The background of the slide is a deep blue gradient. On the left side, there are several overlapping circular patterns. One prominent circle has a white scale around its perimeter, with numbers ranging from 140 to 260 in increments of 10. Other circles are dashed or have partial outlines. The overall aesthetic is technical and scientific.

NUTRITIONAL ASSESSMENT OF PANCREATIC CANCER PATIENTS

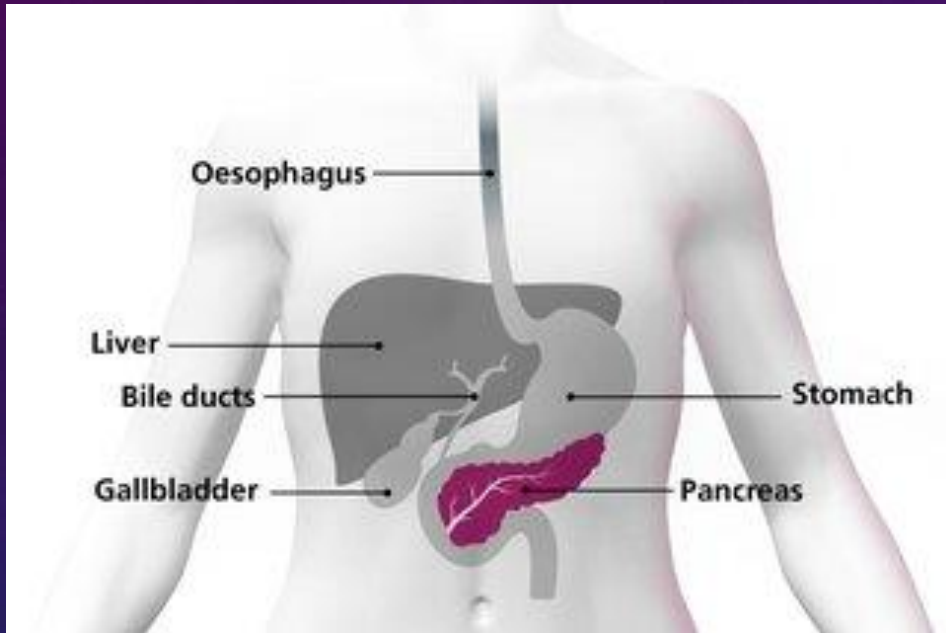
HELEN WEBSTER

UGI & HPB ONCOLOGY DIETITIAN, NHS TAYSIDE

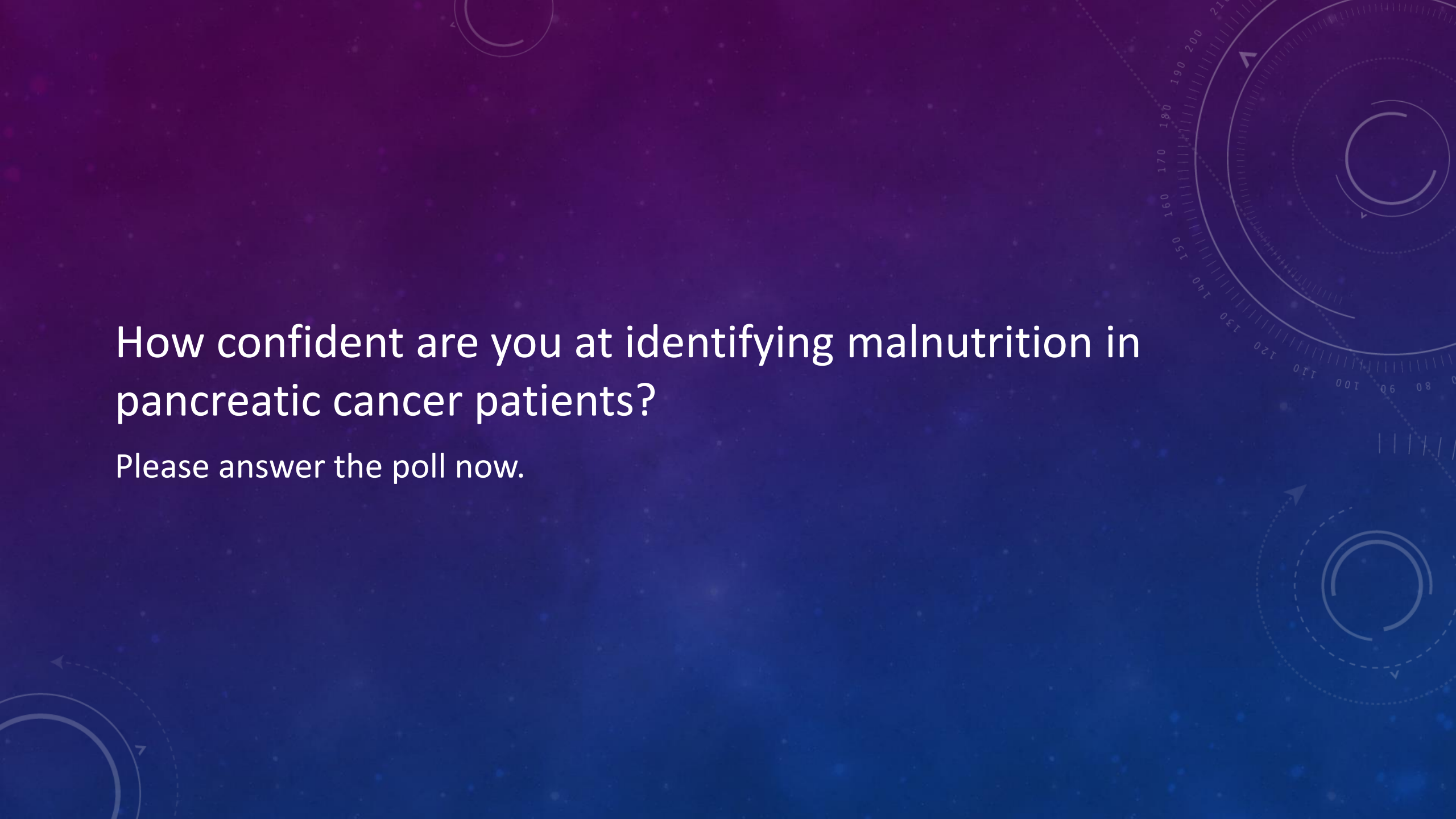
INTRODUCTION

- Normal pancreatic function
- Malnutrition in pancreatic cancer
- Cancer cachexia
- Sarcopenia
- Nutrition Screening tools
- Prehabilitation

NORMAL PANCREATIC FUNCTION



- The pancreas is a gland that sits between the stomach and the duodenum.
- Exocrine function – the pancreas secretes enzymes which are released into the duodenum to facilitate digestion e.g. lipase, proteases and amylase.
- Endocrine function – the pancreas releases insulin to assist with the absorption of glucose from the blood into the cells of the body.
- Cancers in the pancreas reduce enzyme production / release. Closer the tumour to duodenum, less exocrine function exponentially (Keller & Layer, 2005).
- 80-90% of patients display exocrine insufficiency.
- Cancers affecting the tail of the pancreas more likely to cause diabetes.
- Type 3C diabetes



How confident are you at identifying malnutrition in
pancreatic cancer patients?

Please answer the poll now.

MALNUTRITION AND PANCREATIC CANCER

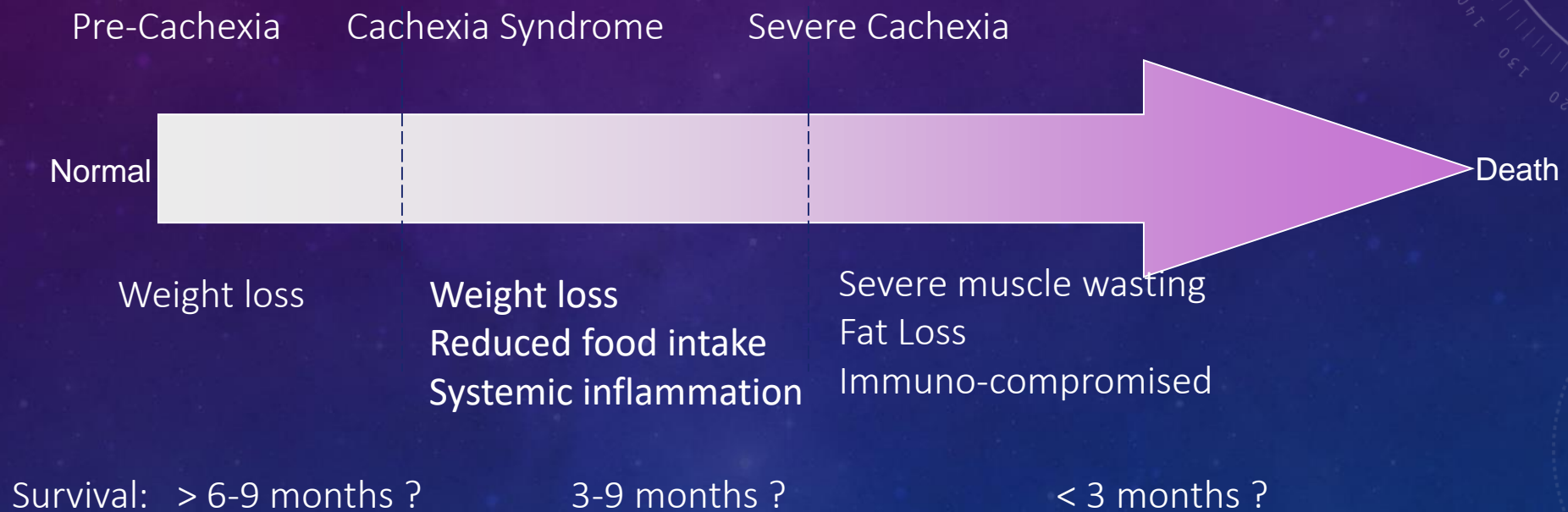
- Malnutrition is an “imbalance of energy, protein and other nutrients which causes adverse effects on body shape, size, composition, function and clinical outcome.” (BAPEN, 2020)
- Multi-factorial including symptoms from the tumour, treatment side effects, cancer cachexia, sarcopenia and exocrine insufficiency so early screening, assessment and dietetic input is crucial for improving patient outcomes.
- More than a third of PC patients have experienced greater than 10% loss of body weight at diagnosis as a result of symptoms such as abdominal pain, anorexia, early satiety, nausea, vomiting and diarrhoea / steatorrhea or constipation.
- This combined with the development of cancer cachexia and /or on a background of existing sarcopenia can mean poorer outcomes for people with pancreatic cancer including:
 - longer hospital stays, increased risk of complications, reduced response to treatment, reduced QoL, Increased morbidity and mortality (Gartner et al, 2016)

CANCER CACHEXIA



- A complex combination of metabolic abnormalities
- Caused by a systemic inflammatory response
- Leads to ongoing loss of skeletal muscle mass (with or without loss of fat mass)
- Unable to completely reverse with conventional nutritional support
- Leads to progressive functional impairment / frailty.
- Compounded by poor oral intake from tumour related causes / cancer treatment side effects
- Cachexia syndrome can develop progressively through various stages—pre-cachexia to cachexia to refractory cachexia. (Fearon et al, 2011)
- Thought to be present in up to 65% or more of people with pancreatic cancer (Kordes et al 2021).

CANCER CACHEXIA – A SYNDROME



PHARMACOLOGICAL MANAGEMENT OF CACHEXIA

As well as dietary counselling and exercise, pharmacology can be useful such as:

Corticosteroids e.g. Dexamethasone / Prednisolone

- For short-term improvement of appetite.
- Rapid effect but tends to decrease after 3 to 4 weeks.
- May also help to reduce nausea, improve energy and general feeling of wellbeing.
- However, there is often no significant effect on nutritional status.
- Consider need for gastric protection e.g. PPI
- Multiple side effects.

Progestogens e.g. MegAce

- May stimulate appetite and weight gain
- May take a few weeks to take effect but benefit is more prolonged than steroids.
- More appropriate for patients with a longer prognosis.
- For appetite stimulation, lower doses are as effective as higher doses but for weight gain there does appear to be more of a dose-response relationship.
- Side effects include nausea, fluid retention and risk of pulmonary embolism

(Health Improvement Scotland, 2021)

FISH OIL SUPPLEMENTS

- Supplement drinks containing high doses of EPA and DHA
- Help mediate catabolism caused by cancer cachexia in pancreatic cancer and can help with weight gain
- In studies in all types of cancer, those with cachexia have been shown to improve quality of life and prolong survival
- Very small studies limit the evidence for their use.
- No recent publications
- Further research needed.



MENAC TRIAL

- “**M**ultimodal **E**xercise, **N**utrition and **A**nti-inflammatory medication for **C**achexia” Trial
- Non Steroidal Anti-Inflammatory Drugs – to influence several inflammatory pathways including: IL-1, which reduces appetite and tumour necrosis factor α , which might influence muscle and fat catabolism.
- Eicosapentaenoic Acid and Docosahexaenoic Acid to reduce inflammation, stabilise weight and improve QOL
- Physical exercise programme using resistance and aerobic training to increase anabolism
- Dietary counselling and oral nutritional supplements to promote energy and protein balance.
- Aiming to prevent cachexia or attenuate cachexia progression.
- Awaiting results.

Review

Cancer cachexia: rationale for the MENAC (Multimodal—Exercise, Nutrition and Anti-inflammatory medication for Cachexia) trial

Tora S Solheim^{1, 2}, Barry J A Laird³, Trude R Balstad^{1, 2}, Asta Bye^{4, 5}, Guro Stene^{1, 2, 6}, Vickie Baracos⁷, Florian Strasser⁸, Gareth Griffiths⁹, Matthew Maddocks¹⁰, Marie Fallon³, Stein Kaasa^{1, 2, 11} and Kenneth Fearon^{3, 12}

Correspondence to Dr Barry J A Laird, University of Edinburgh, Edinburgh EH8 9YL, UK; barry.laird@ed.ac.uk

SARCOPENIA

“Sarcopenia is a progressive and generalised skeletal muscle disorder that is associated with increased likelihood of adverse outcomes including falls, fractures, physical disability and mortality.”

Probable sarcopenia is identified by Criterion 1.

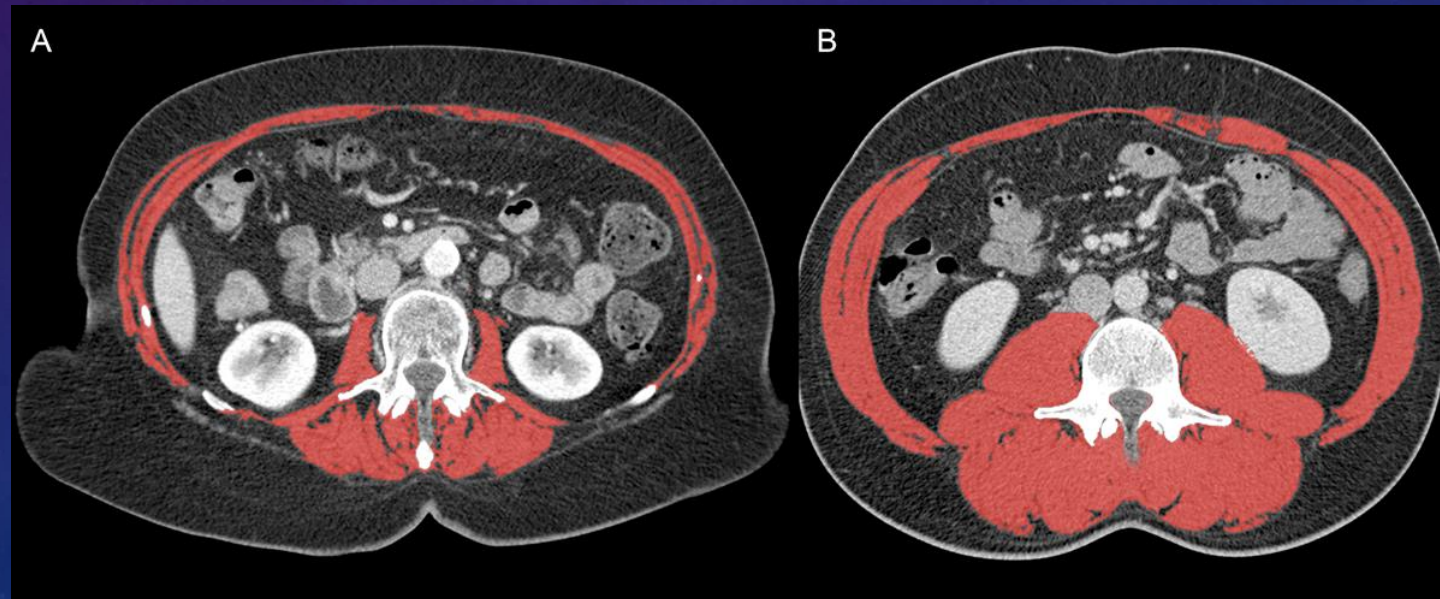
Diagnosis is confirmed by additional documentation of Criterion 2.

If Criteria 1, 2 and 3 are all met, sarcopenia is considered severe.

- 1.Low muscle strength
- 2.Low muscle quantity or quality
- 3.Low physical performance

SARCOPENIC OBESITY

- Obesity epidemic in the western world.
- Patients with cancer diagnoses can present with a high BMI so nutritional concerns may be taken less seriously than those with lower BMIs.
- People with high BMIs can still be at risk of malnutrition as a result of weight loss, reduced oral intake, pancreatic exocrine insufficiency and other symptoms associated with their disease.
- The term Sarcopenic Obesity was coined to define low muscle mass/strength in obese individuals (Benjamin, 2009).
- High BMI can mask sarcopenia as shown in these two CT scans (Gruber et al, 2019)

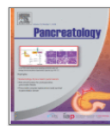


IMPACT OF SARCOPENIA – PALLIATIVE PATIENTS ON CHEMOTHERAPY

- Folfirinox is one of the main types of chemotherapy used neoadjuvantly, adjuvantly and palliatively for Pancreatic cancer.
- In this study by Kurita et al, Patients undergoing Folfirinox chemotherapy for Advanced PC with sarcopenia had worse overall survival.
- Those with Sarcopenic obesity also had increased toxicities from the treatment.
- The IMPACT Study – preliminary findings show >10% loss of lean muscle mass has a negative prognostic role in PC (Basile et al, 2019)



Pancreatology
Volume 19, Issue 1, January 2019, Pages 127-135



Sarcopenia is a reliable prognostic factor in patients with advanced pancreatic cancer receiving FOLFIRINOX chemotherapy

Yusuke Kurita ^{a, b}, Noritoshi Kobayashi ^b ✉, Motohiko Tokuhisa ^b, Ayumu Goto ^b, Kensuke Kubota ^a, Itaru Endo ^c, Atsushi Nakajima ^a, Yasushi Ichikawa ^b

> J Cachexia Sarcopenia Muscle. 2019 Apr;10(2):368-377. doi: 10.1002/jcsm.12368. Epub 2019 Feb 4.

The IMPACT study: early loss of skeletal muscle mass in advanced pancreatic cancer patients

Debora Basile ^{1 2}, Annamaria Parnofiello ^{1 2}, Maria Grazia Vitale ^{1 2}, Francesco Cortiula ^{1 2}, Lorenzo Gerratana ^{1 2}, Valentina Fanotto ^{1 2}, Camilla Lisanti ^{1 2}, Giacomo Pelizzari ^{1 2}, Elena Ongaro ^{1 2}, Michele Bartoletti ^{1 2}, Silvio Ken Garattini ^{1 2}, Victoria Josephine Andreotti ^{1 2}, Anna Bacco ³, Donatella Iacono ², Marta Bonotto ², Mariaelena Casagrande ², Paola Ermacora ², Fabio Puglisi ^{1 4}, Nicoletta Pella ², Gianpiero Fasola ², Giuseppe Aprile ⁵, Giovanni G Cardellino ²

IMPACT OF SARCOPENIA - SURGERY

- Increased perioperative mortality
- Increased overall mortality (Bundred et al, 2019)
- Patients with sarcopenia and sarcopenic obesity undergoing resection for PDAC have a significantly shorter overall survival and a higher complication rate.
- The assessment of body composition in these patients may provide a broader understanding of patients' individual condition and guide specific supportive strategies in patients at risk (Gruber et al, 2019).



HPB

Volume 21, Issue 12, December 2019, Pages 1603-1612



Review article

Body composition assessment and sarcopenia in patients with pancreatic cancer: a systematic review and meta-analysis

James Bundred^{1, *}, Sivesh K. Kamarajah^{2, 3, *}, Keith J. Roberts⁴  

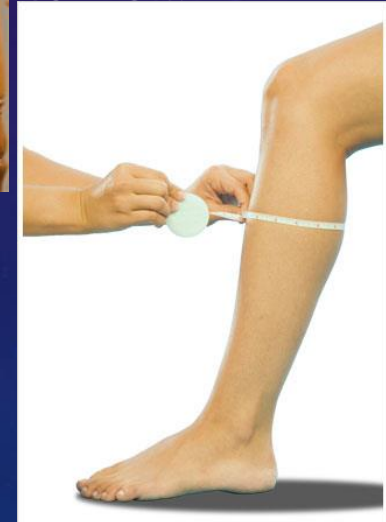
Sarcopenia and sarcopenic obesity are independent adverse prognostic factors in resectable pancreatic ductal adenocarcinoma

Elisabeth S. Gruber , Gerd Jomrich, Dietmar Tamandl, Michael Gnant, Martin Schindl, Klaus Sahora 

Published: May 6, 2019 • <https://doi.org/10.1371/journal.pone.0215915>

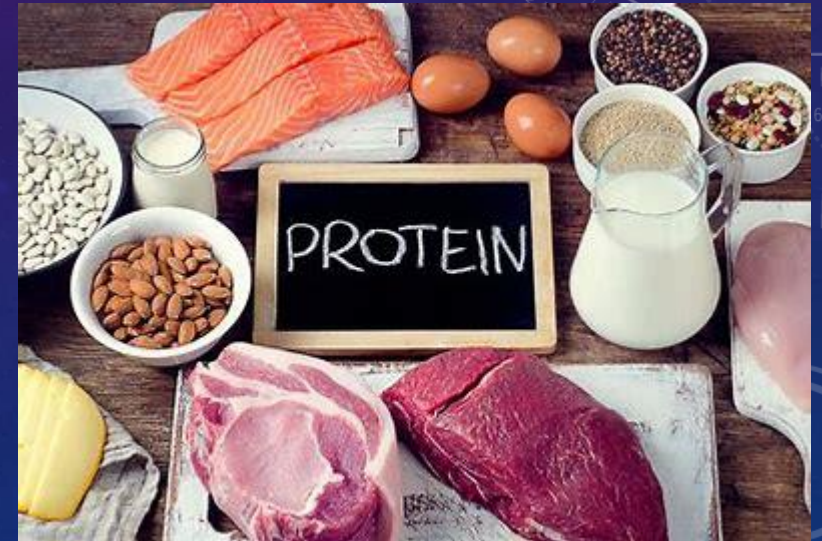
ASSESSMENT OF SARCOPENIA

- **SARC-F tool** – questionnaire used to detect signs of sarcopenia
- 5 Questions: patient's ability to lift, climb up a flight of stairs, experience with falls, walking ability and rising from a chair.
- **Hand grip strength** to measure muscle strength
- Used as a surrogate measure for arm / leg muscle strength as good correlation with grip strength.
- Values less than 85% of normal range suggest high risk of severe postoperative morbidity and mortality.
- Low HGS associated with poor 1 year survival for those with cancer cachexia (Song et al, 2021)
- **Calf Circumference** – correlates strongly with MRI, <34cm in Men and <33cm women diagnostic of sarcopenia (Kawakami, 2015)
- **DXA, MRI or CT** can be used to assess muscle quantity but not used routinely as high costs / training needs / not very practical.
- **Bioelectrical Impedance Analysis** - estimate of muscle mass based on whole-body electrical conductivity.
(Cruz-Jentoft et al, 2019)



MANAGEMENT OF SARCOPENIA

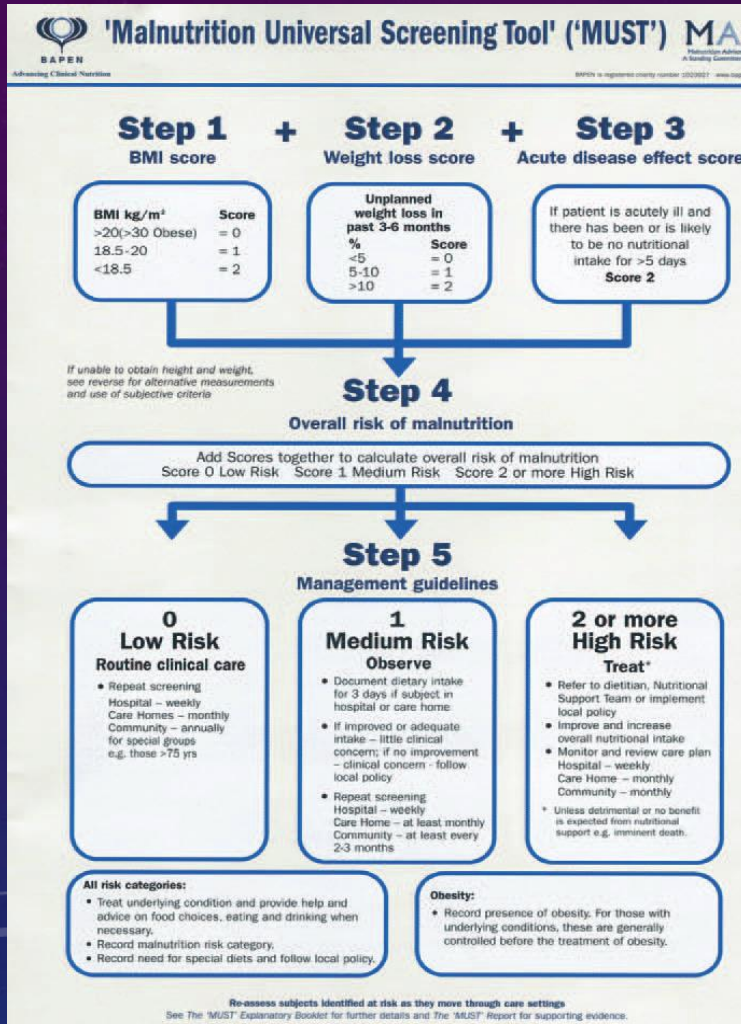
- Exercise – everything from aerobic exercise, HIIT training, Whole body vibration and resistance exercise beneficial
- Dietary counselling
 - ❖ Correct protein deficits 1-1.5g/kg
 - ❖ Vitamin D = increased muscle fibres and strength, reversal of muscle atrophy
 - ❖ Antioxidants = may help improve strength and physical performance
 - ❖ Amino acids = leucine may reverse suboptimal protein synthesis in older adults
- Drug therapy – more research needed but use of Testosterone, ACE inhibitors and selective androgen receptor modulators e.g. myostatin / thalidomide may be beneficial.
- (Papadopoulou, 2020)



Poll:

Do you routinely use a nutrition screening tool
with your patients?


NUTRITION SCREENING TOOLS



- Several tools to consider.
- Malnutrition Universal Screening Tool (MUST) – lots of educational resources / training programs UK wide to support its use.
- BAPEN offer “self MUST”: [Worried About Weight Loss - Self-Screening for Malnutrition \(malnutritionselfscreening.org\)](http://WorriedAboutWeightLoss-Self-ScreeningforMalnutrition(malnutritionselfscreening.org)),
- Lower specificity and sensitivity in oncology population but widely used.
- No consideration of risk of sarcopenia or Nutrition Impact symptoms

NUTRITION SCREENING TOOLS

- PG-SGA – validated in Oncology Settings
- Uses Nutrition Impact Symptoms and food intake as part of scoring so has some predictive value in terms of malnutrition developing as a result of symptoms / reduced food intake.
- Validated in oncology settings
- Considers activity / function as a step towards consideration of frailty / sarcopenia / performance status.

 Scored Patient-generated Subjective Global Assessment (PG-SGA)	
History: Boxes 1 - 4 are designed to be completed by the patient. [Boxes 1-4 are referred to as the PG-SGA Short Form (SF)]	
1. Weight (see worksheet 1) In summary of my current and recent weight: I currently weigh about _____ pounds I am about _____ feet _____ inches tall One month ago I weighed about _____ pounds Six month ago I weighed about _____ pounds During the past two weeks my weight has: <input type="checkbox"/> Decreased ₍₁₎ <input type="checkbox"/> Not changed ₍₀₎ <input type="checkbox"/> Increased ₍₀₎	2. Food intake: As compared to my normal intake, I would rate my food intake during the past month as <input type="checkbox"/> Unchanged ₍₀₎ <input type="checkbox"/> More than usual ₍₀₎ <input type="checkbox"/> Less than usual ₍₁₎ I am now taking <input type="checkbox"/> Normal food but less than normal amount ₍₁₎ <input type="checkbox"/> Little solid food ₍₂₎ <input type="checkbox"/> Only liquids ₍₃₎ <input type="checkbox"/> Only nutritional supplements ₍₃₎ <input type="checkbox"/> Very little of anything ₍₄₎ <input type="checkbox"/> Only tube feedings or only nutrition by vein ₍₀₎
3. Symptoms: I have had the following problems that have kept me from eating enough during the past two weeks (check all that apply) <input type="checkbox"/> No problem eating ₍₀₎ <input type="checkbox"/> No appetite, just did not feel like eating ₍₃₎ <input type="checkbox"/> Nausea ₍₁₎ <input type="checkbox"/> Constipation ₍₁₎ <input type="checkbox"/> Mouth sores ₍₂₎ <input type="checkbox"/> Things taste funny or have no taste ₍₁₎ <input type="checkbox"/> Problems swallowing ₍₂₎ <input type="checkbox"/> Pain; where? ₍₃₎ _____ <input type="checkbox"/> Other ₍₁₎ ** _____ **Examples: Depression, money, or dental problems	<input type="checkbox"/> Vomiting ₍₃₎ <input type="checkbox"/> Diarrhea ₍₃₎ <input type="checkbox"/> Dry mouth ₍₁₎ <input type="checkbox"/> Smells bother me ₍₁₎ <input type="checkbox"/> Feel full quickly ₍₁₎ <input type="checkbox"/> Fatigue ₍₁₎
Box 1 <input type="checkbox"/>	Box 2 <input type="checkbox"/>
Box 3 <input type="checkbox"/>	Box 4 <input type="checkbox"/>
The remainder of this form is to be completed by your doctor, nurse, dietitian, or therapist. Thank you.	
©FD Ottery 2005, 2006, 2015 v3.22.15 email: faithotteryndphd@aol.com or info@pt-global.org	
Additive score of boxes 1-4 <input type="checkbox"/> A	

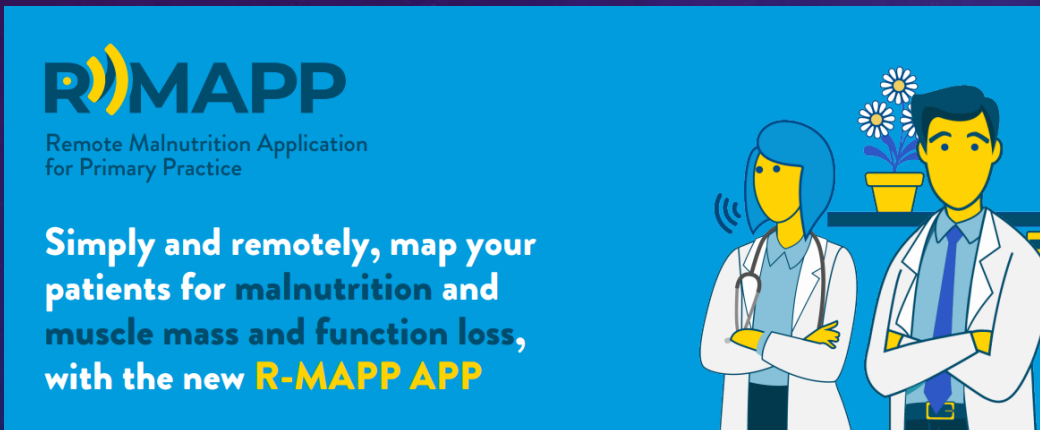
NUTRITION SCREENING TOOL

- Royal Marsden Nutrition Screening Tool
- Validated in Oncology
- Considers Nutrition Impact Symptoms

Question	If answer to the question is yes, then score
1. Has the patient experienced unintentional weight loss in the last 3 months? (>7 kg in men or >5.5 kg in women) If not, unintentional weight loss less than the above	10 5
2. Does the patient look underweight?	5
3. Has the patient had a reduced food intake (less than 50 % of meals) in the last 5 days (this may be due to mucositis, dysphagia, nausea, bowel obstruction, vomiting)?	5
4. Is the patient experiencing symptoms that are affecting food intake, e.g. mucositis, nausea, vomiting, diarrhoea and constipation?	3
Total score	Maximum 23
Copyright The Royal Marsden NHS Foundation Trust	
Score 0–4, well-nourished, score 5–9, moderately malnourished, score >10 , severely malnourished	

NUTRITION SCREENING TOOL

- R-MAPP: Combination of MUST and the SARC-F tool in the form of a free app
- Developed during COVID 19 to assist with remote nutrition screening
- Considers malnutrition risk as well as detection of sarcopenia.



PREHABILITATION

- Defined as “supporting people living with cancer to prepare for treatment. It promotes healthy behaviours and prescribes exercise, nutrition and psychological interventions based on a person’s needs, to help them find their best way through.”
- Ideally should be implemented in the early stages soon after diagnosis and well in advance of treatment.
- Some pilot studies have shown that benefits can still be seen in as little as two weeks prior to surgery.

PRINCIPLES AND GUIDANCE FOR PREHABILITATION WITHIN THE MANAGEMENT AND SUPPORT OF PEOPLE WITH CANCER

 **Guides**

Published: 30 Nov 2020 | Next review: 30 Nov 2021 | Edition: 1

This guide will support healthcare professionals to integrate prehabilitation services into the cancer pathway.

BENEFITS OF PREHAB

- 3 main benefits:
- Personal empowerment – giving pts a sense of control and purpose and enhances QOL
- Physical and psychological resilience – an opportunity to improve physical function and psychological well being helping people cope better with treatments and surgery, enhancing the quality of recovery and living better after treatments.
- Long term health – a teachable moment to reflect on the role of healthier lifestyle practices after a diagnosis to promote positive behavior change.
- Several programs underway across the UK such as:
 - ❖ Prepwell – community based programme in NE England
 - ❖ Fit 4 Surgery – Royal Surrey, 5 week rolling program
- Programs demonstrate reversal of sarcopenia, improved fitness levels, improved lifestyle choices and better mental health.
- ❖ Scottish Government have a Prehab Working Group, currently using Maggie's as pilot centers in early trials, looking to create a “once for Scotland” approach to Prehabilitation services, largely delivered online.

CONCLUSION

- Early Nutrition screening, consideration of cancer cachexia and screening for sarcopenia can allow for earlier dietetic support, referral to formal prehabilitation programs or referral to other routes of increasing exercise such as Macmillan Move More / Exercise on prescription schemes.
- Early nutritional assessment and development of treatment plans to tackle these issues can improve tolerance of treatments, surgical outcomes and overall survival.

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