



Auto-transplantation des îlots de Langerhans: pour qui? Quand y penser?

PD Dr. Axel Andres

Médecin-adjoint agrégé

Services de Chirurgie viscérale/Transplantation



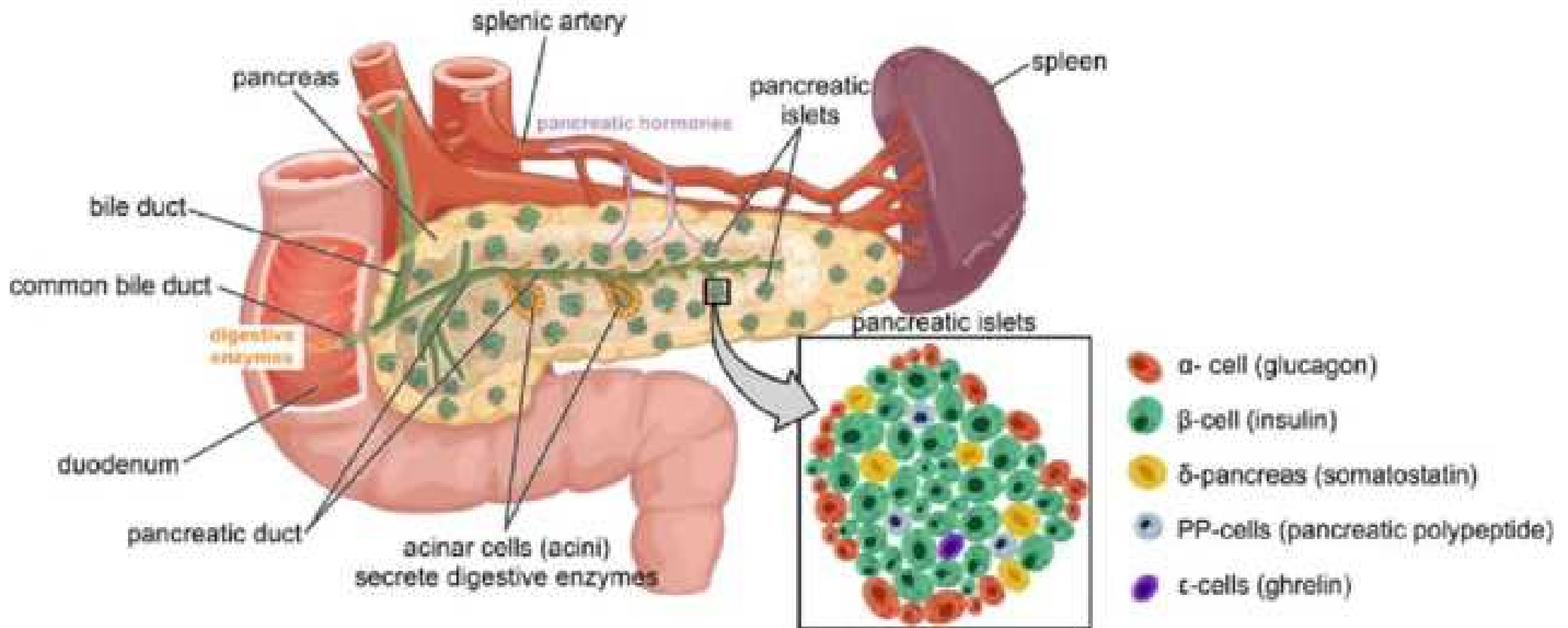
**UNIVERSITÉ
DE GENÈVE**

FACULTÉ DE MÉDECINE
Département de chirurgie



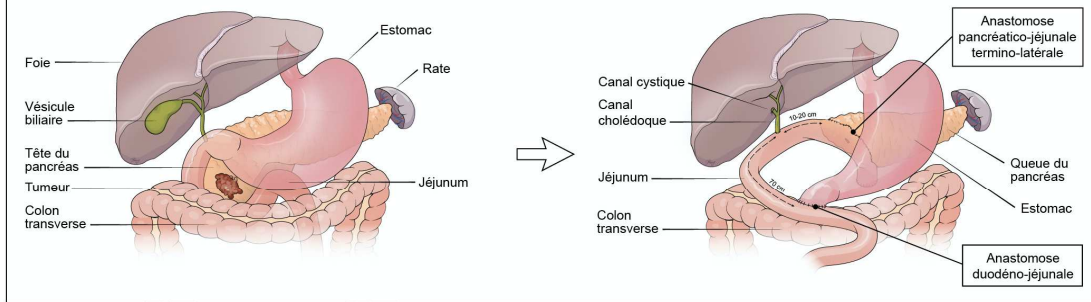
Hôpitaux
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Le pancréas: rappel

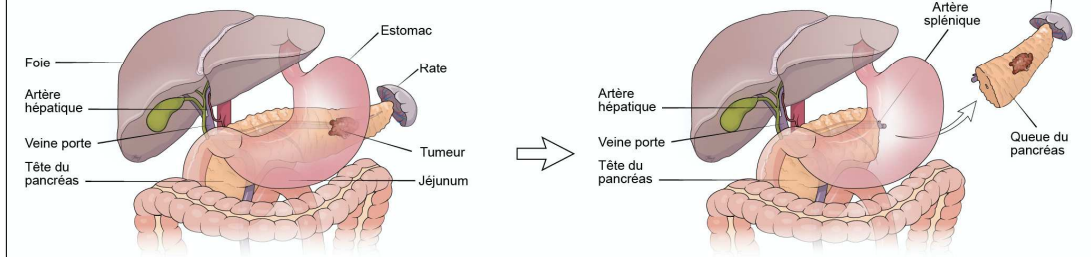


Les types de résection du pancréas

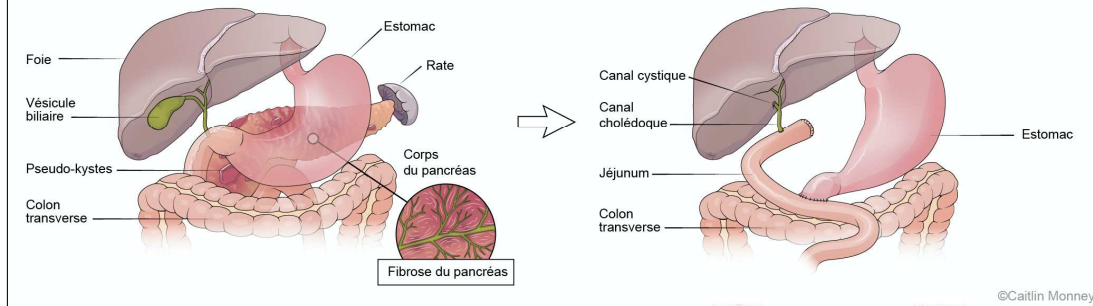
A Duodéno pancréatectomie (Procédure de Whipple)



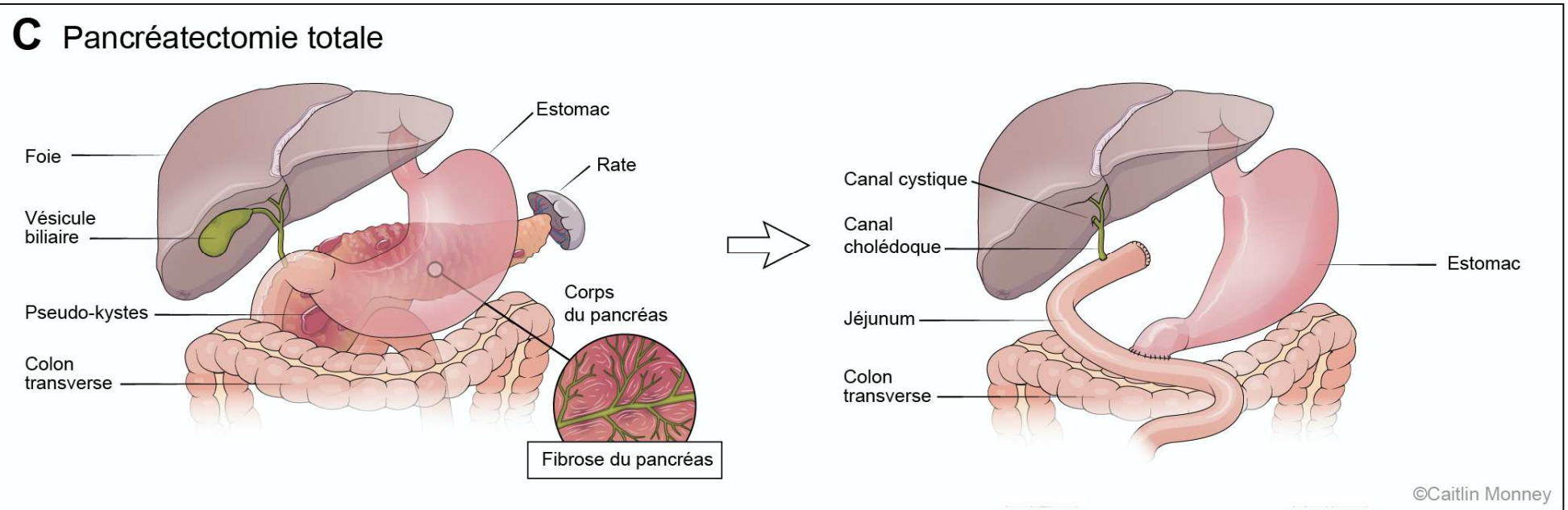
B Pancréatectomie distale



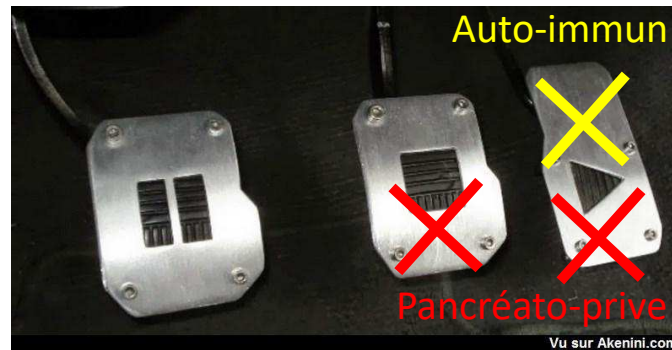
C Pancréatectomie totale



Risque de développer un diabète après une pancréatectomie totale



Diabète pancréato-prive (3c)



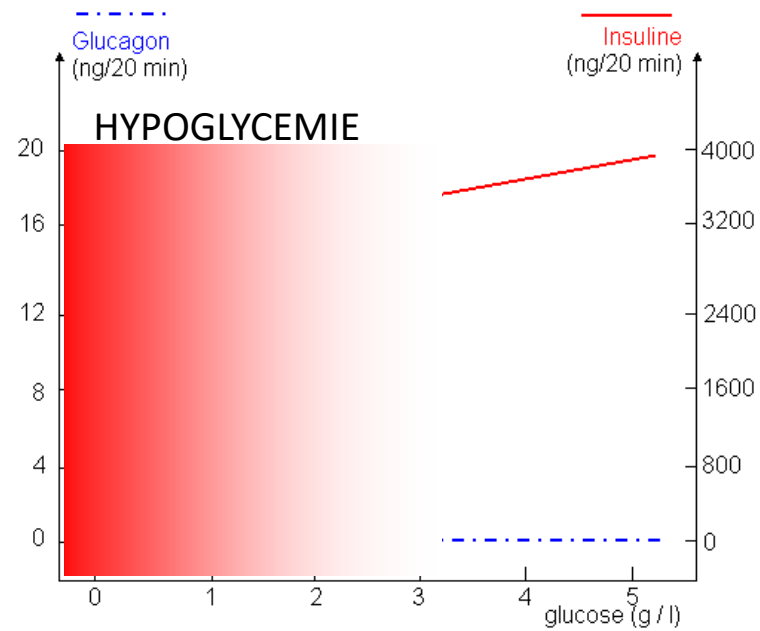
Morbidité: 24 – 40 %

Mortalité: 5-6%

Episodes d'hypoglycémies: 1-12 semaines

A. V. Maker Langenbecks Arch Surg (2017) 402:873–883

Diabète pancréato-prive (3c)



Morbidité: 24 – 40 %

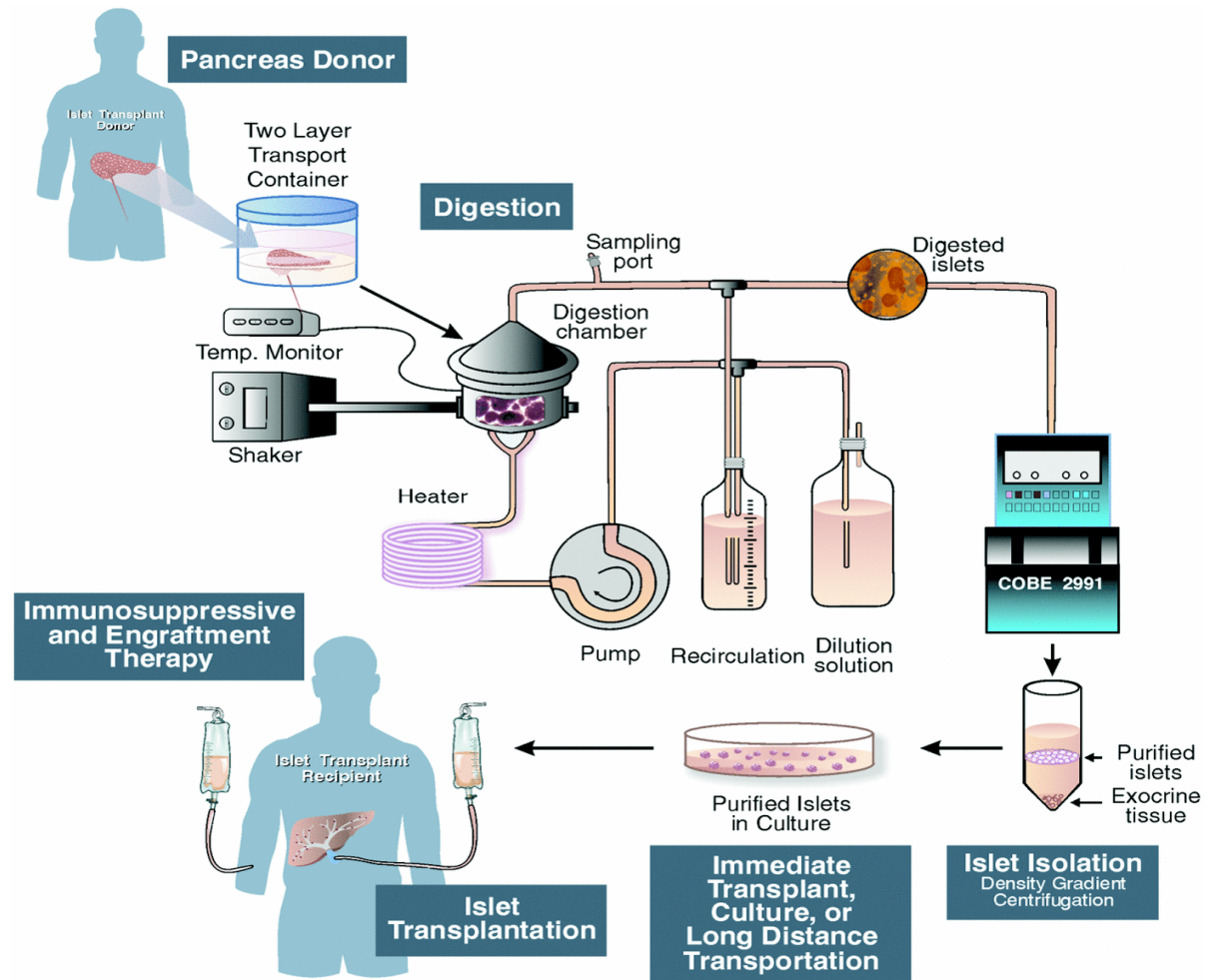
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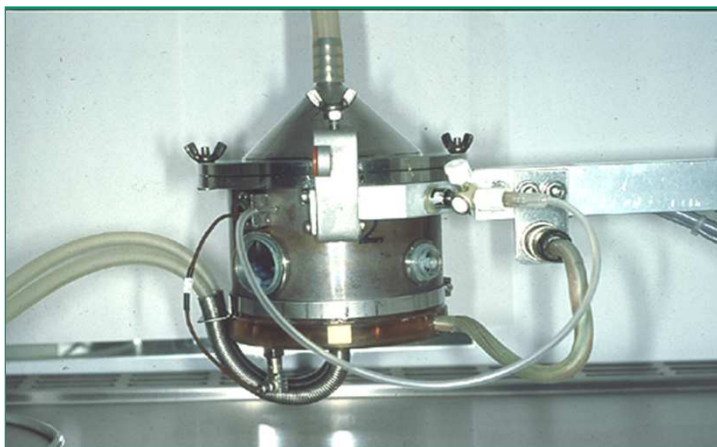
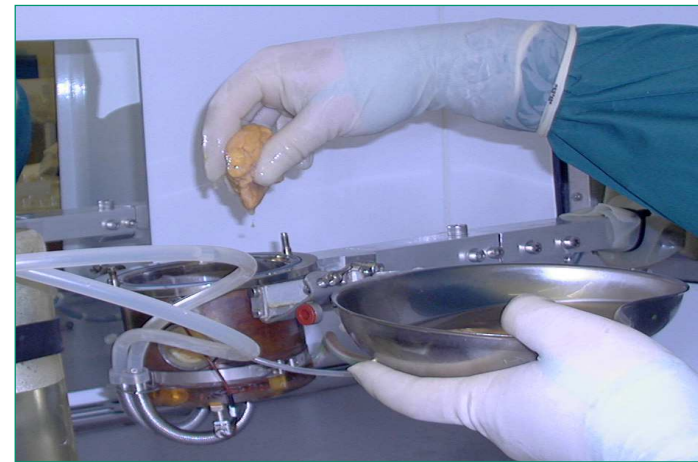
A. V. Maker Langenbecks Arch Surg (2017) 402:873–883

L'auto-transplantation d'îlots de Langerhans

Shaheed MERANI and A. M. James SHAPIRO
Clinical Science (2006) 110, 611-625



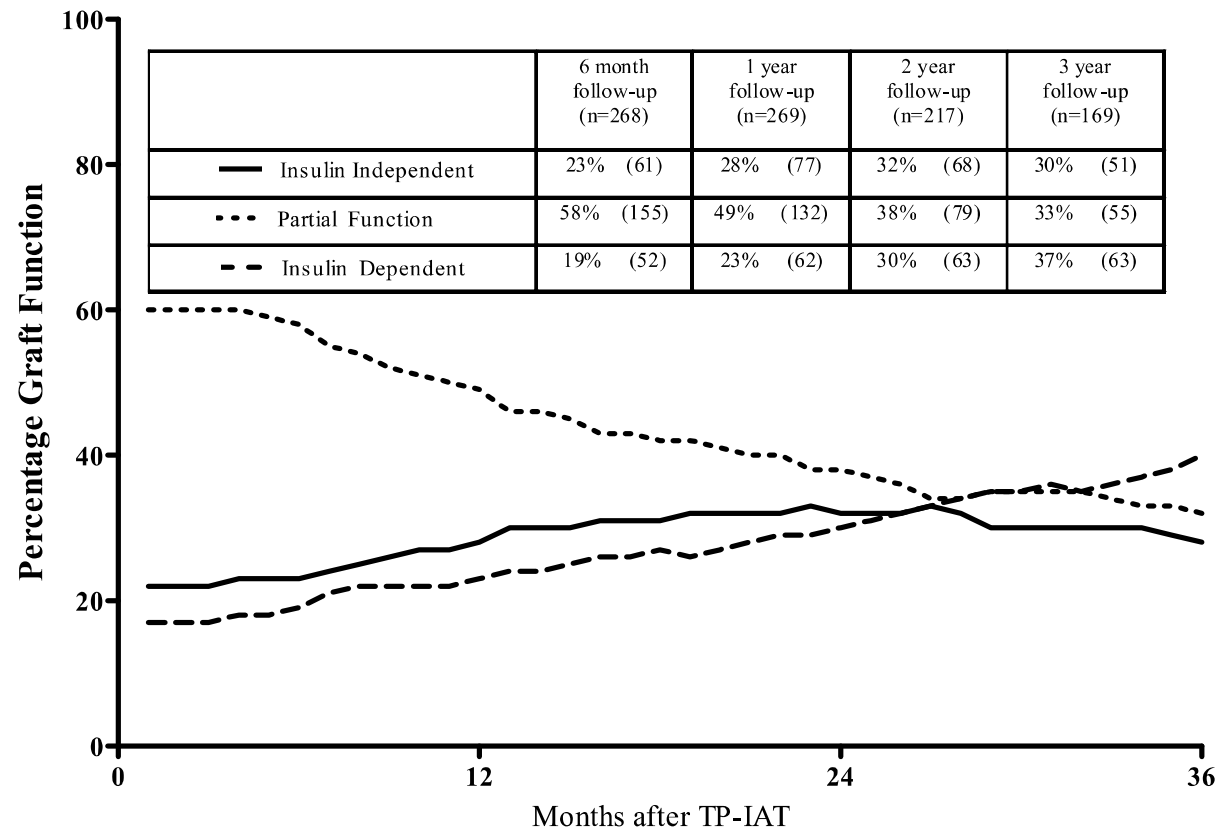
L'auto-transplantation d'îlots de Langerhans



L'auto-transplantation d'îlots de Langerhans: résultats pour la PC

Total Pancreatectomy and Islet Autotransplantation for **Chronic Pancreatitis**

David ER Sutherland, MD, PhD, FACS, David M Radosevich, RN, PhD, Melena D Bellin, MD, Bernard J Hering, MD, Gregory J Beilman, MD, FACS, Ty B Dunn, MD, FACS, Srihath Chinnakotla, MD, Sekou M Yickers, MD, FACS, Barbara Brand, RN, MS, AN, Balaramurugan, PhD, Martin L Freeman, MD, Timothy J Platt, MD, FACS



L'auto-transplantation d'îlots de Langerhans: résultats pour la PC

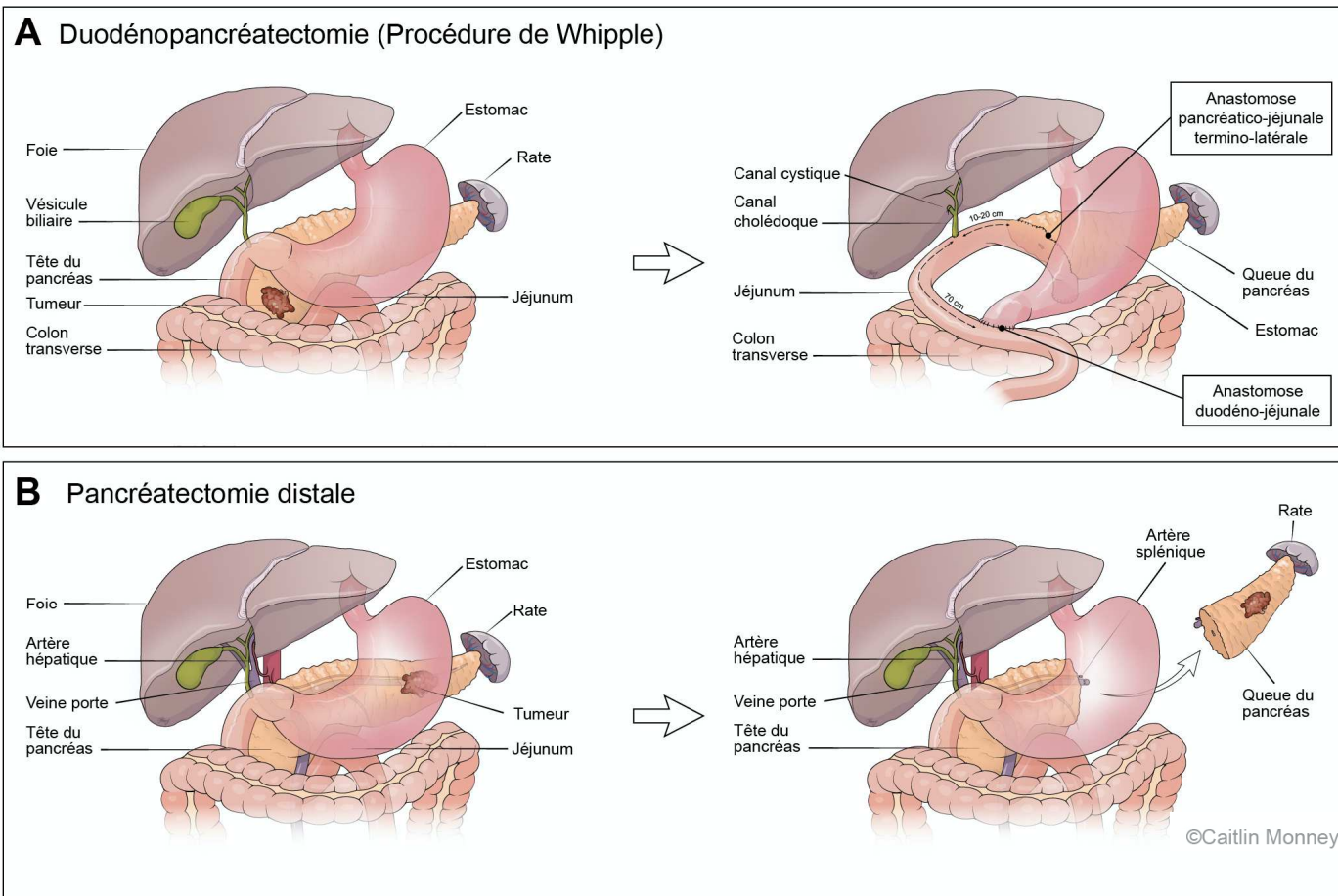
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Timothy J Puett, MD, FACS

3 years post-tx::

Islet Nb (IEQ/kg)	No function (%)	Partial function (%)	Insulin- independant (%)
< 2500	55	33	12
2500 - 5000	16	62	22
> 5000	4	24	72

Risque de développer un diabète après une pancréatectomie partielle

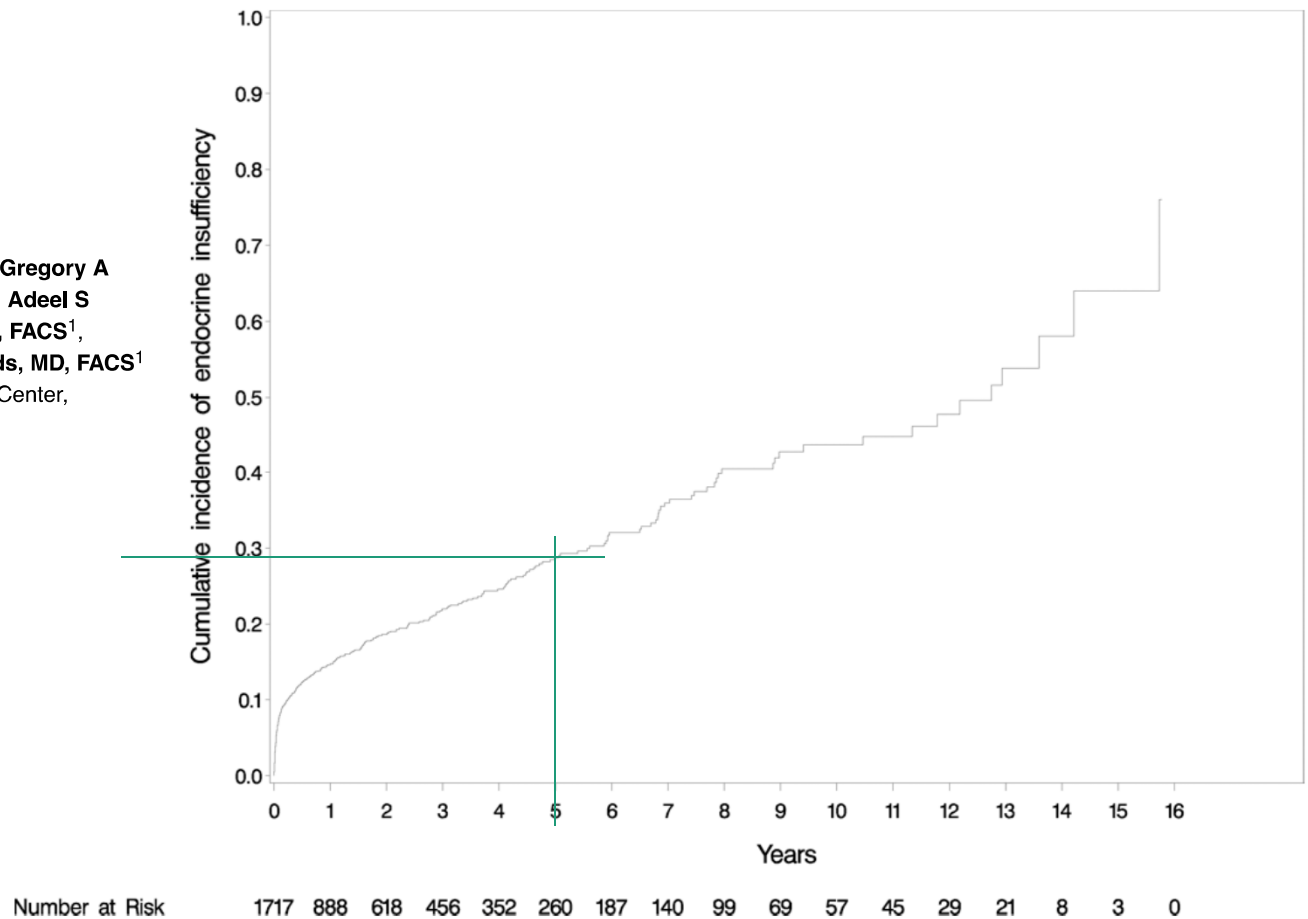


Risque de développer un diabète après une pancréatectomie partielle

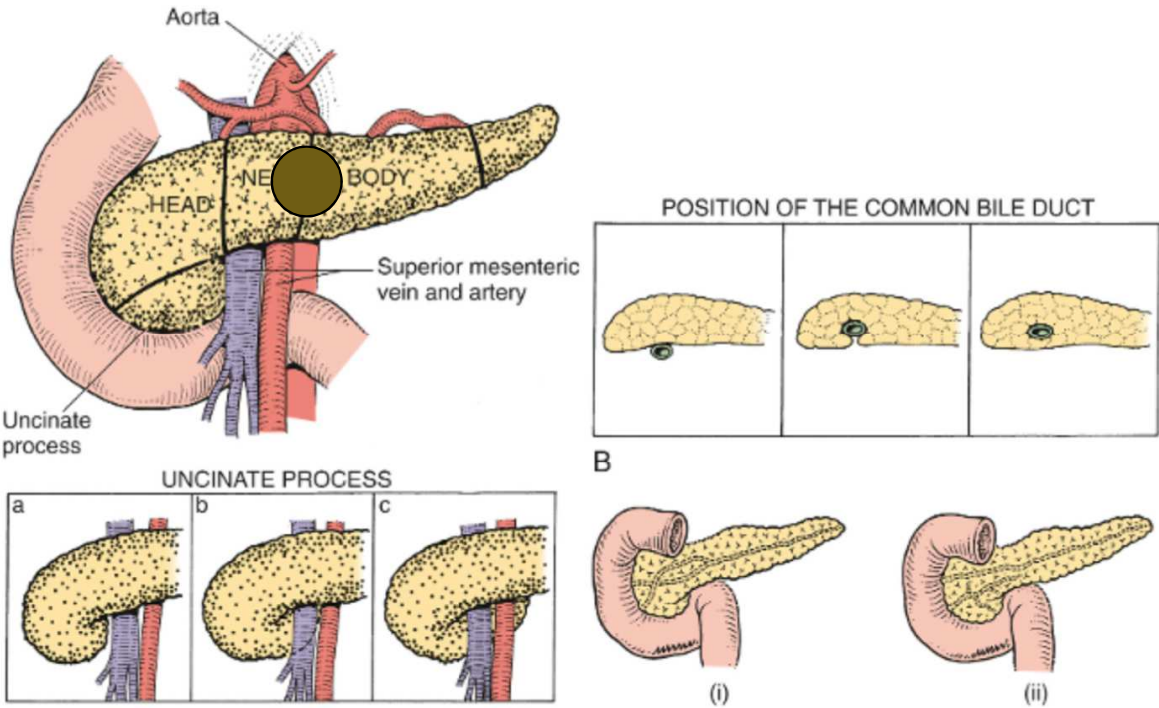
Long Term Endocrine and Exocrine Insufficiency after Pancreatectomy

Jiro Kusakabe, MD^{#1}, Blaire Anderson, MD, FRCSC^{#1}, Jingxia Liu, MS, PhD¹, Gregory A Williams, MA¹, William C Chapman, MD, FACS¹, Majella MB Doyle, MD, MBA¹, Adeel S Khan, MD, MPH¹, Dominic E Sanford, MD, MPHS¹, Chet W Hammill, MD, MCR, FACS¹, Steven M Strasberg, MD, FACS¹, William G Hawkins, MD, FACS¹, Ryan C Fields, MD, FACS¹

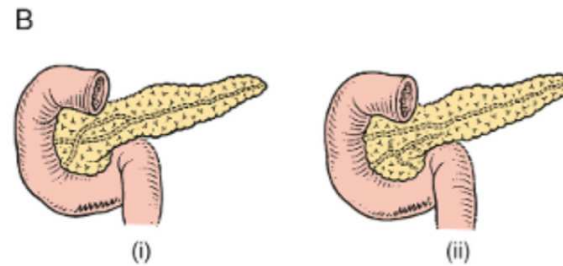
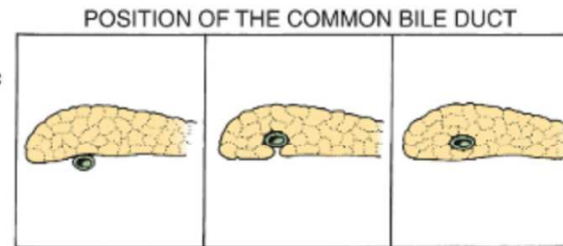
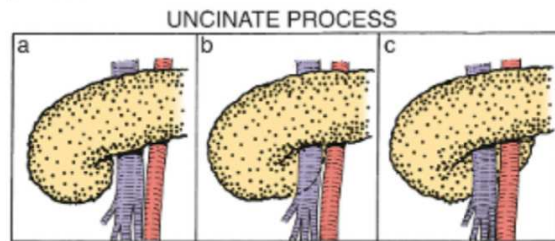
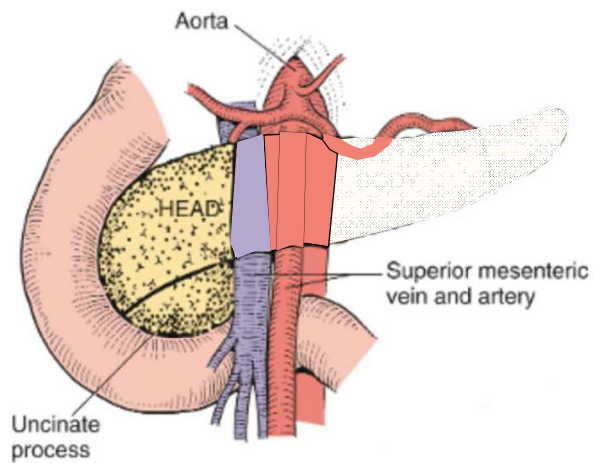
¹Department of Surgery, Barnes-Jewish Hospital and the Alvin J. Siteman Cancer Center, Washington University School of Medicine, St Louis, MO



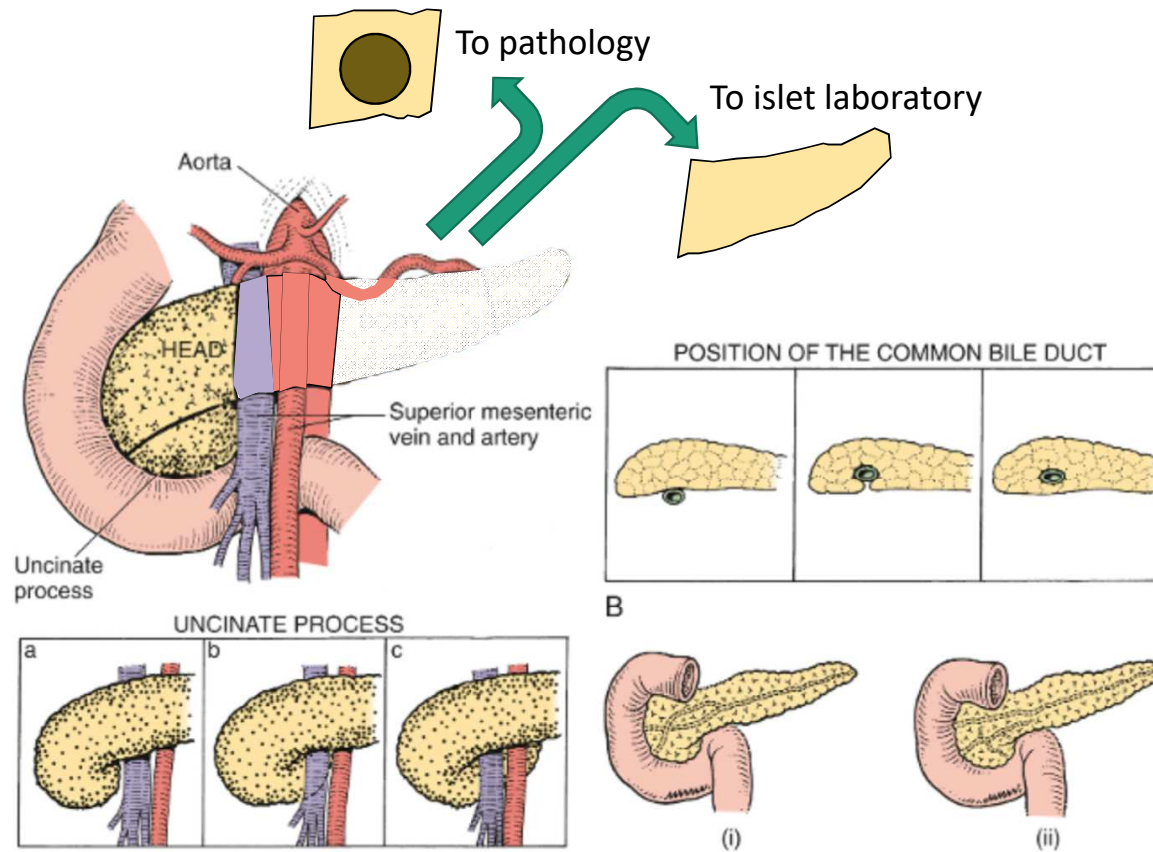
La 1ère cause de pancréatectomie partielle: les tumeurs



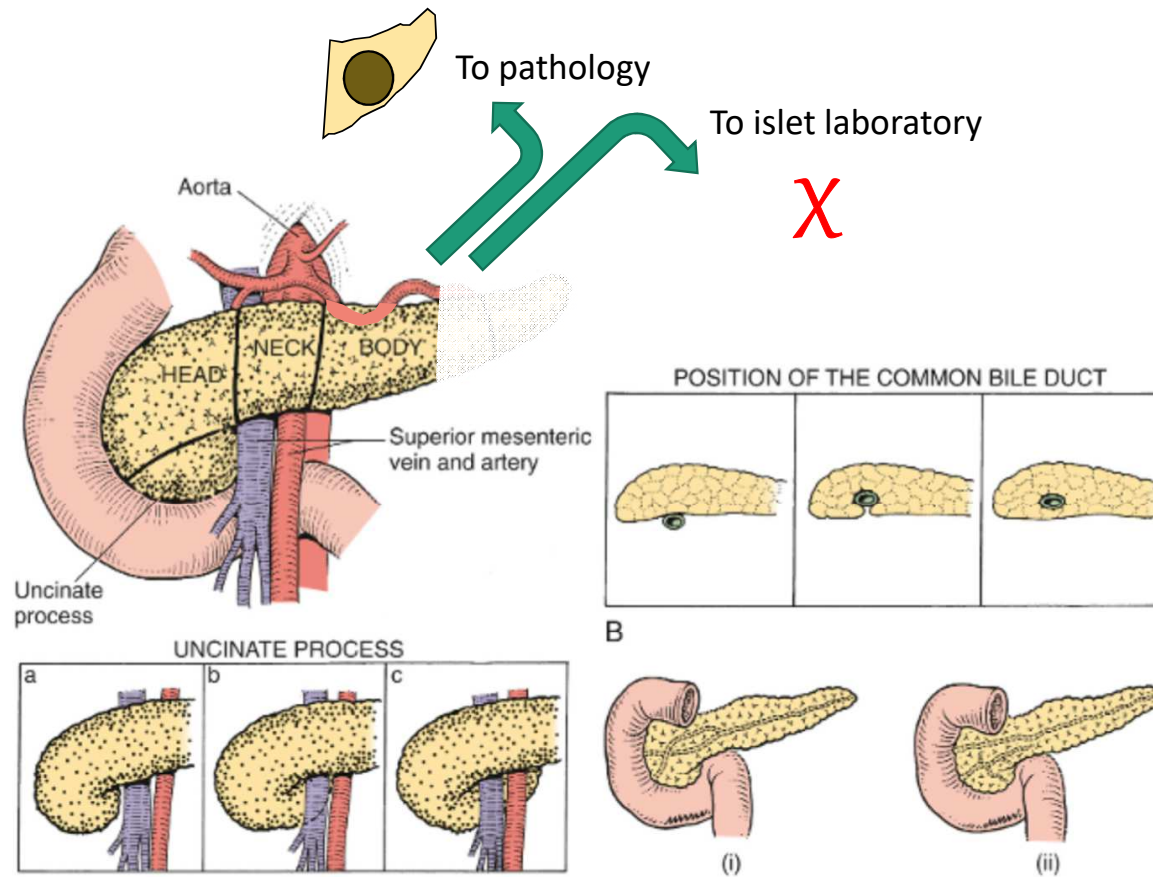
Et pour les tumeurs... de la queue?



Et pour les tumeurs... de la queue?



Et pour les tumeurs... de la queue?



Et pour les tumeurs... de la queue?

Islet Autotransplantation After Extended Pancreatectomy for Focal Benign Disease of the Pancreas

Frédéric Ris,¹ Nadja Niclauss,¹ Philippe Morel,¹ Sandrine Demuylder-Mischler,¹ Yannick Muller,¹ Raphael Meier,¹ Muriel Genevay,² Domenico Bosco,¹ and Thierry Berney^{1,3}

Transplantation • Volume 91, Number 8, April 27, 2011

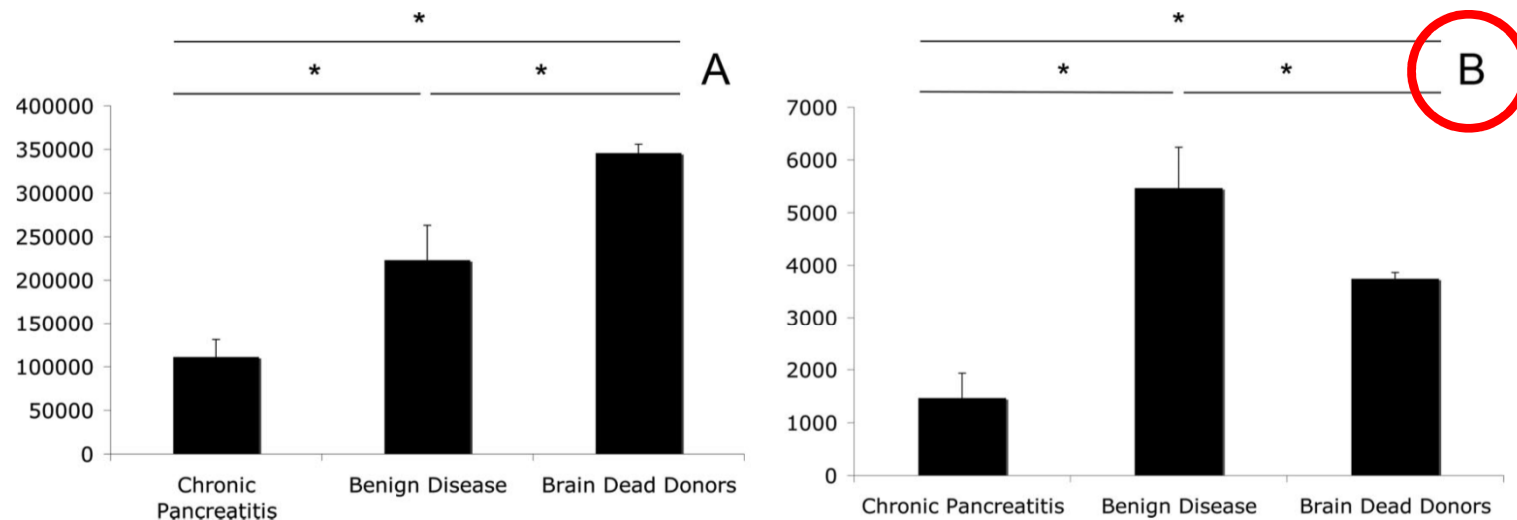



FIGURE 1. Islet yields after isolation from pancreata obtained from patients with chronic pancreatitis (n=10), benign disease (study group; n=15), and donors with brain death (DBD; n=280). (A) Islet yields expressed in total islet equivalents (IEQ). (B) Islet yields expressed in IEQ per gram of pancreas. Values are expressed as mean \pm standard error of the mean, * P less than 0.05.

Et pour les tumeurs... de la queue?

Diabetes-free survival after extended distal pancreatectomy and islet auto transplantation for benign or borderline/malignant lesions of the pancreas

Gianpaolo Balzano¹ | Paola Maffi² | Rita Nano² | Alessia Mercalli² | Raffaella Melzi² |
 Francesca Aleotti¹ | Francesco De Cobelli³ | Paola Magistretti² | Marina Scavini² |
 Antonio Secchi^{4,5} | Massimo Falconi^{1,5} | Lorenzo Piemonti^{2,5} 

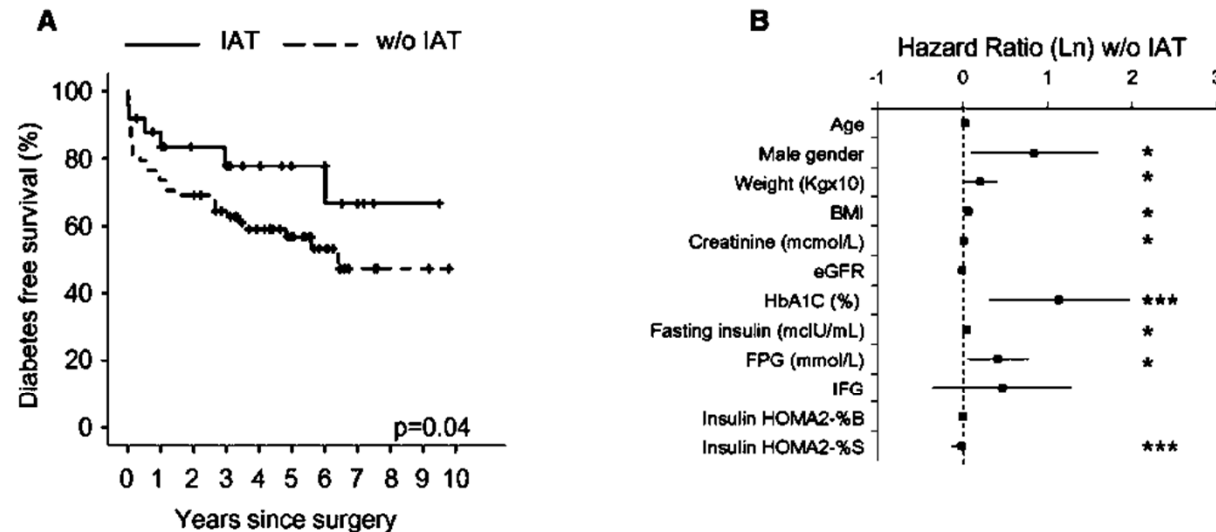
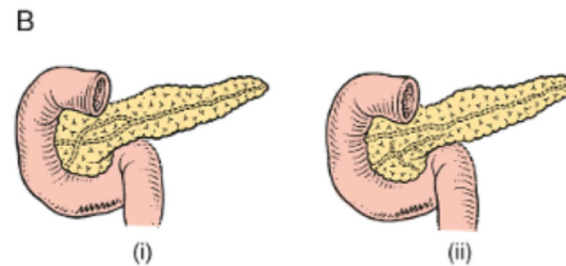
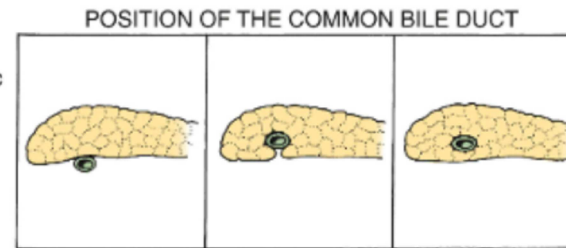
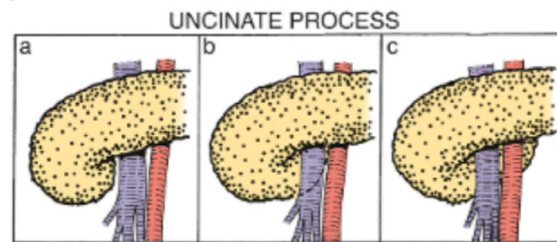
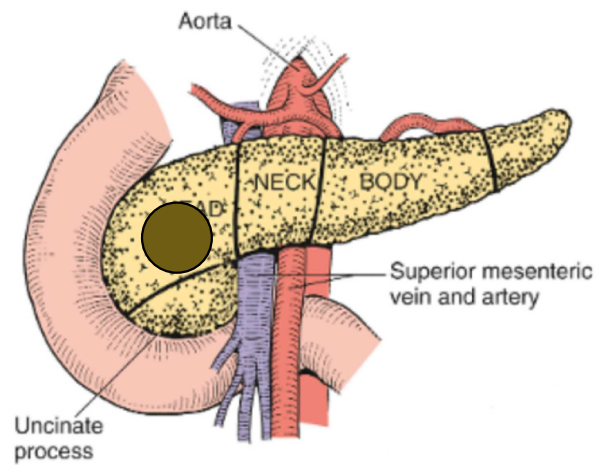
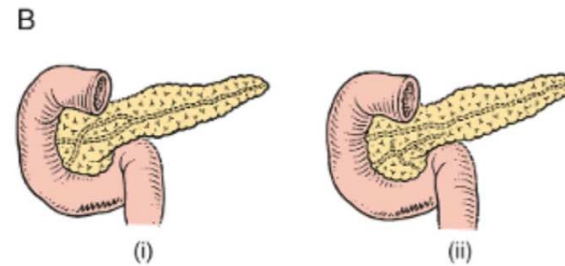
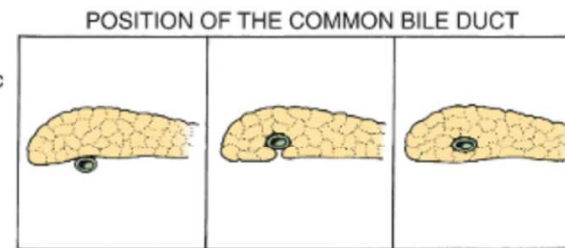
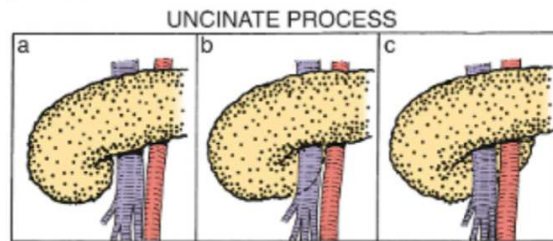
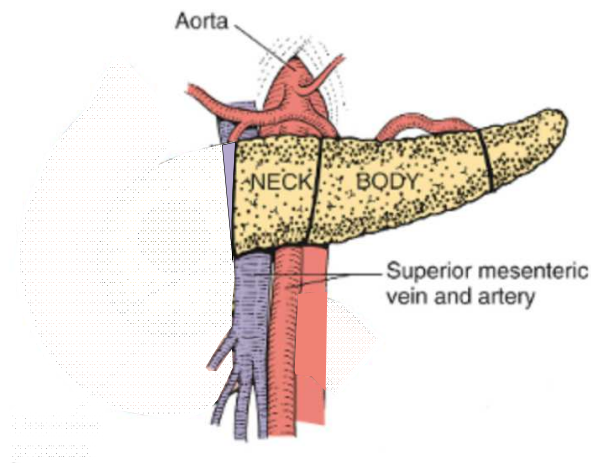


FIGURE 4 Metabolic follow-up. A, Probability of diabetes-free survival after extended distal pancreatectomy combined or not with islet autotransplant, according to Kaplan-Meier. IAT, islet autotransplant. B, Univariate hazard ratios for the development of diabetes. The associations between patient characteristics and diabetes were assessed using Cox regression. All presurgery variables analyzed are presented. Dots represent the hazard ratio after *natural log transformation*; lines limit the 95% confidence intervals. * $P < .05$. FPG, fasting plasma glucose; IFG, impaired fasting glucose; IEQ, islet equivalent; HOMA, homeostasis model assessment; GFR, glomerular filtration rate [Color figure can be viewed at wileyonlinelibrary.com]

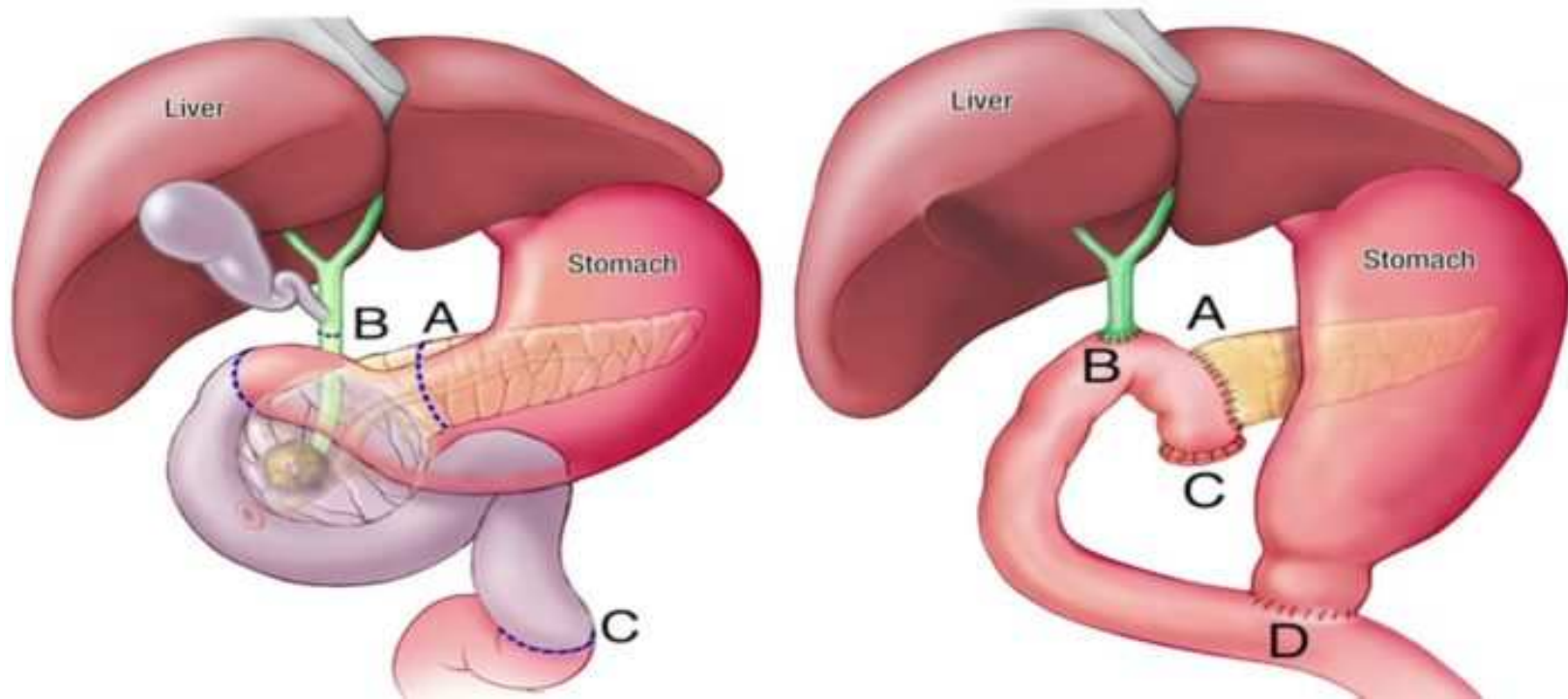
Et pour les tumeurs... de la tête?



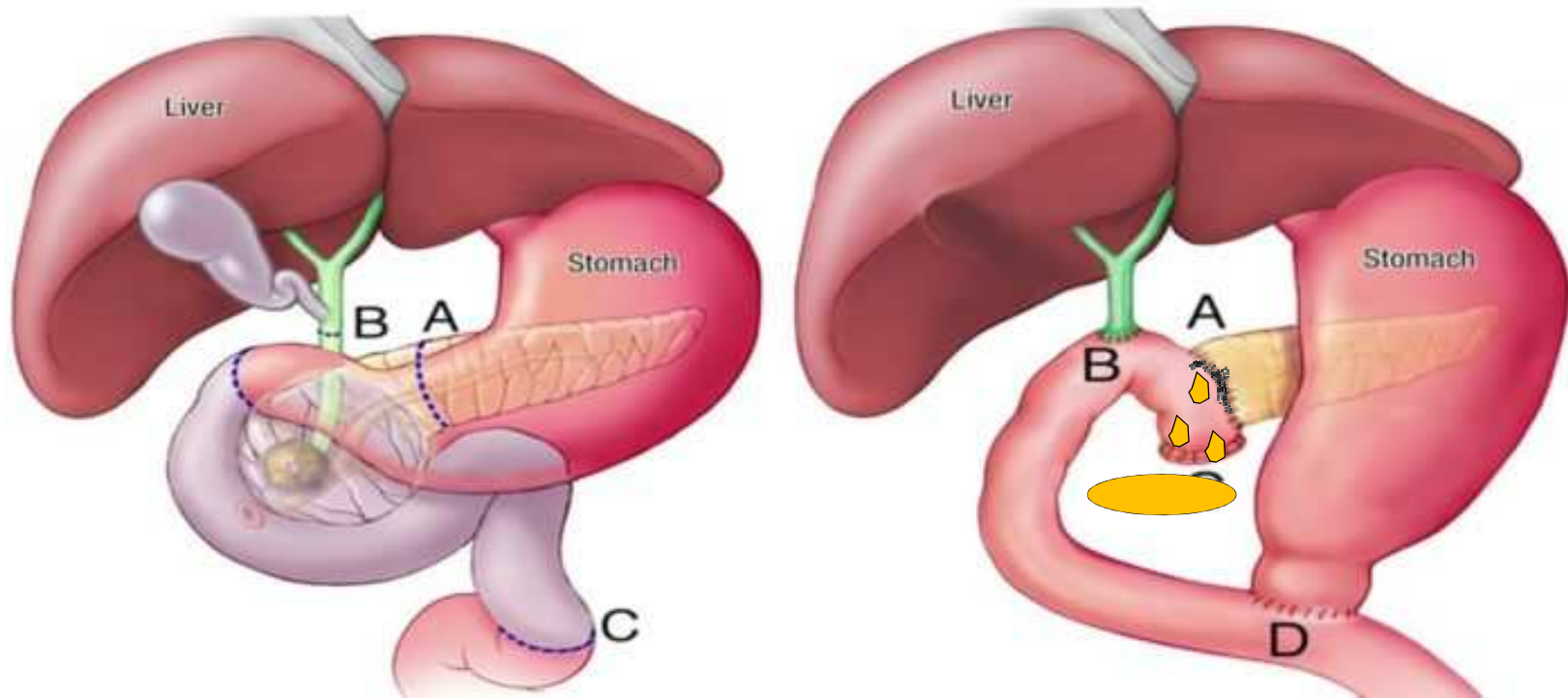
Et pour les tumeurs... de la tête?



Le problème: la suture du pancréas...



... et les fistules pancréatiques



... et les fistules pancréatiques

Table I. Characteristics of patients according to PF

Characteristics	Overall (n = 100)	Group PF- (n = 69)	Group PF+ (n = 31)	P value
Sex (male/female)	62/38	58/31	24/7	.03
Age (years)	58 (16–82)	56 (19–78)	61 (16–82)	.05
BMI (kg/m ²)	24 (16–42)	23 (16–36)	28 (20–42)	<.0001
Comorbidity				
Diabetes mellitus	7 (7%)	4 (6%)	3 (10%)	.49
HBP	10 (10%)	4 (6%)	6 (19%)	.05
Coronary artery disease	8 (8%)	5 (7%)	3 (10%)	.68
Indication				
Ductal adenocarcinoma	33 (33%)	25 (36%)	8 (26%)	.30
IPMN	18 (18%)	16 (23%)	2 (6%)	.03
Ampullary carcinoma	15 (15%)	7 (10%)	8 (26%)	.05
Endocrine tumor	12 (12%)	6 (9%)	6 (19%)	.14
Bile duct carcinoma	11 (11%)	6 (8%)	5 (17%)	.29
Chronic pancreatitis	6 (6%)	5 (7%)	1 (3%)	.41
Other indications*	5 (5%)	4 (6%)	1 (3%)	.57
Benign neoplasms	24 (24%)	19 (28%)	5 (16%)	.20
Intra-operative data				
Operative time (min)	450 (290–720)	420 (290–720)	470 (360–610)	.04
Blood loss (mL)	500 (100–2,800)	500 (100–2,800)	600 (200–1,200)	.01
Transfusion (units red cells)	0 (0–6)	0 (0–6)	0 (0–4)	.41

*Cholangitis (n = 1), cystadenoma (n = 1), pancreatic metastasis (n = 1), and solid and pseudopapillary tumor (n = 1).

Fatty pancreas and increased body mass index are risk factors of pancreatic fistula after pancreaticoduodenectomy

Sébastien Gaujoux, MD,^a Alexandre Cortes, MD,^a Anne Couvelard, MD, PhD,^b Séverine Noullet, MD,^a Laurent Clavel, MSc,^d Vinciane Rebours, MD,^c Philippe Lévy, MD,^c Alain Sauvanet, MD,^a Philippe Ruszniewski, MD,^c and Jacques Belghiti, MD,^a Paris and Clichy, France

... et les fistules pancréatiques

ORIGINAL ARTICLE

Alternative Fistula Risk Score for Pancreatoduodenectomy (a-FRS)

Design and International External Validation

Timothy H. Mungroop, MD,* L. Bengt van Rijssen, MD,* David van Klaveren, PhD,† F. Jasmijn Smits, MD,‡
 Victor van Woerden, MD,§ Ralph J. Linnemann, MD,¶ Matteo de Pastena, MD,|| Sjors Klompmaker, MD,*
 Giovanni Marchegiani, MD,|| Brett L. Ecker, MD,** Susan van Dieren, PhD,* Bert Bonsing, MD,**
 Olivier R. Busch, MD,* Ronald M. van Dam, MD,§ Joris Erdmann, MD,†† Casper H. van Eijck, MD,‡‡
 Michael F. Gerhards, MD,§§ Harry van Goor, MD,¶¶ Erwin van der Harst, MD,||||
 Ignace H. de Hingh, MD,*** Koert P. de Jong, MD,††† Geert Kazemier, MD,‡‡‡ Misha Luyer, MD,***
 Awad Shamali, MD,§§§ Salvatore Barbaro, MD,§§§ Thomas Armstrong, MD,§§§ Arjun Takhar, MD,§§§
 Zaed Hamady, MD,§§§ Joost Klaase, MD,¶¶¶ Daan J. Lips, MD,||||| I. Quintus Molenaar, MD,‡
 Vincent B. Nieuwenhuijs, MD,¶ Coen Rupert, MD,**** Hjalmar C. van Santvoort, MD,††††
 Joris J. Scheepers, MD,‡‡‡‡ George P. van der Schelling, MD,§§§§ Claudio Bassi, MD,||
 Charles M. Vollmer, MD,** Ewout W. Steyerberg, PhD,‡‡ Mohammed Abu Hilal, MD,§§§
 Bas Groot Koerkamp, MD,‡‡ and Marc G. Besselink, MD, MSc, PhD*,
 for the Dutch Pancreatic Cancer Group

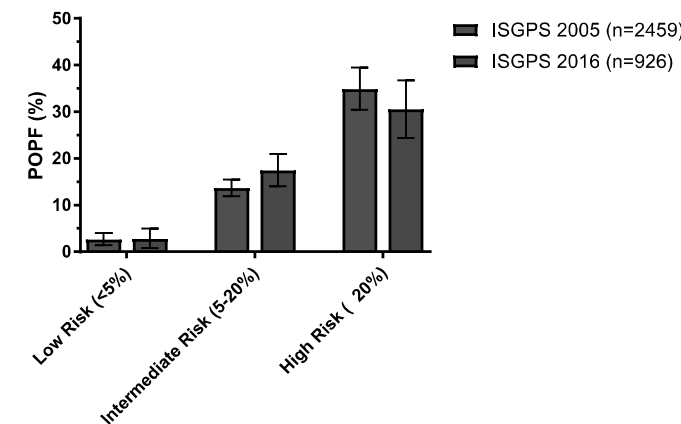
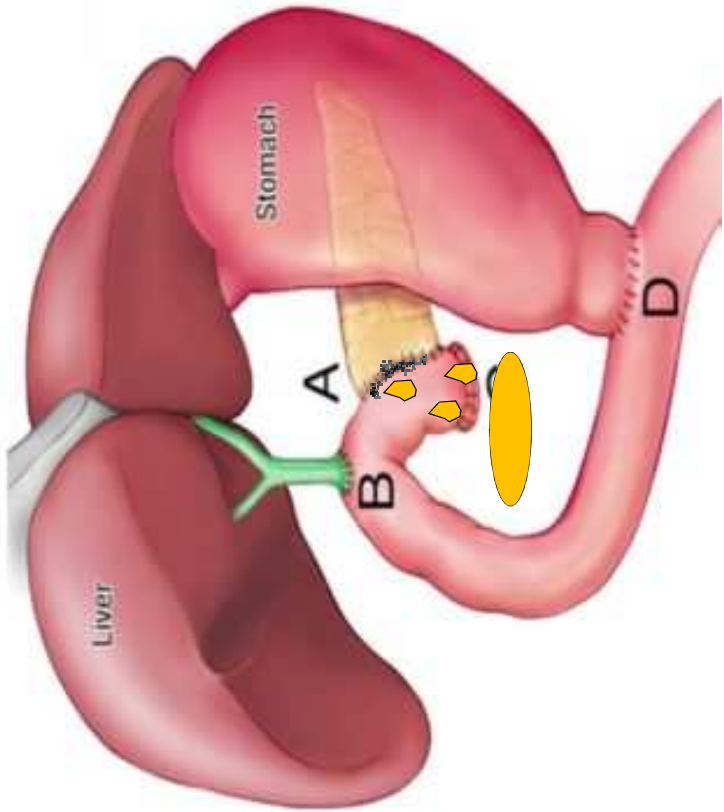
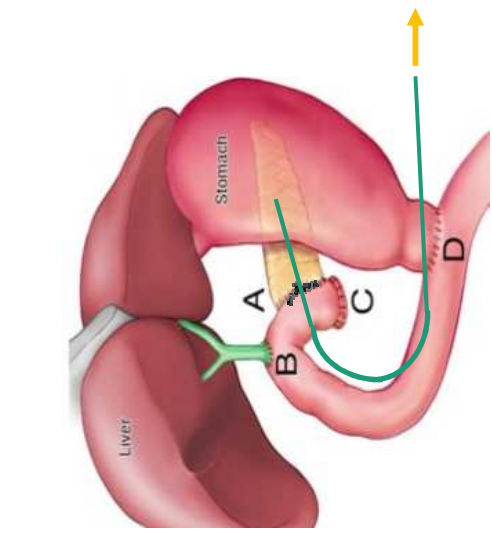
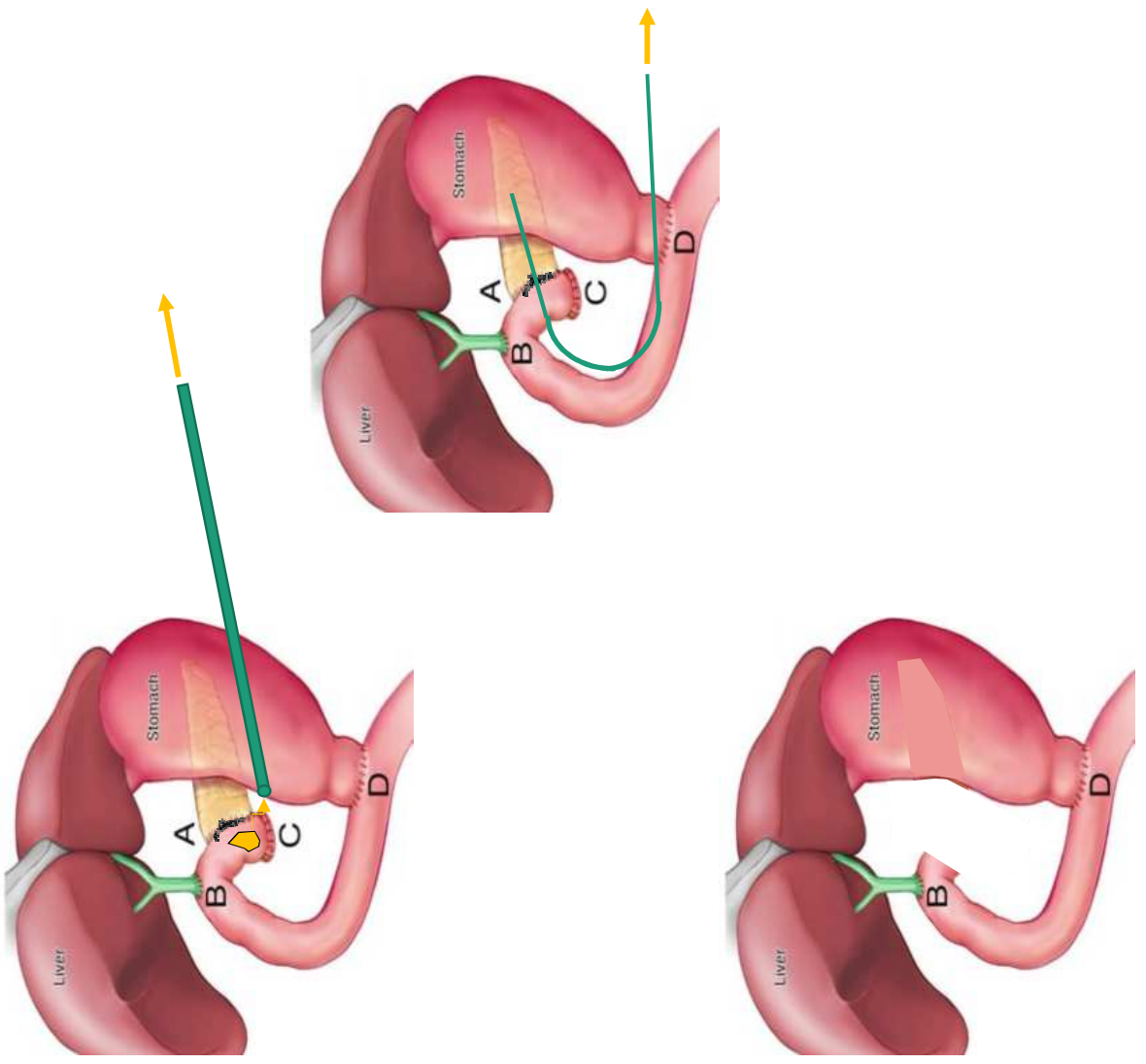


FIGURE 3. Risk groups of the a-FRS.

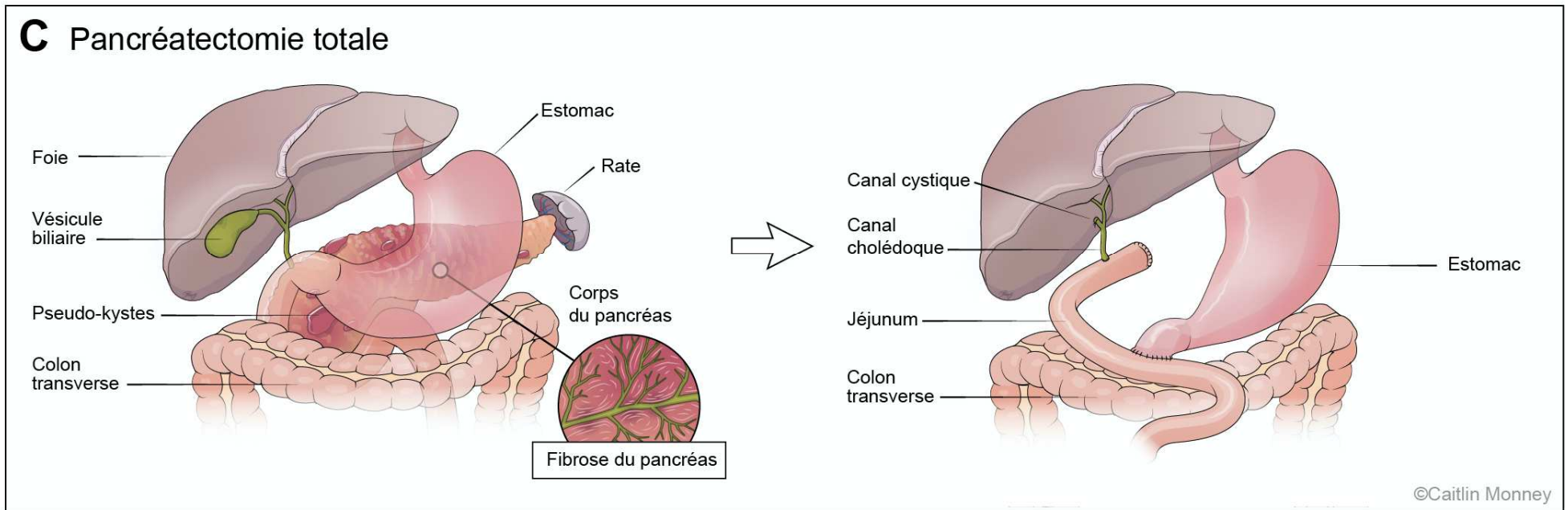
TABLE 2. Model Design

	Full Model			Selected Model		
	Odds Ratio	95% CI	P	Odds Ratio	95% CI	P
Area under curve (AUC)	AUC 0.75	0.71–0.78		AUC 0.75	0.71–0.78	
Male	1.46	1.08–2.00	0.015	—	—	—
Age, yrs	0.99	0.98–1.01	0.485	—	—	—
Soft pancreatic texture	2.29	1.59–3.29	<0.001	2.58	1.80–3.69	<0.001
Duct size, per mm increase	0.69	0.57–0.83	<0.001	0.68	0.61–0.76	<0.001
ASA Class	—	—	—	—	—	—
1	Reference	—	—	—	—	—
2	0.69	0.45–1.07	0.125	—	—	—
3/4	1.17	0.71–1.94	0.652	—	—	—
BMI, kg/m ²	1.07	1.03–1.11	<0.001	1.07	1.04–1.11	<0.001
Diabetes Mellitus	0.94	0.64–1.38	0.957	—	—	—
Tumor location (Pancreatic vs other)	0.64	0.46–0.89	0.009	—	—	—

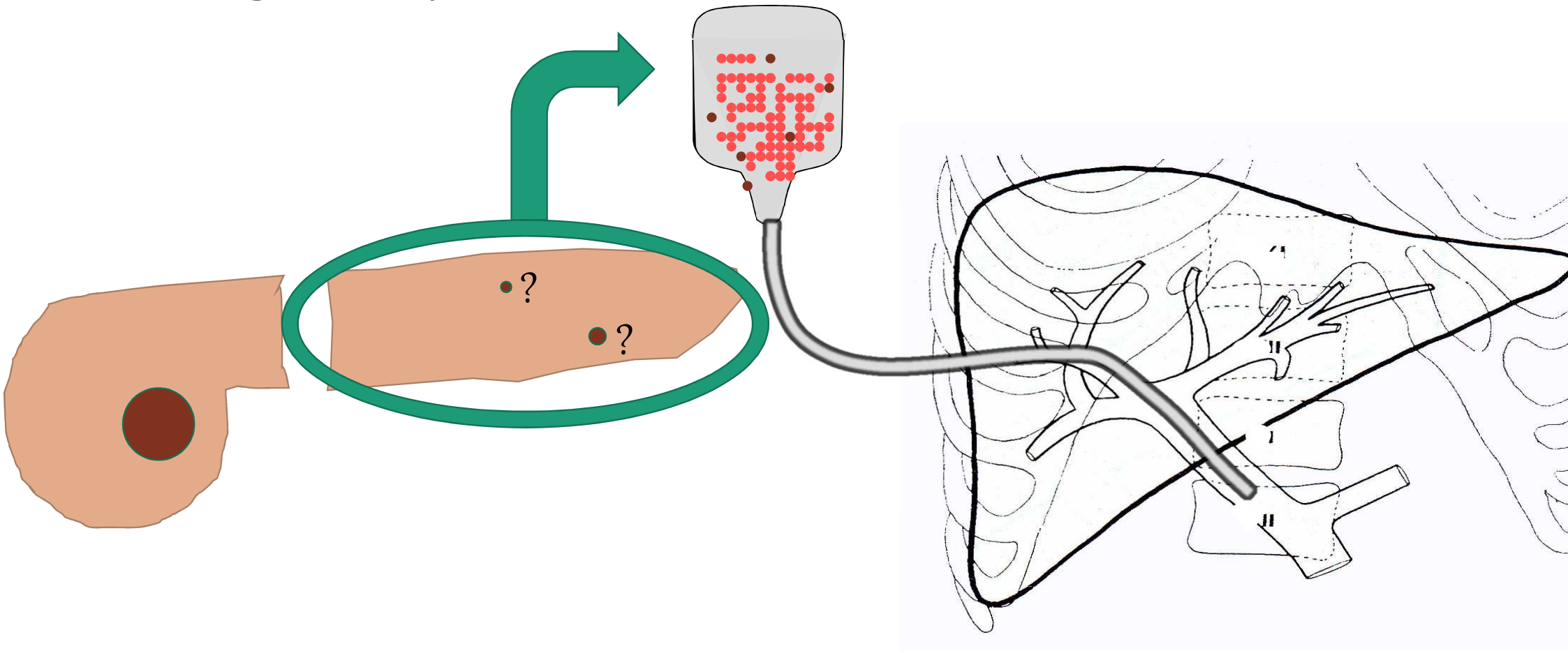
ASA indicates American Society of Anesthesiologists; BMI, body mass index; CI, confidence interval.



Why not a total pancreatectomy?



Pourquoi pas une pancréatectomie totale et auto-greffe pour cancer?



Pancréatectomie totale et auto-greffe: l'expérience internationale

Pancreatic Islet Autotransplantation After Completion Pancreatectomy for Pancreatic Fistula After Hemipancreatoduodenectomy for Carcinoma

M. Kocik^{a,*}, K. Lipar^a, F. Saudek^b, P. Girman^b, P. Boucek^b, M. Kucera^a, J. Froněk^a, and M. Oliverius^a

^aTransplant Surgery Department and ^bDepartment of Diabetes, Institute for Clinical and Experimental Medicine, Prague, Czech Republic

Transplantation Proceedings, 46, 1996–1998 (2014)

5 cases: 75% recurrence but not earlier than expected

Pancréatectomie totale et auto-greffe: l'expérience internationale

Pancreatic Islet Autotransplantation After Completion Pancreatectomy for Pancreatic Fistula After Hemipancreat

M. Kocik^{a,*}, K. Lipar^a

^aTransplant Surgery Depar

Transplantation Proceeding

5 cases: 75% recurrence but not

doi: 10.1111/ajt.13851

Case Report

Metastatic Pancreatic Adenocarcinoma After Total Pancreatectomy Islet Autotransplantation for Chronic Pancreatitis

**S. Muratore^{1,*}, X. Zeng¹, M. Korc², S. McElyea²,
J. Wilhelm¹, M. Bellin³ and G. Beilman¹**

American Journal of Transplantation 2016; 16: 2747–2752

1 case of pancreatic ductal adenocarcinoma
developing in the liver of a patient after TPIAT
for presumed benign chronic pancreatitis.

Pancréatectomie totale et auto-greffe: l'expérience internationale

Pancreatic Islet Autotransplantation Pancreatectomy for Pancreatic Hemipancreatic

M. Kocik^{a,*}, K. Lipari^a

^aTransplant Surgery Department

Transplantation Proceedings

Case Report

Metastatic Pancreatic Pancreatic

S. Muratore^{1,*}, X
J. Wilhelm¹, M. I

American Journal of

Pancreatic Islet Autotransplantation With Completion Pancreatectomy in the Management of Uncontrolled Pancreatic Fistula After Whipple Resection for Ampullary Adenocarcinoma

Faisal Alsaif, MBBS*
Michele Molinari, MD*
Abdulmuttalib Al-Masloom, MBBS*
Jonathan R.T. Lakey, PhD*†
Tatsuya Kin, MD, PhD*†
A. M. James Shapiro, MD, PhD,
FRCS (Eng), FRCS*
*Department of Surgery
University of Alberta Hospital
†Clinical Islet Transplant Program
University of Alberta
Edmonton, Alberta, Canada
shapiro@islet.ca

Pancreas • Volume 32, Number 4, May 2006

A year later, the patient remains insulin-free
with no evidence of tumor recurrence.

cinoma
ter TPIAT
atitis.

Pancréatectomie totale et auto-greffe: l'expérience internationale

Pancreatic Islet Autotransplantation Pancreatectomy for Pancreatic Hemipancreat

M. Kocik^{a,*}, K. Lipari^a

^aTransplant Surgery Depart

Transplantation Proceedings

Case Report

Metastatic Pancreatic Pancreatic

S. Muratore^{1,*}, X
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American Journal of

Pancreatic Islet Autotransplantation With Completion Pancreatectomy in the Management of Uncontrolled

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University of Alberta
Edmonton, Alberta, Canada

Autologous Islet Transplantation After Total Pancreatectomy for Renal Cell Carcinoma Metastases

B. L. Gala-Lopez^{1,2}, E. Semlacher³,
N. Manouchehri², T. Kin¹
and A. M. J. Shapiro^{1,2,*}

American Journal of Transplantation 2013; 13: 2487–2491

Insulin-independance and excellent glycemic control for 1 year of follow-up, and there is no evidence of tumor recurrence.

Pancréatectomie totale et auto-greffe: l'expérience internationale

Total Pancreatectomy and Islet Auto-Transplantation as Treatment for Ampullary Adenocarcinoma in the Setting of Pancreatic Ductal Disruption Secondary to Acute Necrotizing Pancreatitis. A Case Report

Uroghupatei P Iyegha, Javariah I Asghar, Gregory J Beilman

Department of Surgery, University of Minnesota. Minneapolis, MN, USA

3-months follow-up: no signs of recurrence

J. Wilhelm¹, M. I.

American Journal of

After Total Pancreatectomy for Renal Cell Carcinoma Metastases

**B. L. Gala-Lopez^{1,2}, E. Semlacher³,
N. Manouchehri², T. Kin¹
and A. M. J. Shapiro^{1,2,*}**

American Journal of Transplantation 2013; 13: 2487–2491

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^aTrans

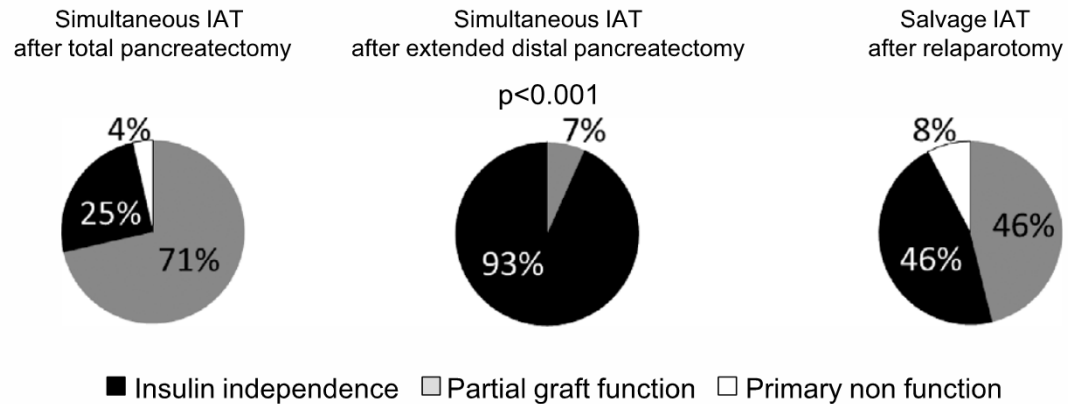
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Pancréatectomie totale et auto-greffe: Quel est le risque?

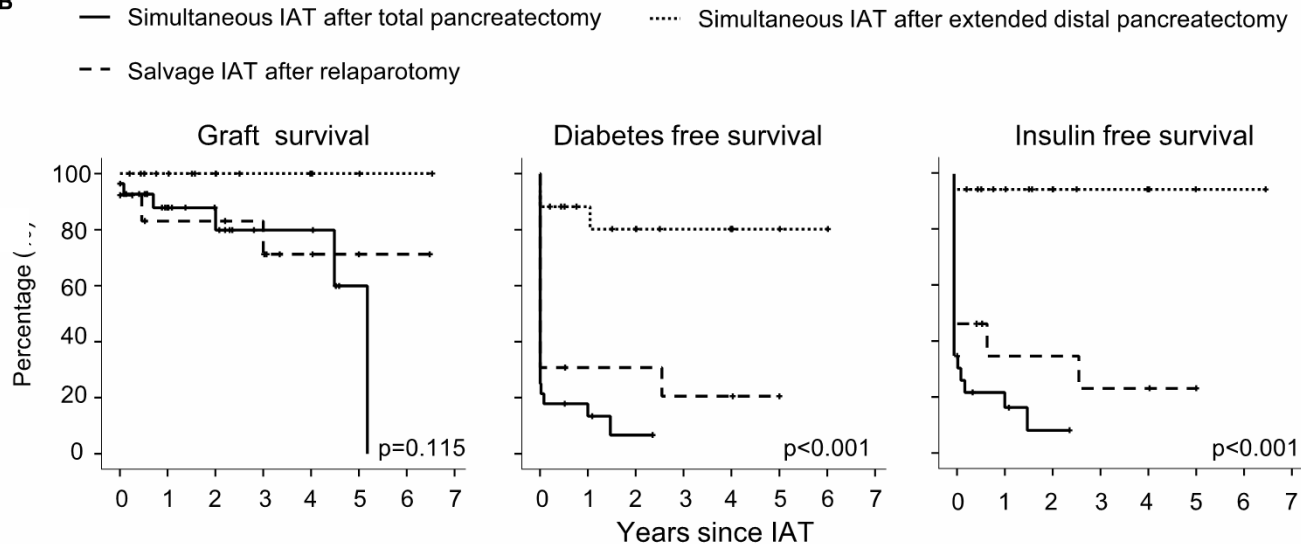
Autologous Islet Transplantation in Patients Requiring Pancreatectomy: A Broader Spectrum of Indications Beyond Chronic Pancreatitis

G. Balzano¹, P. Maffi², R. Nano², A. Mercalli², R. Melzi², F. Aleotti¹, A. Zerbi³, F. De Cobelli⁴, F. Gavazzi³, P. Magistretti², M. Scavini², J. Peccatori⁵, A. Secchi^{6,7}, F. Ciceri⁵, A. Del Maschio^{4,7}, M. Falconi^{1,7} and L. Piemonti^{2,*}

A



B

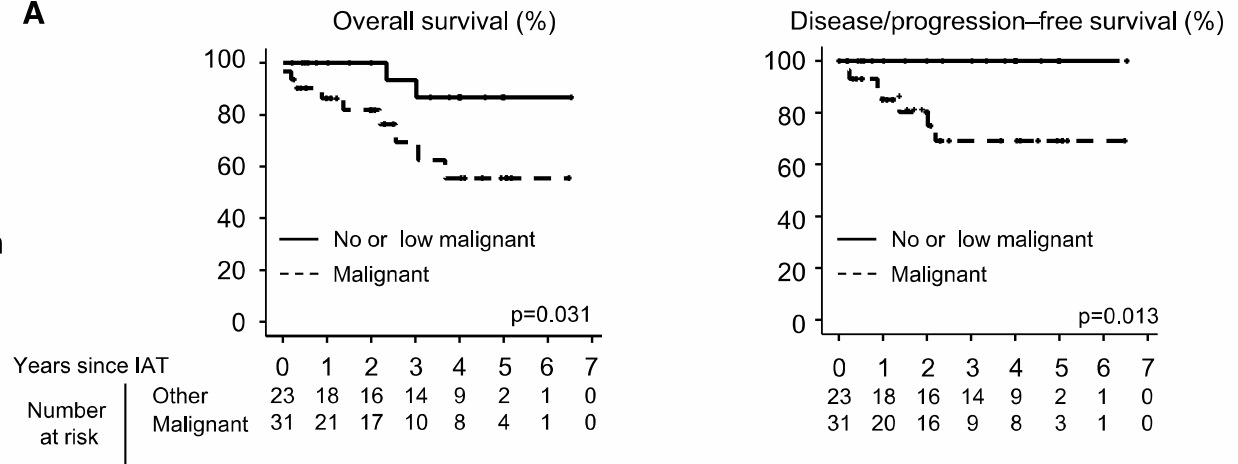


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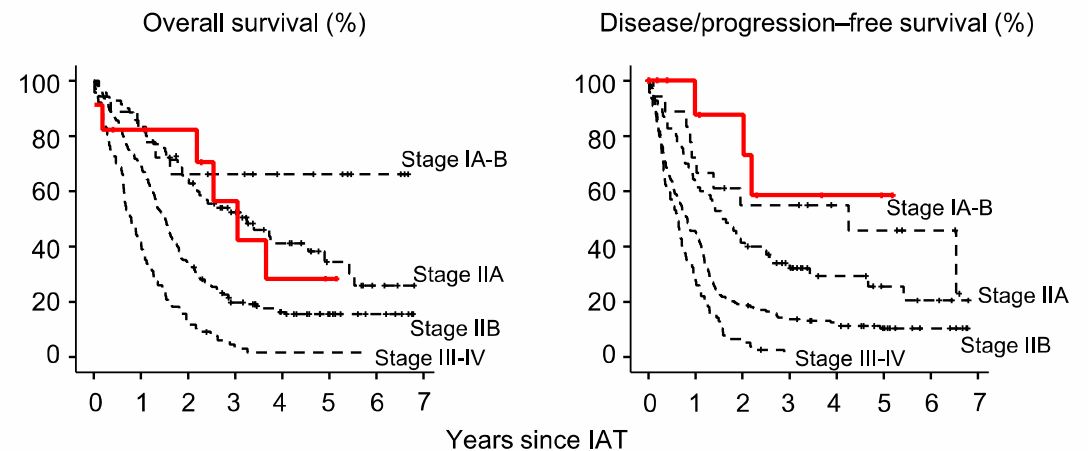
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Conclusions

- Quand se poser la question d'une auto-greffe d'îlots?
 - TOUT LE TEMPS!
- Pour qui?
 - Pancréatectomie totale = avis systématique
 - Toute pancréatectomie caudale +/- élargie
 - Resection de la tête si risque important de fuite
- A qui demander?
 - Centre hepato-pancreato-biliaire

Merci pour votre attention

