6)	23 (7)	29 (9)	12 (4)	46 (14)	—
Distal Pancreatectomy								
Kooby et al, 2008*†	342	170 (50)	99 (29)	—	—	—	36 (11)	6 (2)
Kleef et al, 2007	302	105 (35)	35 (12)	14 (5)	14 (5)	10 (3)	8 (3)	26 (9)
Goh et al, 2008	232	107 (46)	72 (31)	—	—	—	17 (7)	11 (5)
Nathan et al, 2009	704	232 (33)	203 (29)	36 (5)	—	—	—	40 (6)
Central Pancreatectomy								
Sauvanet et al, 2002*	53	22 (42)	16 (30)	3 (6)	1 (2)	2 (4)	2 (4)	3 (6)
Roggin et al, 2006	10	6 (60)	3 (30)	—	—	1 (10)	—	1 (10)
Crippa et al, 2007*	100	58 (58)	44 (44)	15 (15)	2 (2)	1 (1)	—	0 (0)
Adham et al, 2008	50	18 (36)	4 (8)	7 (14)	—	3 (6)	—	6 (12)
Hirono et al, 2009	24	12 (50)	15 (63)	1 (4)	1 (4)	0 (0)	1 (4)	0 (0)
Total Pancreatectomy								
Billings et al, 2005‡	99	32 (32)	NA	6 (6)	8 (8)	—	4 (4)	2 (2)
Muller et al, 2007	100	38 (38)	NA	2 (2)	8 (8)	2 (2)	2 (2)	15 (15)
Reddy et al, 2009	100	69 (69)	NA	—	11 (11)	14 (14)	18 (18)	—

*Multiinstitutional study

†Matched case-control study

‡Included completion pancreatectomy patient

DGE, delayed gastric emptying; NA, not applicable; —, not available



ELSEVIER



Review article

HPB

Volume 20, Issue 3, March 2018, Pages 204–215



Systematic review on the impact of pancreatoduodenectomy on quality of life in patients with pancreatic cancer

Sven M. van Dijk¹, Hanne D. Heerkens², Dorine S.J. Tseng³, Martijn Intven², I. Quintus Molenaar⁴, Hjalmar C. van Santvoort^{4, 5}  

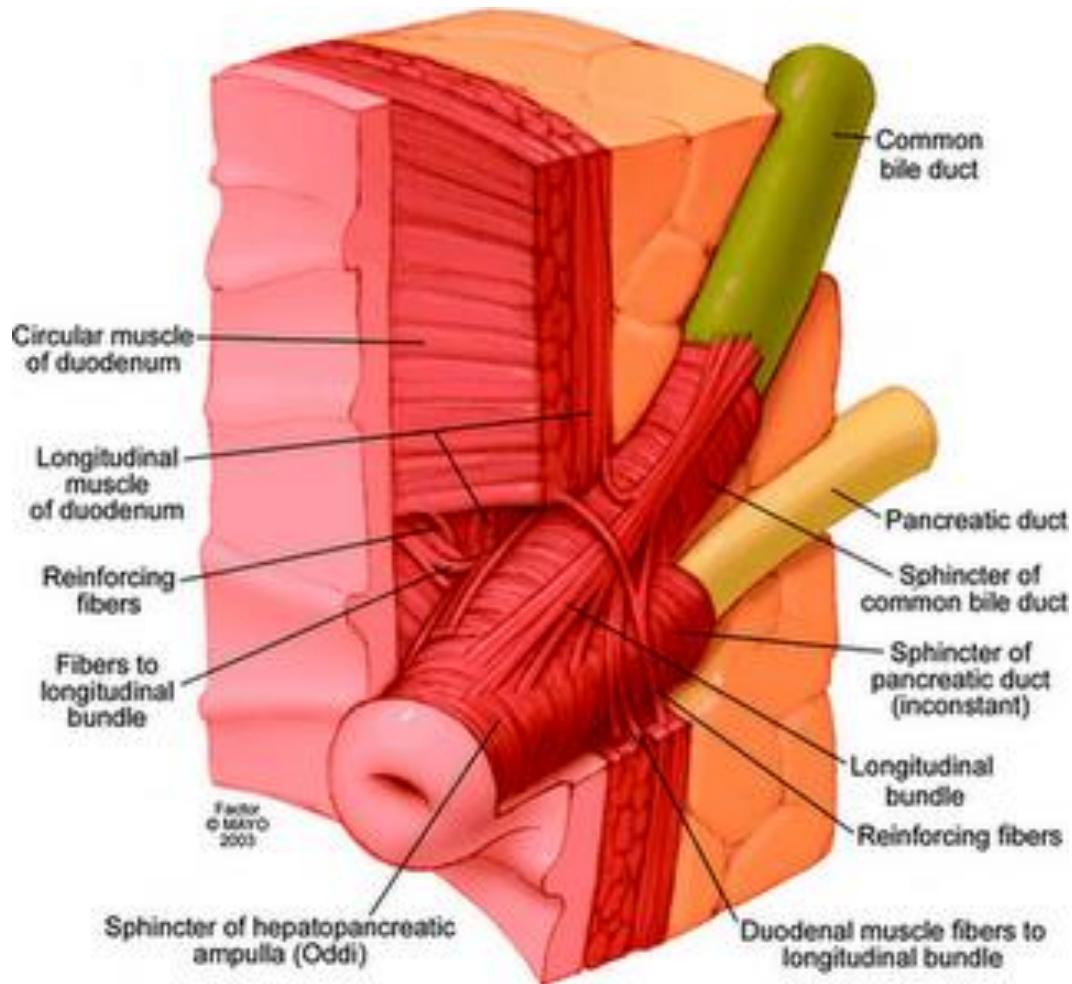
- QoL of physical and social functioning domains decreased in the first 3 months after surgery.
- Recovery of physical and social functioning towards baseline values took place after 3–6 months.
- Pain, fatigue and diarrhoea scores deteriorated postoperatively, but eventually resolved after 3–6 months.



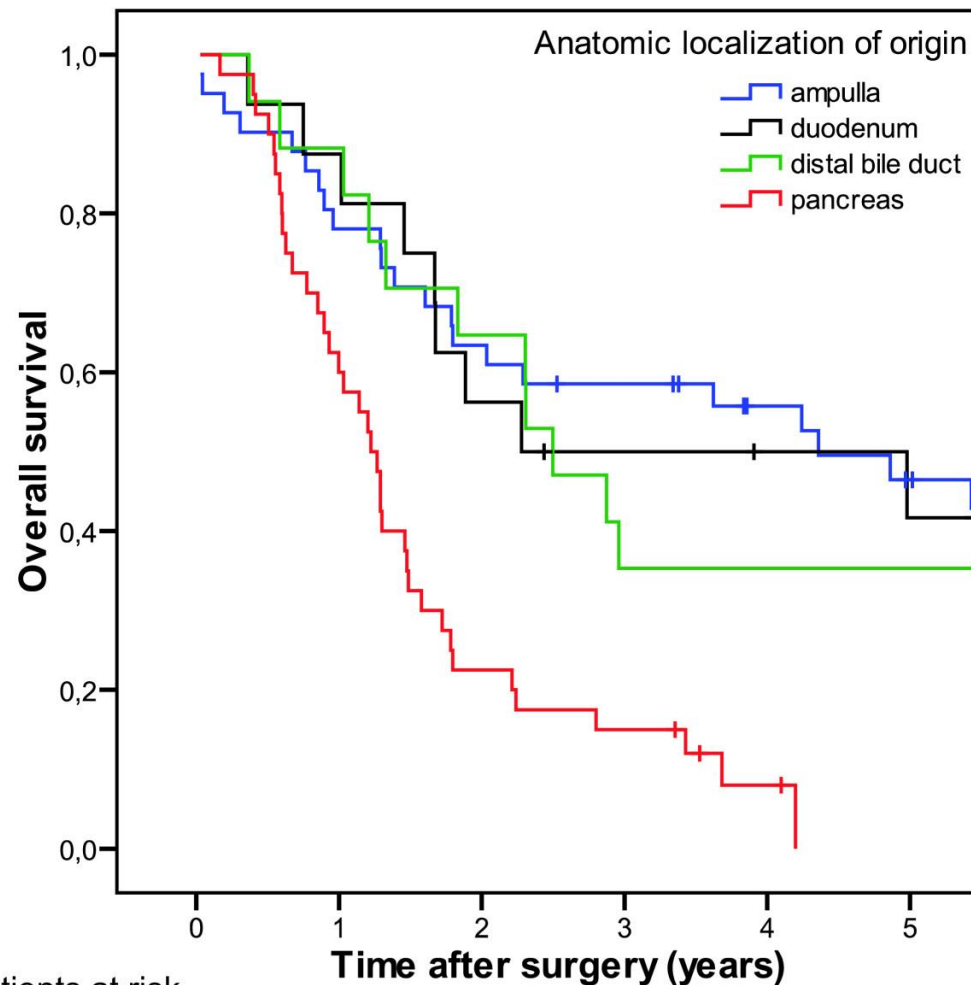
Outcomes for pancreatic cancer

- Depends on:
 - Type of cancer
 - Tumour biology
 - Extent of disease spread
 - Resection margins
 - Adjuvant/neoadjuvant treatment
 - Physical fitness

Periampullary tumours



- Pancreatic duct
- Common bile duct
- Ampulla
- Duodenum



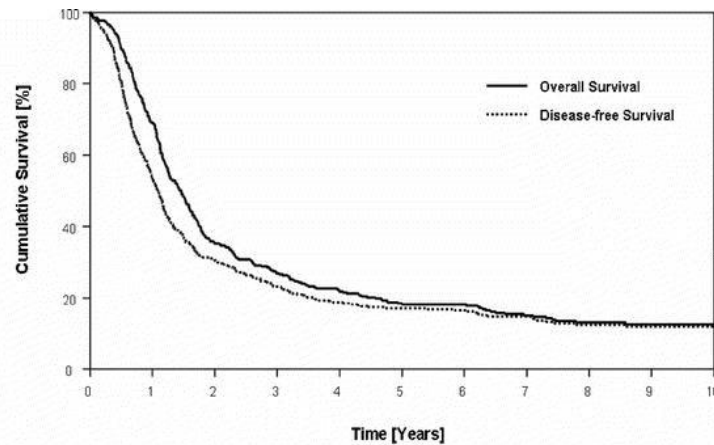
Westgaard *et al. BMC Cancer* 2008

Patients at risk

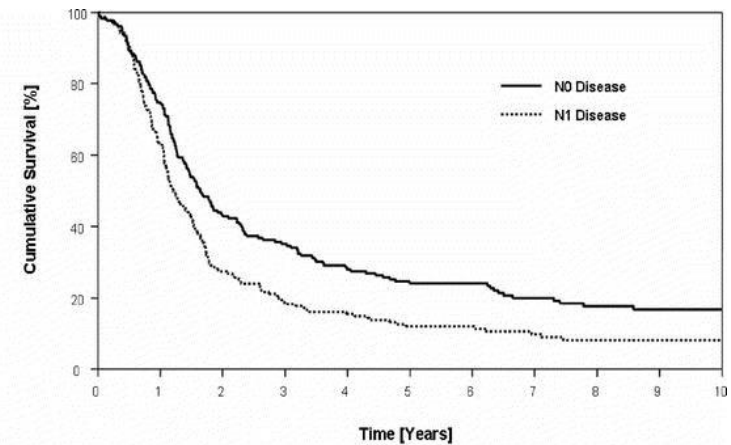
ampulla	41	32	26	23	18	14
duodenum	16	14	9	7	6	5
distal bile duct	17	15	11	6	6	6
pancreas	40	24	9	6	2	0

Pancreatic cancers have worst prognosis of all perampullary tumors

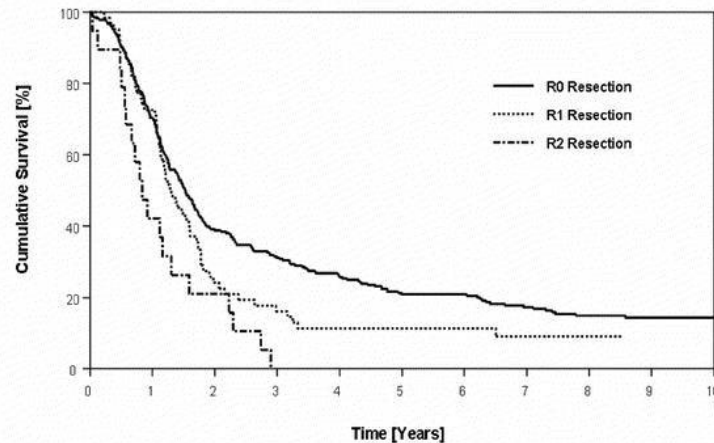
Resection margin and nodal status affect prognosis in pancreatic cancer



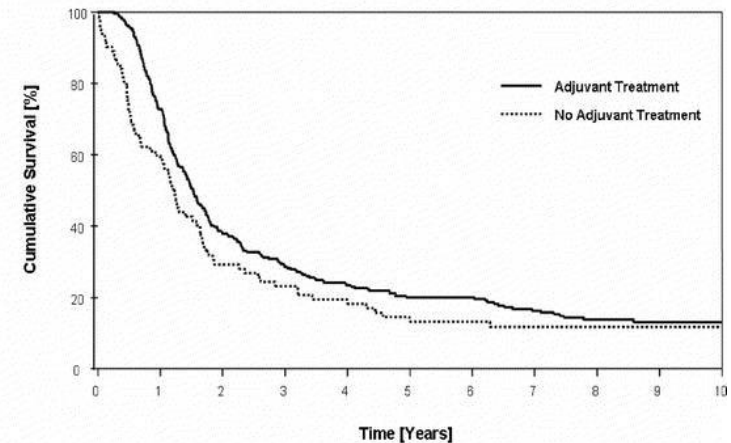
No. at Risk											
Overall Survival	357	247	126	96	78	62	53	40	29	21	21
Disease-free Surv.	357	191	109	83	67	58	48	39	29	21	21



No. at Risk											
NO Disease	192	136	78	64	51	42	36	28	20	15	15
N1 Disease	175	111	48	32	27	20	17	12	9	6	6

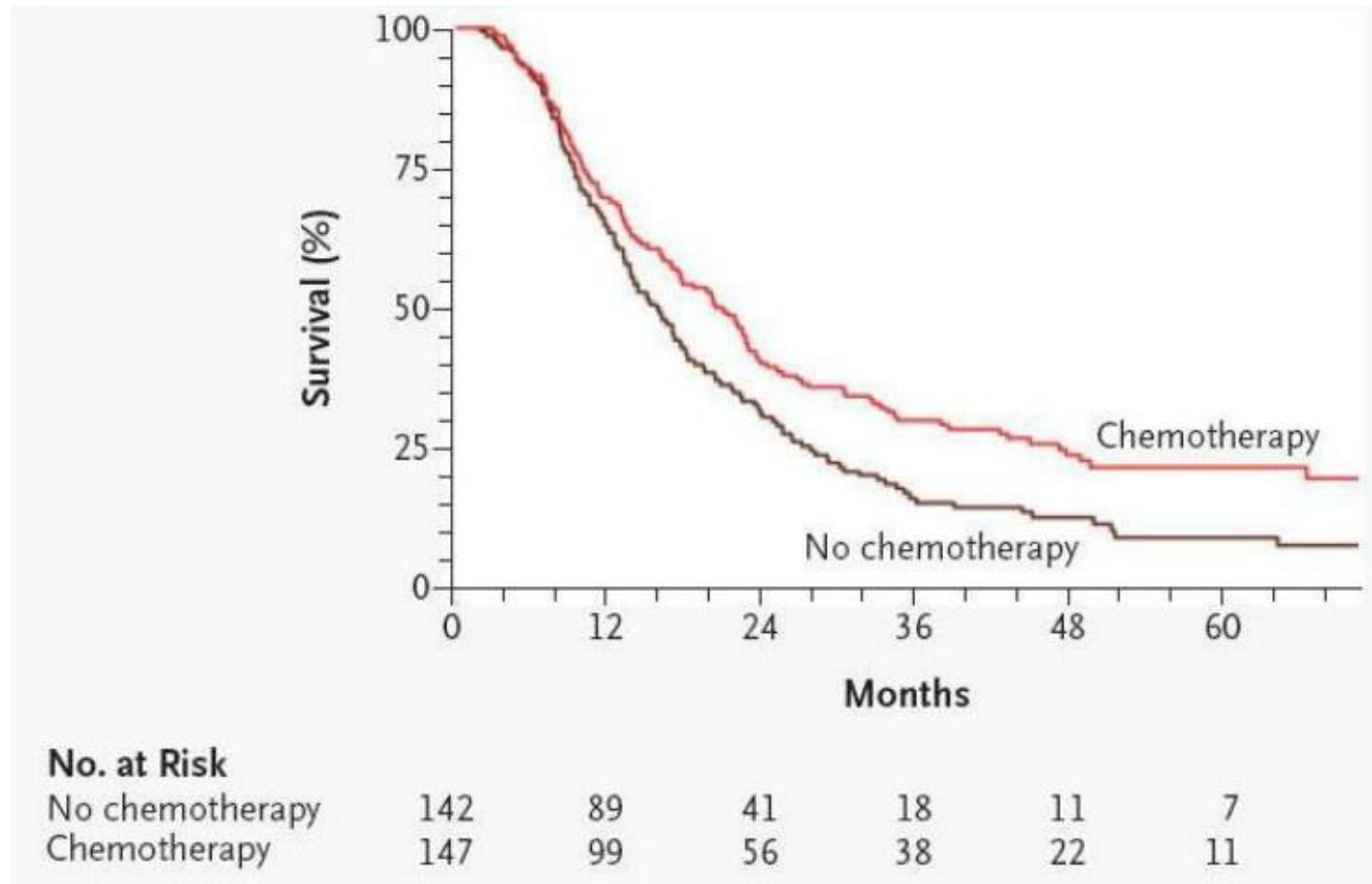


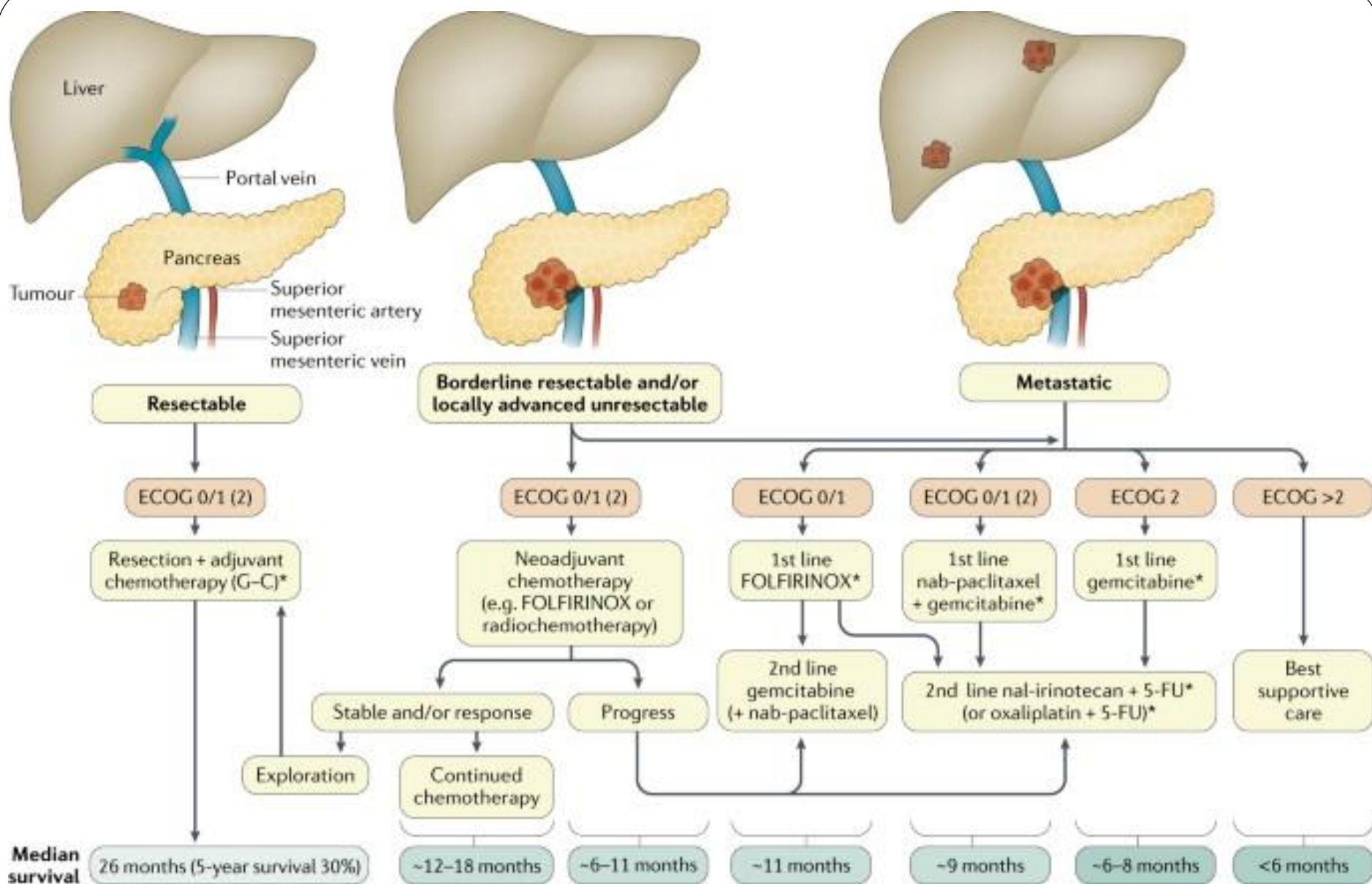
No. at Risk											
R0 Resection	276	194	107	86	71	55	47	37	27	21	21
R1 Resection	62	45	15	10	7	7	6	3	2	0	0
R2 Resection	19	8	4	0	0	0	0	0	0	0	0



No. at Risk											
No Adjuvant	82	49	24	19	15	10	9	7	6	6	6
Adjuvant	269	196	102	77	63	52	44	33	23	15	15

ESPAC-1





Neoptolemos, J.P., Kleeff, J., Michl, P. et al. Therapeutic developments in pancreatic cancer: current and future perspectives. *Nat Rev Gastroenterol Hepatol* **15**, 333-348 (2018). <https://doi.org/10.1038/s41575-018-0005-x>

Surveillance

Pancreatic cancer in adults: diagnosis and management

NICE guideline [NG85] Published: 07 February 2018

Follow-up for resected pancreatic cancer

- 1.8.8 For people who have had resection, offer ongoing specialist assessment and care to identify and manage any problems resulting from surgery.
- 1.8.9 For people who have new, unexplained or unresolved symptoms after treatment, provide access to specialist investigation and support services.

TABLE 1

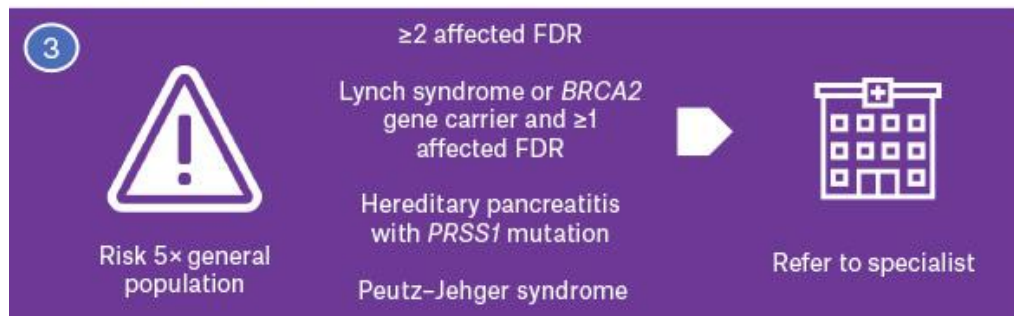
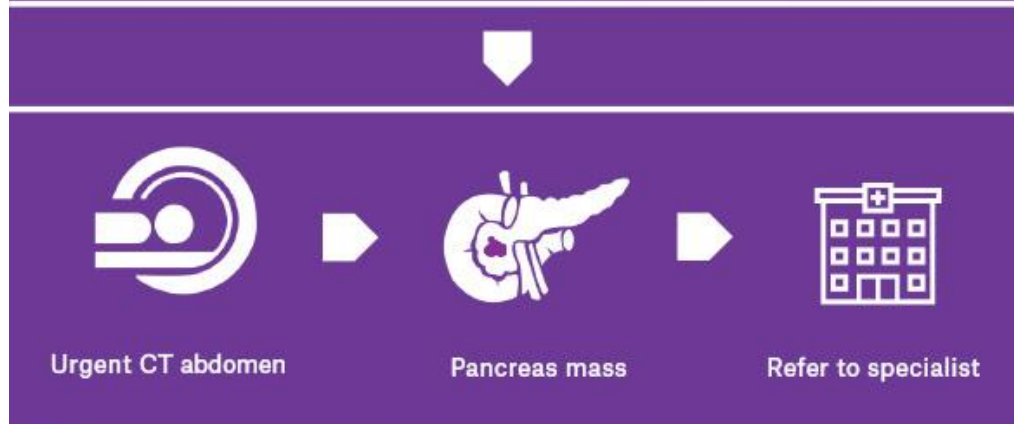
Current surveillance guidelines after resection for PDAC

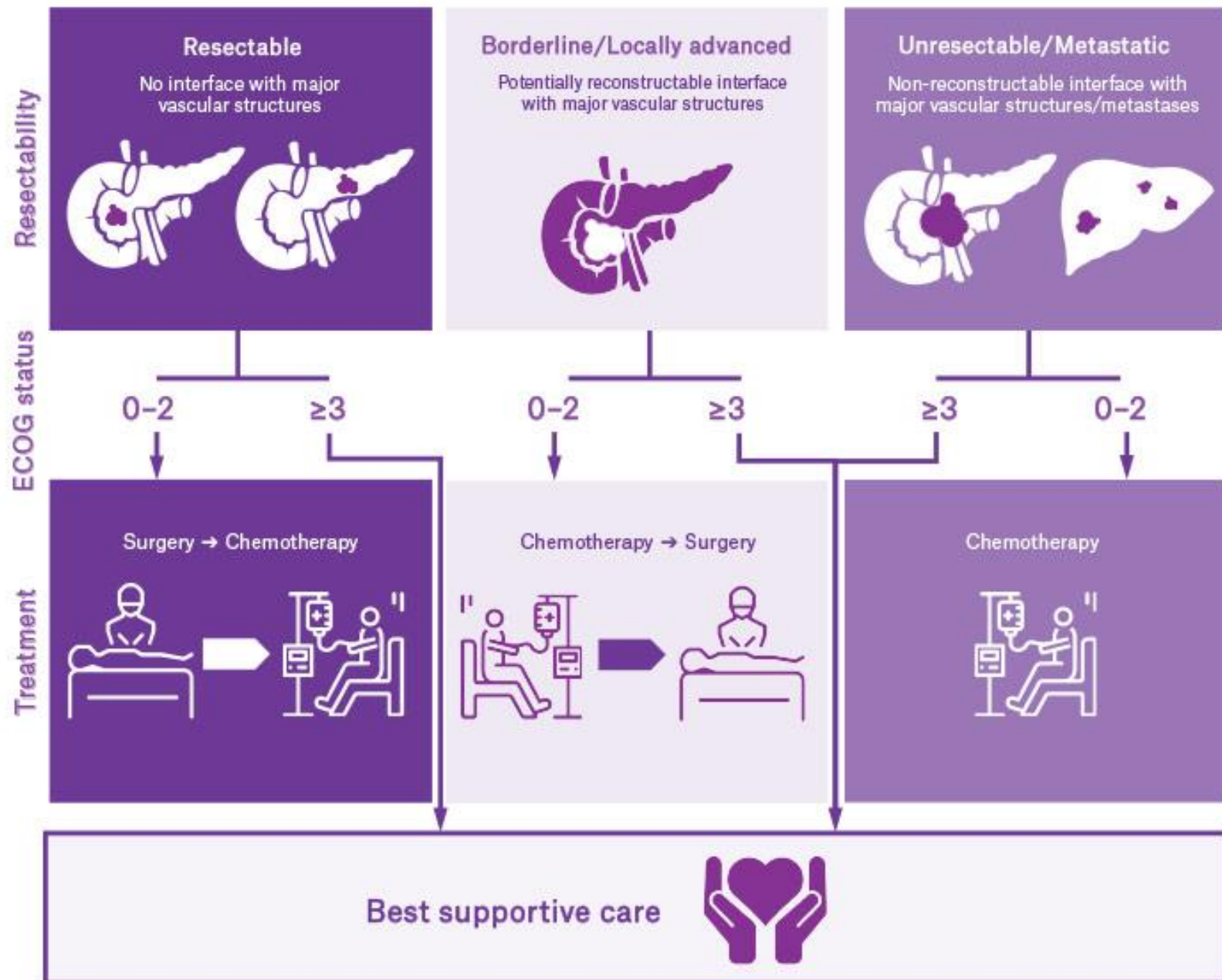
Society	Recommendation	Evidence level
National Comprehensive Cancer Network	Clinical evaluation every 3–6 months for 2 years, then annually	Low-level expert opinion (uniform)
	CA19-9, CT scan every 3–6 months for 2 years, then annually	Expert opinion (nonuniform)
European Society of Medical Oncology	Follow-up schedule discussed with patient, designed to avoid emotional stress and economic burden for the patient	Low level
	If CA19-9 is elevated before surgery, then reassess every 3 months for 2 years	Expert opinion
	Abdominal CT scan every 6 months	

PDAC pancreatic adenocarcinoma, CA carbohydrate antigen, CT computed tomography



**Take
home message*





Summary

- CTTAP with Pancreas protocol and PET CT for staging
- Biliary drainage to be considered only if bili likely to increase above 200-230 pre-op
- Palliative metal stents biliary/duodenal are preferable in comparison to bypass surgery for patients with short predicted survival
- No surgical technique is superior.
- Overall prognosis remains poor.
 - Resection and adjuvant therapy - median survival - 20–28 months.
 - Palliative chemotherapy - median survival -12 months
 - Best supportive care - median survival of <6 months.
- Surgery negatively influences QoL at short term.
- Eventually recovers to baseline values after 3–6 months.
- Follow up imaging not usually indicated in UK practice.

Thank you