Central Manchester University Hospitals NHS
NHS Foundation Trust

Dietetic Management in Pancreatic Cancer – an introduction

Pancreatic Enzyme Replacement Therapy
Enteral Nutrition
Diabetes

Marie Labaquere
Senior Specialist HPB Dietitian
Supplementary prescriber

mft.hpbdietitians@nhs.net

Introduction to Dietetic Management in PC

Learning objectives:

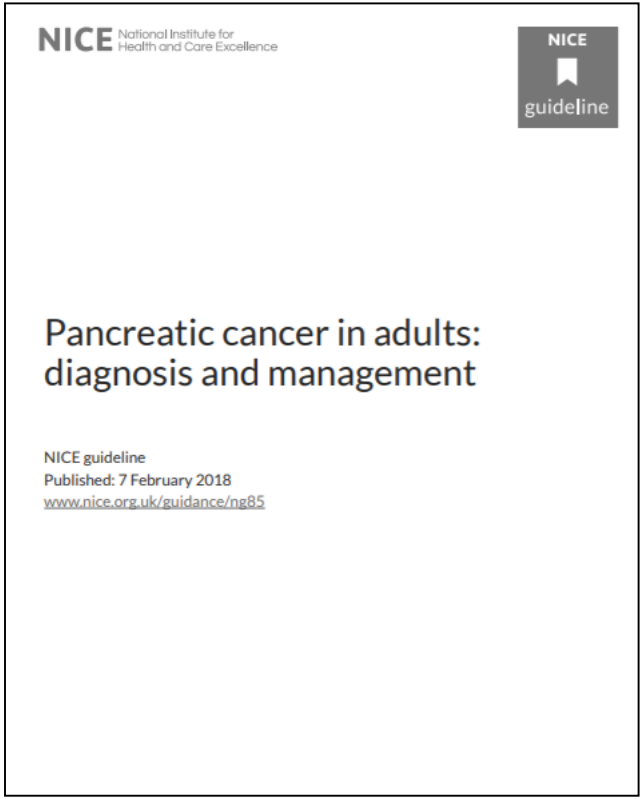
- ✓ Understand the basic principles of PERT, enteral nutrition (EN) and Diabetes management in PC
- ✓ Appreciate the complexity of managing nutrition support, PERT, Diabetes in pancreatic cancer

Evidence ?

- poor and low quality/ not much certainty

NICE- Pancreatic cancer in adults

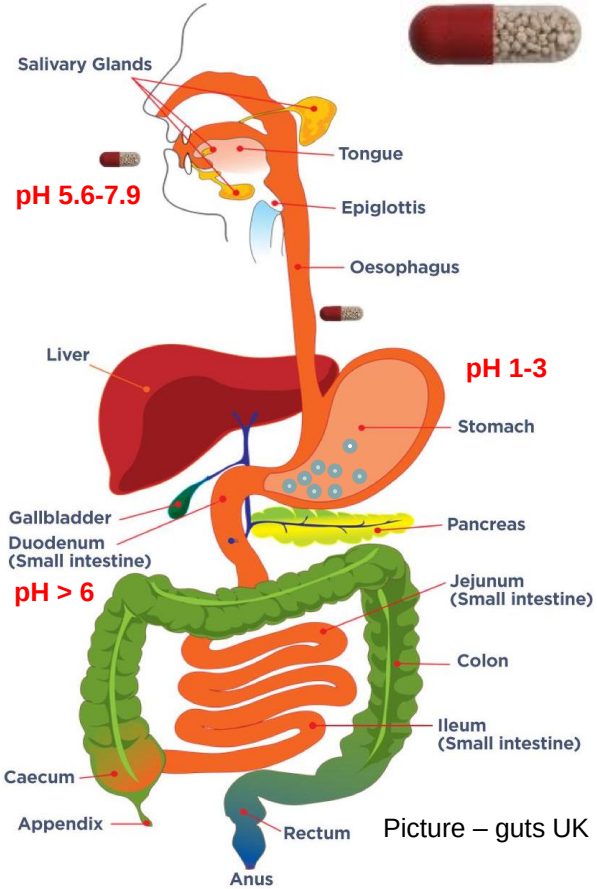
- PERT Improves nutritional status
- Enteric-coated pancreatin (most studies)
- Patients with resectable and unresectable pancreatic cancer probably benefit from PERT
- EN linked to less post op complications than PN
- Fish oils should not be used to manage weight loss



PERT (Pancreatic Enzyme Replacement Therapy)

- Mimic normal physiology of pancreatic enzyme action
- PERT formulations contain lipase, amylase, elastase
  - digest fats, starches and proteins
  - absorbed into bloodstream

- **Multiple formulations available**
  - Enteric-coated capsules for adults: Creon 25000, Nutrizym 22, Pancrease HL
  - Gelatine capsule dissolves in the stomach – enteric coated mini-tablets/ mini-microspheres released
  - Mini-tablets' enteric coating disintegrates (at pH > 5.5 = in small bowel) to release enzymes



Picture – guts UK

Think PEI - https://www.thinkpei.com/en-gb/pei-and-associated-ta/pancreatic-cancer
NICE – BNF Pancreatin

PERT – Informed Consent

- **Licensed formulations in UK – all from porcine origin**
  - Allergies/ Intolerances
  - Religious beliefs
  - Vegetarianism/ veganism

- **For patients to give informed consent - Understand indications/ risks/ benefits PERT**
  - Explain indications
  - Timeframe
  - Pill burden (manage expectations)
  - Benefits – QOL, weight/ strength maintenance/ treatment outcome.

PERT dosage

- **NICE, 2018 – no guidance on dosage**
  - Creon - 25,000 unit lipase
  - Nutrizym 22 - 22,000 unit lipase
  - Pancrease HL - 25,000 unit lipase
- **Practice varies - Manchester Local guidelines PERT in cancer**
  - The pancreas typically produces 720,000 units of lipase for an average 300-600 Kcal meal
  - **Starting dose** =10% of the value required to maintain normal digestion.
    - 75,000 units with meals
    - 50,000 units with snacks
- **Avoid dietary/ fat restrictions – precipitate weight loss/ malnutrition**
  - Fortified diet recommended
  - Dose titration

https://pancreaticcanceraction.org/

Gastrointestinal symptom questionnaire

This questionnaire is designed to establish how severe your gastrointestinal symptoms are. This information allows us to advise you appropriately on your treatment

1. Please rate your symptoms during the last week by placing a tick in the box that best describes your symptoms

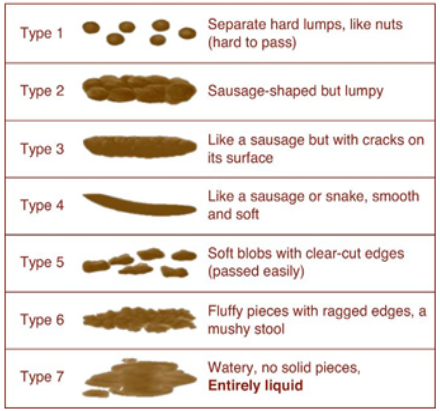
	Never	Occasional (once a week)	Frequent (2-3 times a week)	All the time (every day)
1.Abdominal pain after eating	☐	☐	☐	☐
2.Abdominal bloating/ distention	☐	☐	☐	☐
3.Increased flatulence/ wind	☐	☐	☐	☐
4.Belching or burping	☐	☐	☐	☐
5.Stomach/abdominal gurgling	☐	☐	☐	☐
6.Heartburn or acid reflux	☐	☐	☐	☐
7.Nausea	☐	☐	☐	☐
8.Vomiting	☐	☐	☐	☐
9.Urgency to open bowels	☐	☐	☐	☐
10.Incomplete evacuation	☐	☐	☐	☐
11.Greasy/oily/ Pale/floaty stools	☐	☐	☐	☐
12.Foul smelling stools	☐	☐	☐	☐
13. Tiredness/ lethargy	☐	☐	☐	☐

2. Currently how often do you open your bowels?

- Less than once a week ☐
- Once every 4-7 days ☐
- Once every 2-3 days ☐
- Once a day ☐
- 2-3 times a day ☐
- 4-6 times a day ☐
- 7 or more times a day ☐

3. Please pick the box(es) which best describe(s) your stool:

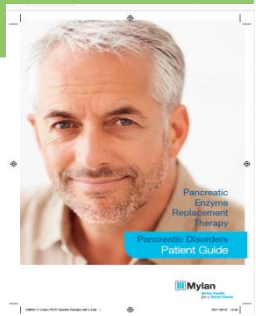
Bristol stool chart



☐
☐
☐
☐
☐
☐

4. How much do your bowel symptoms affect your quality of life?

PERT education



- **Verbal/ Written information/ Document dose/ contact details**
- **Practical aspects – individualised advice**
  - Baseline PERT education – dosage with meals, snacks, drinks, timing, booklet
  - Check understanding and expand - pathophysiology of PEI, spreading dose, storage <25^{o}C
  - Refer to Dietitian for dose titration depending on meal/ snack/ drink content and size and f'up
- **Be aware of barriers to uptake/ concordance**
  - Insight - Understanding pathophysiology of PEI
  - Ability to remember information provided, remember to administer
  - Emotional barriers at time of distress/ anxiety
  - Consider enlisting help of family and friends living in same household to offer support
  - Nurses ability to administer at meal times (outside drug rounds)
  - Patient's ability to adjust dose to oral intake – medicine self administration policy/ paperwork.

Not a one off! Most patients will require on-going education – refer to DT

Pancreatic Enzyme replacement Questionnaire

This questionnaire is designed to establish how much you understand about the pancreatic enzymes you have been prescribed. This information allows us to advise you appropriately on your treatment.

1. **What Pancreatic Enzyme Replacement are you currently taking?**
   - Name Creon
   - Strength 25000
   - Dose 1-4

/3

2. **How confident do you feel in relation to pancreatic enzyme replacement?**
   (0=not confident, 10= very confident)

0 1 2 3 4 5 6 7 8 9 10

/10

3. **What is your understanding of why you have been asked to take pancreatic enzymes?**
   -
   -
   -

/3

4. **Which of these would you normally take enzymes with? (highlight)**

Cake ☐	Milky coffee ☐	Fruit squash ☐
Glass milk ☐	Wine/beer ☐	Toast ☐
Small plain biscuit ☐	Sugary sweets ☐	Nutritional supplement (i.e Complan/ fortisip) ☐
Small portion fruit ☐		

/10

5. **How many pancreatic enzymes would you take with the following?**

Breakfast..... Lunch..... Evening meal..... Snacks.....

/4

6. **When would you take your pancreatic enzymes? (highlight)**

30 minutes before food ☐ At the start of food ☐

During food ☐ After food ☐

/4

7. **What symptoms have you been advised to keep an eye on?**
   -
   -
   -
   -
   -
   -
   -
   -

/8

8. **What would you do if you still had symptoms after taking pancreatic enzymes?**
   -
   -

/2

Total score: /44

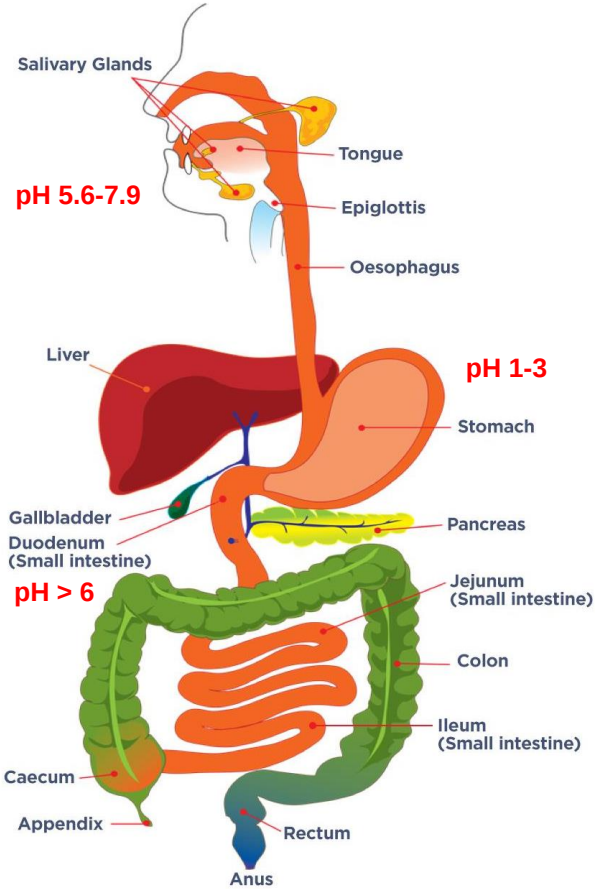
PERT Prescribing

- **Clear and documented diagnosis and indication for initiating PERT**
  - Medical team/ prescriber

- **Prescribable product**
  - check local formulary – specialist initiation listing – prescription initiated by a specialist independent or supplementary prescriber.
  - Consider appropriate dose, administration route, safety
  - Report side effects/ trial alternative(s)
  - Review dosage efficacy, titrate
  - Ongoing prescribing by GP - all relevant elements of treatment communicated

PERT troubleshooting

Swallowing difficulties	Caps open, spheres mix with acidic soft food Not to be chewed - risk mouth ulcers Acid denatures enzymes
Tolerance issues Diarrhoea, bloating, skin rash, etc.	Try alternative brand
Ongoing PEI symptoms	Try PPI - improves efficacy of PERT preserve pancreatic tissue/volume in post-surgical patients
Constipation Opiate induced	Not an adverse reaction ! Constipation can occur alongside and mask PEI malabsorption. Treat constipation and continue PERT
High CBGs	PERT improves absorption of carbohydrates/ glucose Routinely test HbA1c, CBGs Refer promptly to DM team

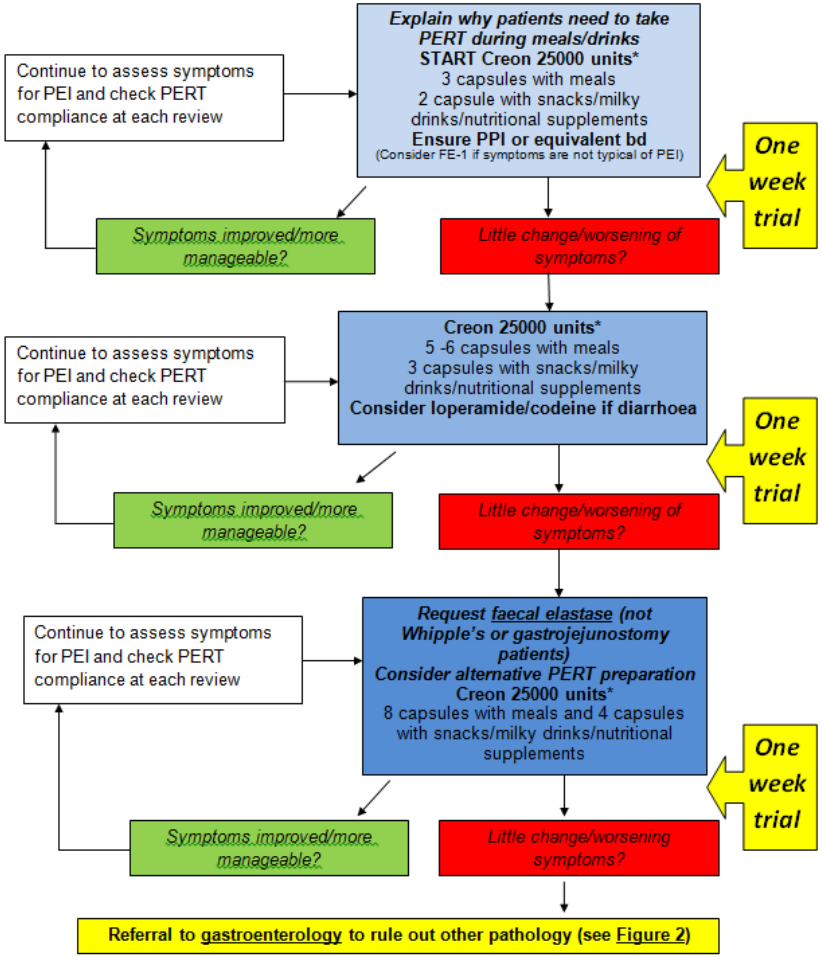


Manchester guidelines for prescribing PERT in cancer

Christie audit

Awaiting publication

Figure 1: As a guide, PERT should be started/adjusted as below:



Enteral Nutrition (EN) - indications

Malnutrition and cachexia - major cause of

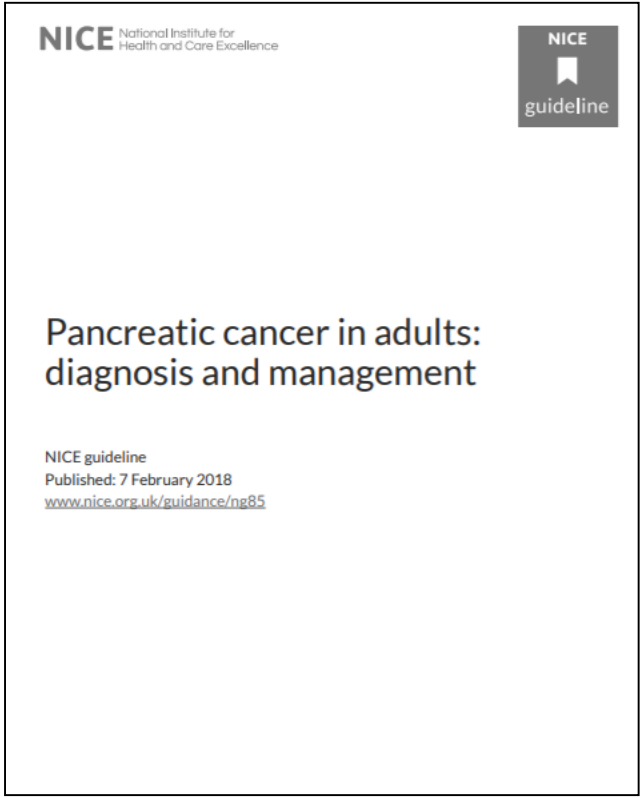
- reduced QOL
- decreased survival
- treatment failure

NICE

Offer oral and enteral nutrition if gut functioning (rather than PN)

Consider

Individualised, consider aims of treatment, prognosis, QOL, patient's views, ability to manage EN in hospital at home, risk vs benefit



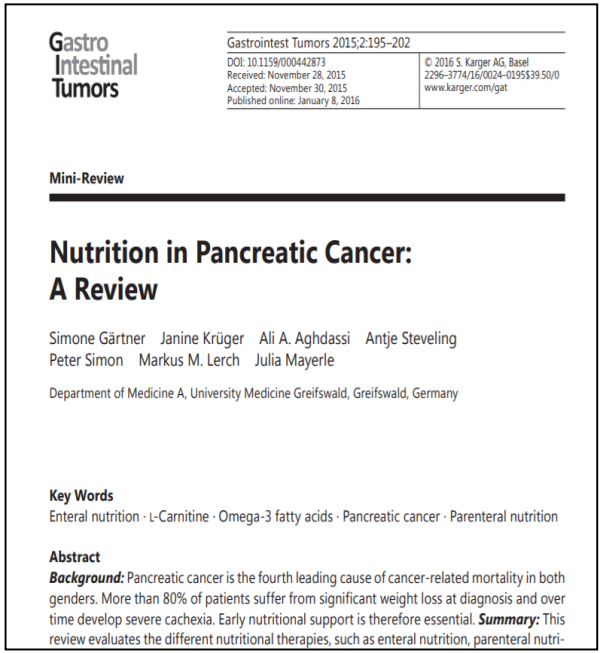
Indications for EN

Nutrition in Pancreatic cancer

Literature rv - 11 studies

(Gärtner et al, 2016)

- Oral supplementation (2 studies)
  - Higher calorie intake linked to higher weight but not LBM
  - Stable weight linked to better QOL and survival time
- Post pancreaticoduodenectomy (6 studies)
  - EN>PN at improving nutritional status, no difference in survival
  - PN higher complications rate and longer return time period to normal diet and bowel movement
- HPN in Cancer cachexia (2 studies) – benefit on QOL, SGA, weight, body composition
- Fish oil supplementation (5 studies oral supplement, 1 study suppl in PN) - low number of participants/ no control groups/ evidence poor



Gastro Intestinal Tumors

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Mini-Review

Nutrition in Pancreatic Cancer: A Review

Simone Gärtner Janine Krüger Ali A. Aghdassi Antje Steveling
Peter Simon Markus M. Lerch Julia Mayerle

Department of Medicine A, University Medicine Greifswald, Greifswald, Germany

Key Words
Enteral nutrition · L-Carnitine · Omega-3 fatty acids · Pancreatic cancer · Parenteral nutrition

Abstract
Background: Pancreatic cancer is the fourth leading cause of cancer-related mortality in both genders. More than 80% of patients suffer from significant weight loss at diagnosis and over time develop severe cachexia. Early nutritional support is therefore essential. ***Summary:*** This review evaluates the different nutritional therapies, such as enteral nutrition, parenteral nutri-

Types of tube – surgical patients

Nutrition management and PC surgery

Literature review (Afaneh et al, 2015)

Oral feeding preferred strategy post pancreatic surgery

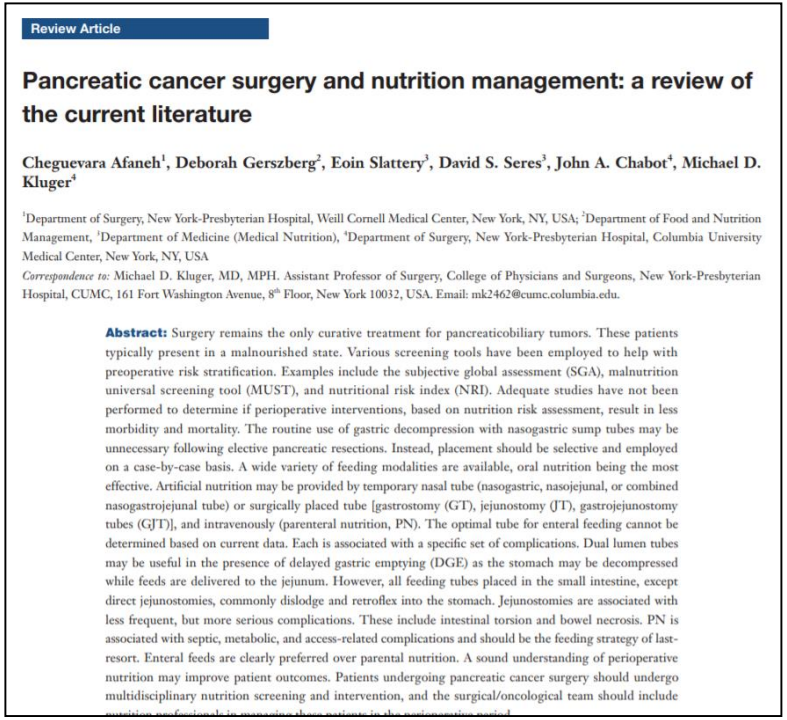
- Lower LOS
- No difference in other parameters when compared with EN and PN
- Stomach decompression

Decision re EN complex

- Consider route, type tube, site tube, feed formula, risk displacement
- EN not recommended routinely but selectively
- MDT decision

Comparing types/ sites feeding tube

- Even in randomised studies – no standardisation of gastric decompression, types of feed, route feeding in control groups – difficult to compare
- Many studies do not show superiority in choice tube (NJ/ jejunostomy)
- NJ best morbidity profile and jejunostomy tubes perceived higher risk complications
- PN if DGE



Review Article

Pancreatic cancer surgery and nutrition management: a review of the current literature

Cheguevara Afaneh[1], Deborah Gerszberg[2], Eoin Slattery[3], David S. Seres[3], John A. Chabot[4], Michael D. Kluger[4]

[1]Department of Surgery, New York-Presbyterian Hospital, Weill Cornell Medical Center, New York, NY, USA; [2]Department of Food and Nutrition Management, [3]Department of Medicine (Medical Nutrition), [4]Department of Surgery, New York-Presbyterian Hospital, Columbia University Medical Center, New York, NY, USA

Correspondence to: Michael D. Kluger, MD, MPH. Assistant Professor of Surgery, College of Physicians and Surgeons, New York-Presbyterian Hospital, CUMC, 161 Fort Washington Avenue, 8th Floor, New York 10032, USA. Email: mk2462@cumc.columbia.edu.

Abstract: Surgery remains the only curative treatment for pancreaticobiliary tumors. These patients typically present in a malnourished state. Various screening tools have been employed to help with preoperative risk stratification. Examples include the subjective global assessment (SGA), malnutrition universal screening tool (MUST), and nutritional risk index (NRI). Adequate studies have not been performed to determine if perioperative interventions, based on nutrition risk assessment, result in less morbidity and mortality. The routine use of gastric decompression with nasogastric sump tubes may be unnecessary following elective pancreatic resections. Instead, placement should be selective and employed on a case-by-case basis. A wide variety of feeding modalities are available, oral nutrition being the most effective. Artificial nutrition may be provided by temporary nasal tube (nasogastric, nasojejunal, or combined nasogastrojejunal tube) or surgically placed tube [gastrostomy (GT), jejunostomy (JT), gastrojejunostomy tubes (GJT)], and intravenously (parenteral nutrition, PN). The optimal tube for enteral feeding cannot be determined based on current data. Each is associated with a specific set of complications. Dual lumen tubes may be useful in the presence of delayed gastric emptying (DGE) as the stomach may be decompressed while feeds are delivered to the jejunum. However, all feeding tubes placed in the small intestine, except direct jejunostomies, commonly dislodge and retroflex into the stomach. Jejunostomies are associated with less frequent, but more serious complications. These include intestinal torsion and bowel necrosis. PN is associated with septic, metabolic, and access-related complications and should be the feeding strategy of last-resort. Enteral feeds are clearly preferred over parental nutrition. A sound understanding of perioperative nutrition may improve patient outcomes. Patients undergoing pancreatic cancer surgery should undergo multidisciplinary nutrition screening and intervention, and the surgical/oncological team should include

Feed type

Feed type	Feed name	Volume (ml) *providing 1000kcal*	Protein (g)	Fat (g)	LCT (g)	MCT (g)
Standard	Nutrison energy	666	40g	38	32	6
Peptide	**Vital 1.5**	**666**	**44**	**36**	**13**	**23**
Peptide	**Peptamen HN**	**751**	**50**	**36**	**11**	**25**
Standard	Nutrison	1000	40	39	33	6
Peptide	**Nutrison advanced Peptisorb**	**1000**	**40**	**17**	**9**	**8**
MCT	Nutrison MCT	1000	50	33	**13**	20

ESPEN guidelines Enteral nutrition: Pancreas (2006) - Peptide feed

+/- PERT ?

Build feed up without PERT

How much PERT?

- 500-4,000 unit lipase/g fat *(CF guidelines)*
- 13g LCT = 52,000 unit lipase

PERT administration via EN tubes

Enteral feeding tube placed – commence feeding

- Referral to Specialist HPB Dietitian for education
- Use Peptide/semi-elemental feed such as Nutrison Advanced Peptisorb, Peptamen HN, Vital 1.5 (up to goal volume)

↓

If PEI symptoms or weight loss, consider either:

- Lowering rate and increasing time of feeding if appropriate
- Adding or increasing PPI dose and/or frequency
- **Administering PERT with, alongside or in the feed – see below for practical options**

↓

Gastric feeding (NG/ PEG), consider either:

- PERT administered orally – 25,000unit lipase at the start of feed and every 2-4hrs during feeding (See quick guide to oral PERT)
- PERT added to feed – Mix starting dose of 1-2g Pancrex V powder (2g = 50,000unit lipase = 2.5ml spoon) with a little water and add to bottle of Peptamen HN or Vital 1.5 (**not Peptisorb**), shake well, administer immediately and for a maximum of 6 hours. Feed can be decanted into a flexitainer for ease.
- PERT via tube alongside feed – Mix starting dose of 1g Pancrex V powder (2g = 50,000unit lipase = 2.5ml spoon) with a little sodium bicarbonate 8.4% and flush down the tube at the start of feed and every 2-4hrs while feed running.

Jejunal feeding (NJ/ PEG-J/ Surgical jej), consider either:

- PERT should not be administered orally
- PERT added to feed – mix starting dose of 1-2g Pancrex V powder (2g = 50,000unit lipase = 2.5ml spoon) with water and add to bottle of Peptamen HN or Vital 1.5 (not Peptisorb!), shake well, administer immediately and for a maximum of 6 hours. Feed can be decanted into a flexitainer for ease.
- PERT via tube alongside feed – Mix starting dose of 2g Pancrex V powder (= 50,000unit lipase = 2.5ml spoon) with a little water and flush down the tube at the start of feed and every 2-4hrs while feed running.

↓

If symptoms resolved and weight stable
Continue current dose

If symptoms on-going:
Titrate PERT dose up by 25,000unit lipase increments. Do not exceed 100,000unit lipase per 500ml peptide feed without discussion with managing consultant

↓

Consider

- site of action
- time of action
- access route

Limited data (stability, efficacy, evidence)

Unlicensed use

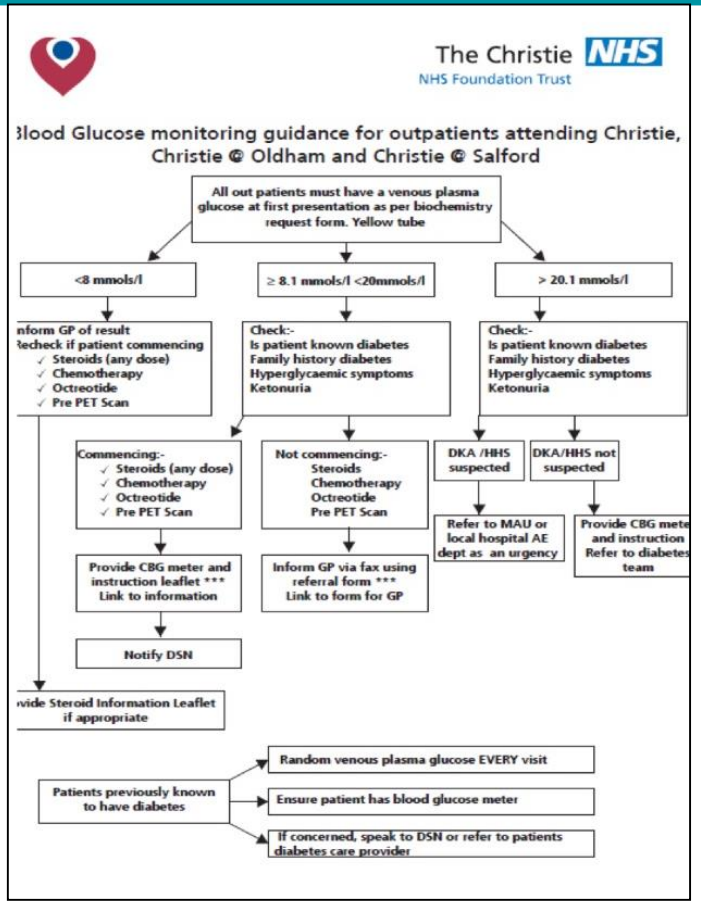
- Open capsules
- If the powder is mixed with liquids or feeds the resulting mixture should not be allowed to stand for more than one hour prior to use.

Check local formulary/ medicines management guidelines

Hauenschild A et al. (2008)
Ferrie S, et al M. (2011).

Dietetic management - Type 3C Diabetes

- Pancreatogenic Diabetes
  - 50% PC patients have DM
  - 85% have glucose intolerance
- Surgical patients
  - Total pancreatectomy – insulin
  - Whipples – 50% DM
- Diagnosis criteria – no consensus
  - CBGs, HbA1c, OGTT, Glucometer
  - Untreated PEI delays diagnosis and treatment
  - Often misdiagnosed/ mismanaged as Type 2 DM



Type 3C DM - pathophysiology

Hormones	Islet Cells	Functions
Insulin	β (beta cells)	Decreased gluconeogenesis, glycogenolysis, fatty acid breakdown & ketogenesis Increased glycogenesis, protein synthesis
Glucagon	α (alpha cells)	Opposite effects of insulin; increased hepatic glycogenolysis & gluconeogenesis
Somatostatin	δ (delta cells)	Inhibits GI secretion; inhibits secretion and action of all GI endocrine peptides; inhibits cell growth
Pancreatic polypeptide	PP (PP cell)	Inhibits pancreatic exocrine secretion and secretion of insulin
Amylin	β (beta cells)	Counter regulates insulin secretion & function
Pancreastatin	β (beta cells)	Decreases insulin & somatostatin release; increases glucagon release & decreases pancreatic secretion
Ghrelin	ε (epsilon cell)	Decreases insulin release and insulin action

Table - Oonnagh Griffin RD

Clinical features

- Accelerating weight loss/ cachexia if diagnosis delayed
- Brittle Diabetes

Type 3C DM - treatment

Aims of dietetic treatment

- Facilitate early diagnosis
- Prevent extreme hyper and hypoglycaemia (CBGs 4-10)
- Prevent GI symptoms/ Malabsorption/ Malnutrition

Pharmacology

- Glucose lowering agents – incl Metformin (CBGs>12)
  - switch to modified release if GI symptoms
- Insulin – rapid/ short/ intermediate/ long acting/ premixed
  - Anabolic, clinical monitoring/ support (specialist DM team)
  - Practicalities for patient (PERT/insulin/CBG testing frequency), staff (regimen/ dose – risk hypo/ long acting/ basal bolus/ pump)
  - Manage expectations – likely need to amend regimen depending on OI, health, etc.

Promptly refer to DM specialist team if CBG control needs optimising

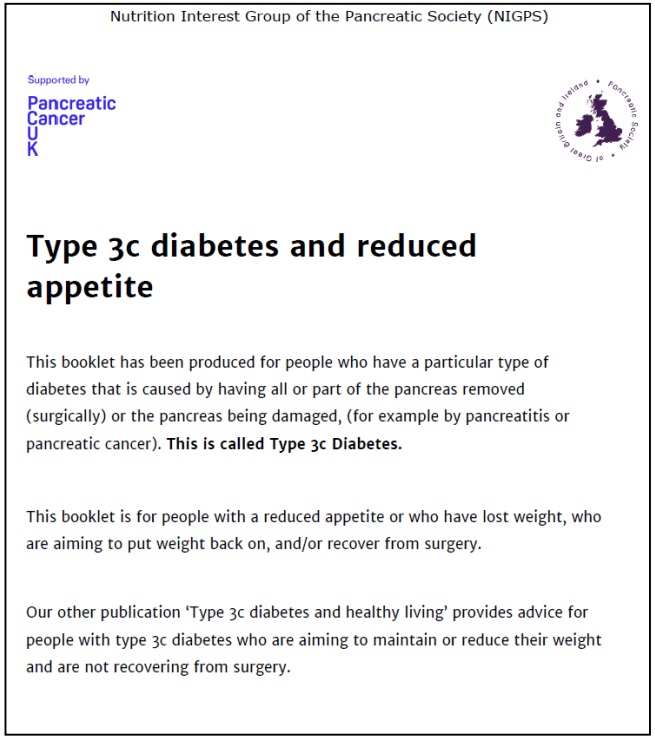
Type 3C DM - Dietetic treatment

- Avoid high GI food/ drinks – sugary drinks, sweets, juice based ONS
- Regular starchy carbohydrates
- Regular x3 meals, x2-3 snacks daily

- High energy/ high protein diet
- Spread protein intake through the day
  - Ideas protein sources for meals
  - meat, fish, dairy, eggs, beans, pulses, tofu and soya.
  - And protein rich snacks – milky puddings,
  - Food fortification
  - High kcal/protein ONS

- Physical activity

- Avoid DM foods – cause diarrhea



Nutrition Interest Group of the Pancreatic Society (NIGPS)

Supported by
Pancreatic Cancer UK

Pancreatic Society of Great Britain and Ireland

Type 3c diabetes and reduced appetite

This booklet has been produced for people who have a particular type of diabetes that is caused by having all or part of the pancreas removed (surgically) or the pancreas being damaged, (for example by pancreatitis or pancreatic cancer). **This is called Type 3c Diabetes.**

This booklet is for people with a reduced appetite or who have lost weight, who are aiming to put weight back on, and/or recover from surgery.

Our other publication 'Type 3c diabetes and healthy living' provides advice for people with type 3c diabetes who are aiming to maintain or reduce their weight and are not recovering from surgery.

Refer to Dietitian - diet/ ONS/ EN/ PERT/ CBGs/ DM medication alongside cancer treatment complex !

Thank you and References

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