



# NET Nutrition

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# What's on the menu today?

- Malnutrition
- Loose stools
- Vitamins
- Plans

# Problems for NET Patients

- Weight loss (or weight gain in insulinomas)
- Loose stools (diarrhoea, steatorrhoea)
- Vitamin and mineral deficiencies
- Oesophageal and intestinal obstructions
- Post op-complications (rare)

Lead to:

- Malnutrition
- Lack of treatment options
- Poor quality of life
- Poorer survival

# 2 Main Causes

- A. Direct effects of NETs
- B. Side effects of treatments
  
- **Some patients get both at some point**

# Malnutrition

Why is it important?



# Malnutrition

- UK study of 161 GEP NET patients screened with MUST tool, not led by a Dietitian.
  - MUST score was positive ( $\geq 1$ ) in 14% of outpatients with GEP-NET.
  - MUST-positive patients had lower faecal elastase concentrations compared to MUST-negative patients
  - Also were more likely to be on treatment with long-acting somatostatin analogues

# Malnutrition

Danish study of 186 patients (51% women) using NRS tool, led by a Dietitian.

- BMI, Hand grip strength (HGS), NRS measures.
- Low BMI (<20.5 kg/m<sup>2</sup>) in 12%
- Low HGS in 25%
- Impaired level of function in 43% of the patients.
- Weight loss more likely in patients with an intestinal or pancreatic NET
- 38% were at nutritional risk, more frequent in patients with residual disease
- Both low HGS, impaired level of function and being at nutritional risk were associated with symptoms: nausea, vomiting, stomach ache and dry mouth
- Poor appetite and early satiety were only associated with being at nutritional risk and having impaired level of function

# Loose Stools- Diarrhoea

- Hormone related
- SIBO
- Intestinal adaptation after surgery

# Small intestinal Bacterial Overgrowth (SIBO)

- Common
- Hydrogen producing bacteria type most common (leads to diarrhoea)
- Methane producing bacteria type less common (causes constipation)
- Hydrogen and methane breath testing
  
- Probably best treated with rifaxamin (+ possibly with low FODMAP diet and 4 hour meal gaps)
- Herbal alternative therapies
- Other studies have used Lactol probiotic

# Food Triggers and Carcinoid syndrome

- Large fatty meals (? saturated fat)
- Spice
- Alcohol
- Foods high in amines: aged cheese, alcohol, smoked/salted fish and meat, yeast, fermented-tofu, miso, sauerkraut
- Foods moderate in amines: large dose of caffeine, chocolate, peanuts, brazil nuts, coconut, avocado, banana, raspberries, most soybean products and broad beans

# Loose Stools- Steatorrhoea and PEI

- Pale, yellow/greasy/oily/floating stools that wont flush
- 1 cause is exocrine pancreatic insufficiency (EPI)
- Caused by obstructed/dilated pancreatic duct/pancreatic calcification/atrophy or tumour replacing pancreatic tissue on CT/ after surgery (and CF)
- And also some patients on somatostatin analogues
- Treating EPI should ideally be under care of Dietitian
- Pancreatic enzyme replacement therapy (PERT)
- 22,000-25,000 units lipase per snack, 44,000-50,000 units lipase per meal
- Once settled on this, increase the dose: usually 22,000-50,000 units lipase per snack/nutritious drink or 44,000-75,000 units lipase per main meal
- Rules for taking

# Somatostatin Analogues (SSA's)

Many patients experience a change in stool after commencing on SSA's

- SSA's interfere with the absorption of nutrients through direct effects on pancreatic enzyme secretion
- SSA's also significantly decrease the duodenal absorption of carbohydrates and triglycerides directly
- Does it make SIBO more common?

# Loose stools - Steatorrhoea

Also caused by

- Small intestinal bacterial overgrowth (SIBO)
- Bile acid malabsorption after surgery and treatment

# Bile acid malabsorption (BAM)

- UK study of 114 patients suffering with BAM after cancer treatment.
- 44% already taking colesevelam
- Personalised dietary intervention by Dietitian
- Reduction of fat in diet to 20% of daily energy requirement
- After dietary intervention, improvement in abdominal pain and nocturnal defecation
- Improvement in bowel frequency, urgency, flatulence, belching and stool consistency

# Vitamins



# Fat soluble Vitamins

Netherlands study of 54 patients, mostly with serotonin producing tumours and on somatostatin analogues for at least 18 months.

- Only one fifth of patients had steatorrhoea, but
- 6% deficient in vitamin A
- 28% deficient in vitamin D
- 15% deficient in vitamin E
- 63% deficient in vitamin K1
- 58% deficient in erythrocyte vitamin E

# Vitamin Deficiencies- B12

Swedish study of 50 patients with SI NETs, half were supplemented with vit B12, calcium, vit D

- 32% deficient in B12
- Therefore requires monitoring and supplementation

1980's Norwegian study found low vitamin B12 levels in some patients receiving octreotide therapy.

# Vitamin Deficiencies -Vitamin D

- Same Swedish study in small intestinal NETS:
  - 46% deficient in Vit D3
  - All patients with small intestinal NETs should have Vitamin D3
- Polish study: vitamin D deficiency is not worsened by tumour location or somatostatin analogues.
- UK study of Vitamin D supplementation. 66% patients with GEP NETs were insufficient.
  - 45% deficient at 12 months, 46% at 24 months. Risk factor- abdominal surgery.
  - Always get your Vit D checked!

# Carcinoid syndrome and Niacin deficiency

- When the body makes large amounts of serotonin, tryptophan levels drop
- When tryptophan stores are low it cannot be converted into niacin
- 28 -45% of patients with serotonin producing tumours and carcinoid syndrome found to be niacin deficient
- Results in Pellagra (DEMENTIA-DIARRHOEA-DERMATITIS)
  - Test urinary N1-MN- ideal, (or tryptophan first and urine second) although not available
  - Study showed average of 144mg nicotinamide /d required for upper normal level
  - As no way of reliable testing in UK, use a nicotinamide containing supplement to prevent niacin deficiency, B strong compound may be best.

# Other Intervention studies

- Use of the low FODMAP diet to reduce diarrhoea, reduce weight loss and improve quality of life.
  - Useful where issues are thought to be linked to IBS, gut dysbiosis.
- GEP NETs. Enterade drinks BD for 1 week.
  - 10/13 (59%) reported more than a 50% reduction in diarrhoea frequency

# Plans

- Dietitians interested in NETs Group (DING) ... joining Europe!!! perhaps.
- Anthropometry and treatment outcomes
- Vitamin studies
- Diet and exercise program
- Genetic syndromes and dietary exclusions
- Pre-surgical Nutrition



Any Questions?