

When the Gut Meets the Brain: Current Nutrition Challenges

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Disclosures

Medtronic, Falk, Bayer:

Bayer, Schwabe, Servatus:

Falk, Pfizer, Bayer, Boston

Bayer AG:

Unrestricted educational support

Advisory panel

Support for specific research projects
unrelated to this topic

Shareholder

Talk outline

- 1. Physiologic considerations of weight loss**
- 2. Case presentation**
- 3. Overview of the new clinical guidelines; DGBI induced altered food intake behaviour**
- 4. Key messages regarding management of patients with DGBI induced altered food intake behaviour?**

Survival of human pancreatic enzymes during small bowel transit: effect of nutrients, bile acids, and enzymes

GERALD HOLTSMANN, DARLENE G. KELLY, BERIT STERNBY,
AND EUGENE P. DiMAGNO

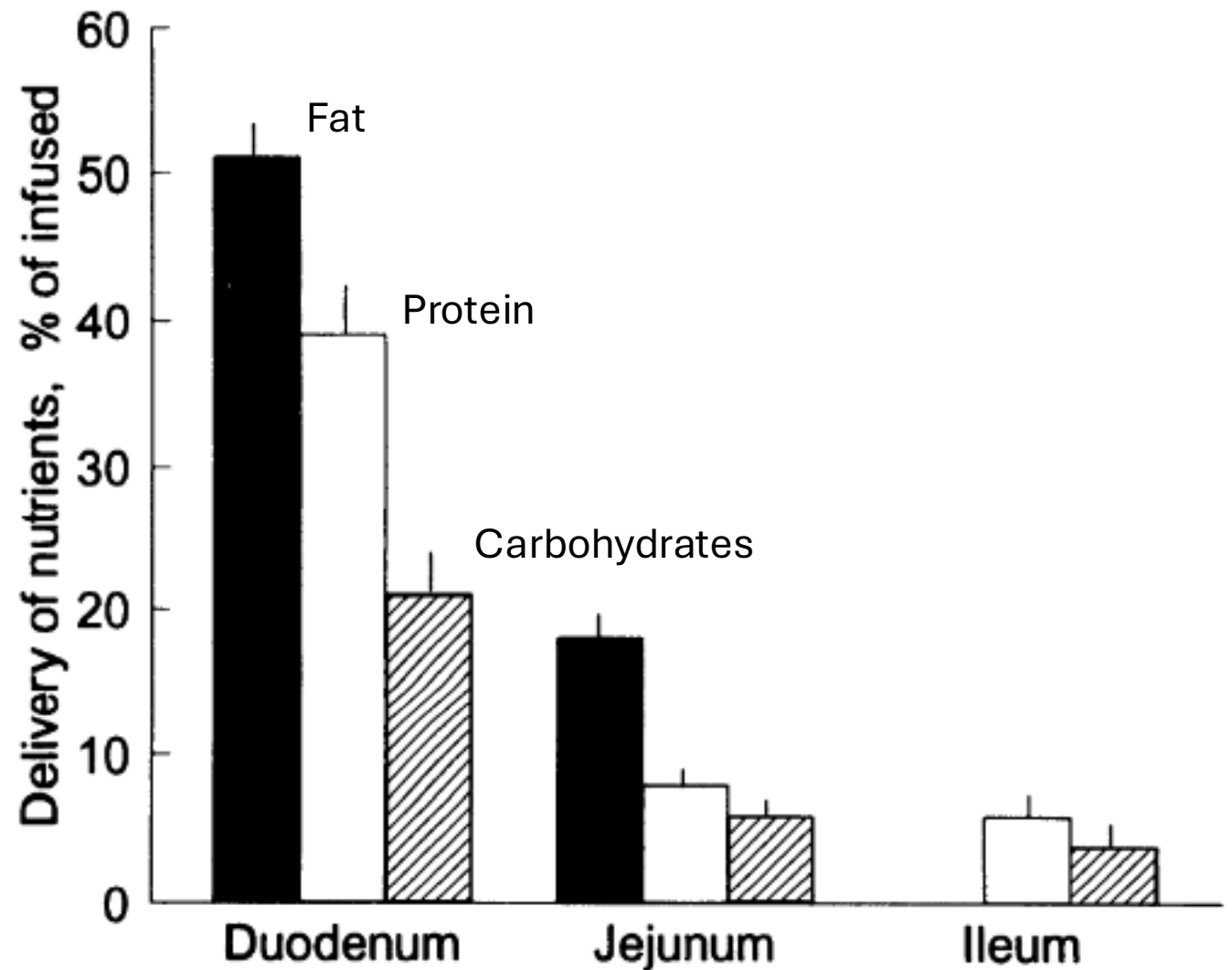
*Division of Gastroenterology and Internal Medicine, Mayo Clinic and Foundation,
Rochester, Minnesota 55905*

Infusion of nutrients into the 1st part of the duodenum

Table 1. *Composition and calories provided by protein, fat, and carbohydrate*

Infusate	Carbohydrate, %	Fat, %	Protein, %	Number of Subjects Receiving:		
				40 kcal/h	90 kcal/h	160 kcal/h
<i>A</i>	64	24	12	2	2	2
<i>B</i>	48	32	20	2	2	2
<i>C</i>	40	24	36	3	3	2
<i>D</i>	40	48	12	2	2	2

Percent of nutrients not absorbed



The absorptive capacity of the small intestine is huge, and likely massive structural changes are required to result in 'failure' if function (digestive enzyme secretion, motility) supports absorption

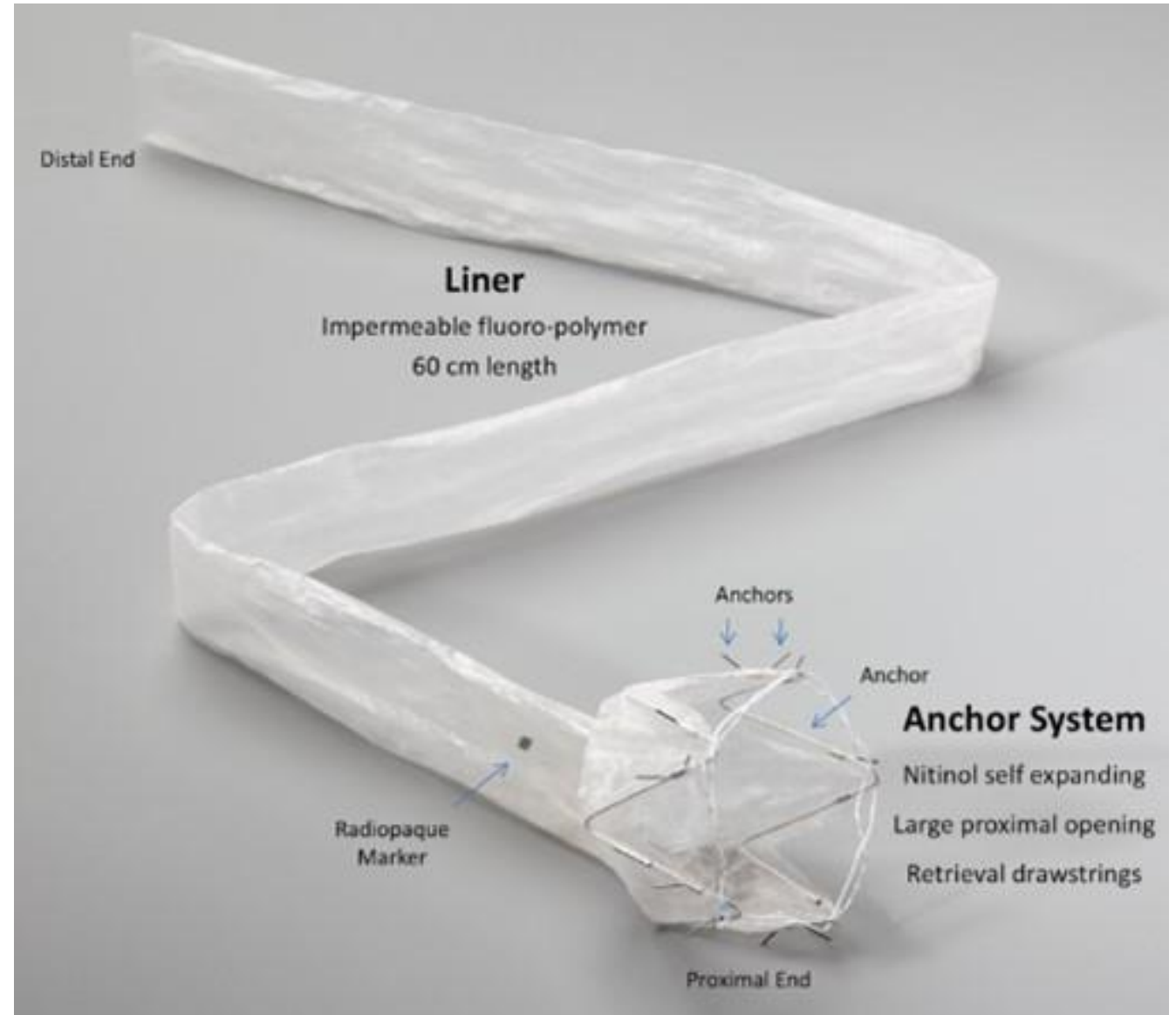
- McMaster, Holtmann GJ. Et al . J Clin Gastroenterol. 2020 Jul;54(6):528-535.

ORIGINAL ARTICLE

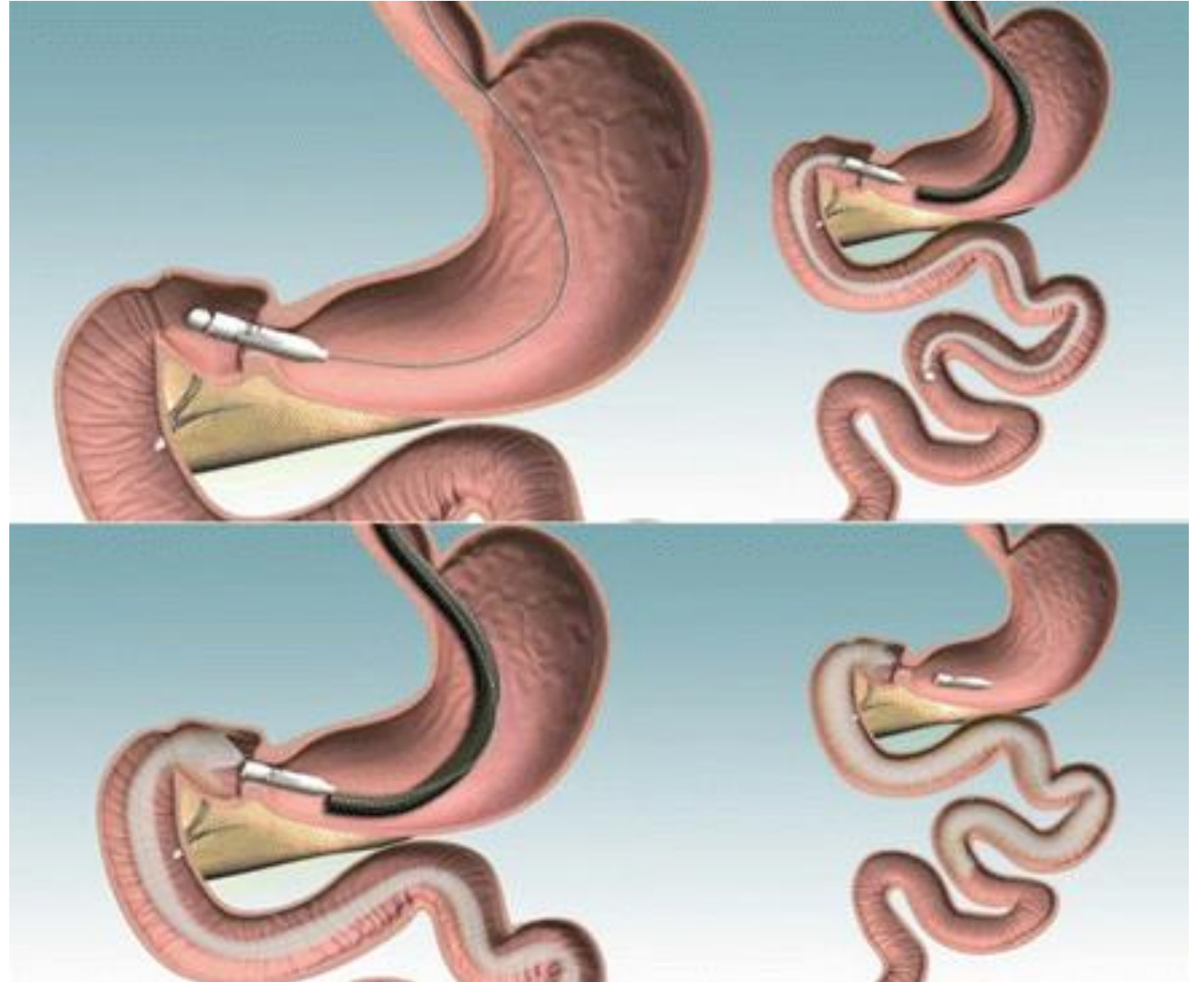
Induction of Meal-related Symptoms as a Novel Mechanism of Action of the Duodenal-Jejunal Bypass Sleeve

Jessica J. McMaster, PhD,†‡ Graeme G. Rich, MBBS,*†§
Erin R. Shanahan, PhD,*†‡ Anh T. Do, PhD,*†‡ Linda M. Fletcher, PhD,*†
Marguerite J. Kutyla, PhD,*†‡|| Caroline Tallis, MBBS,*† Mike P. Jones, PhD,¶#
Nicholas J. Talley, MD, PhD,#** Graeme A. Macdonald, MBBS, PhD,*†‡
Veronique S. Chachay, PhD,|| and Gerald J. Holtmann, MD, MBA, PhD,*†‡||#*

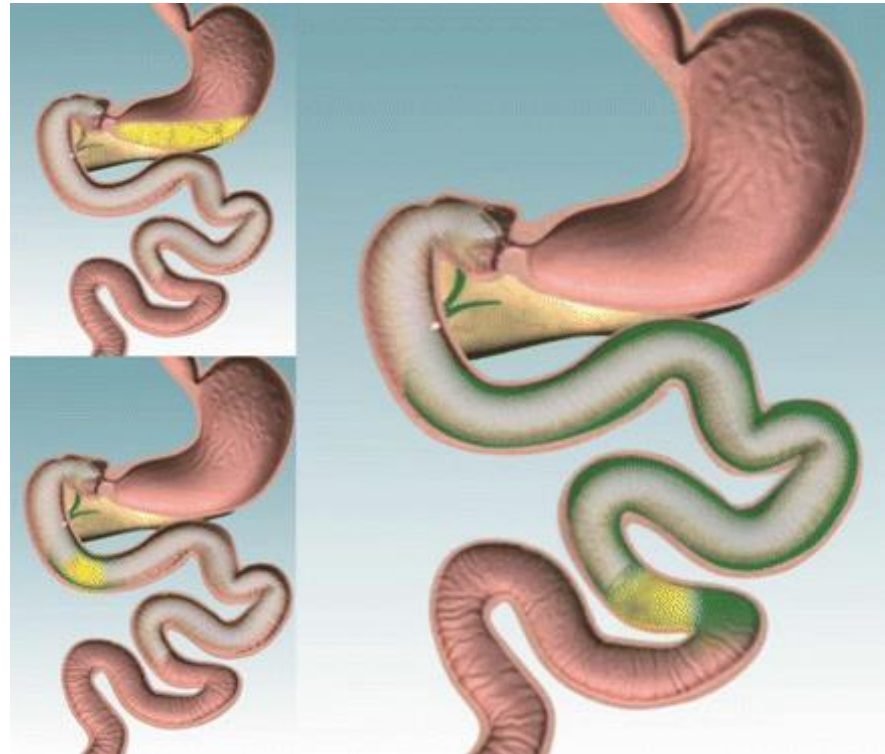
Duodenojejunal Bypass Sleeve (DJBS)



Placement of DJBS

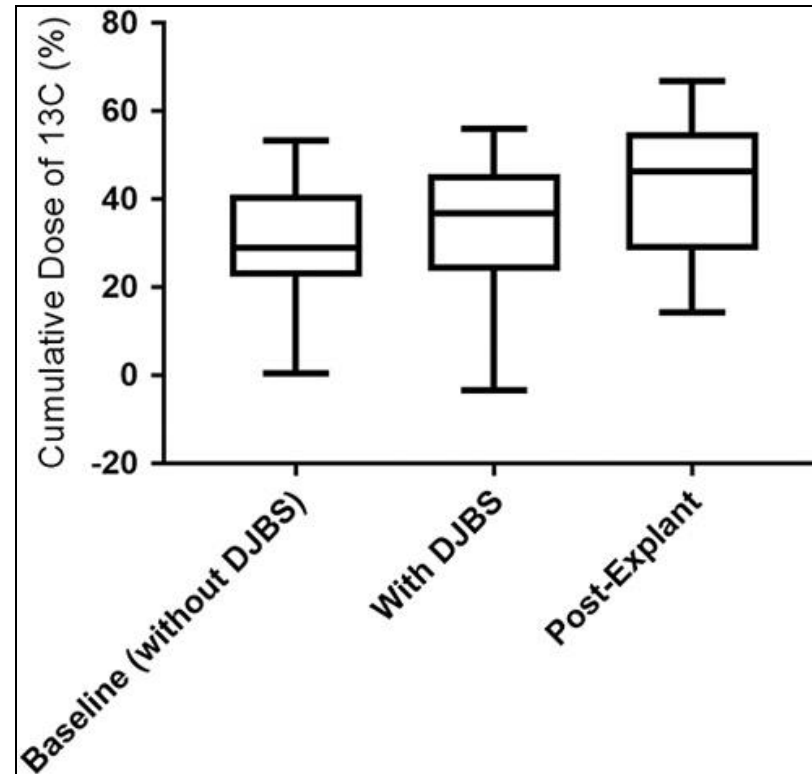


Food is not in contact with the duodenal mucosa

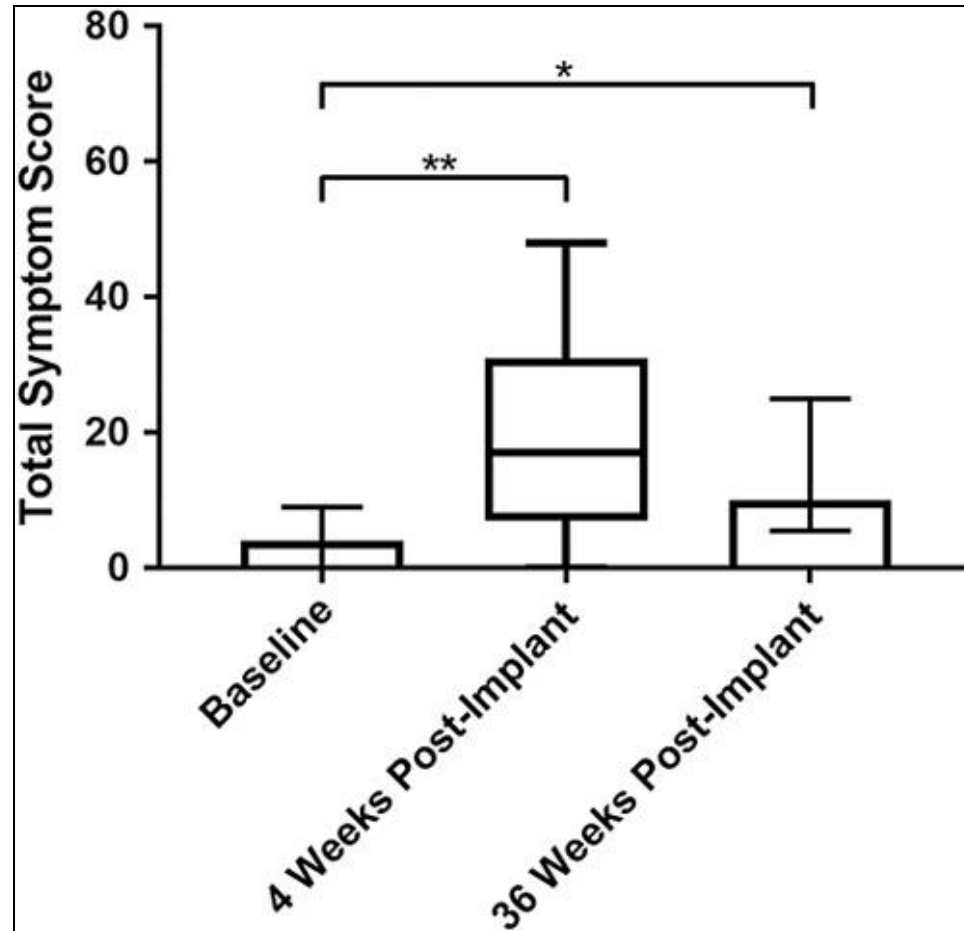


Weight reduction within 1
year: 17.0% (+/-6.5%)

Absorption of Triglycerides (^{13}C labelled)



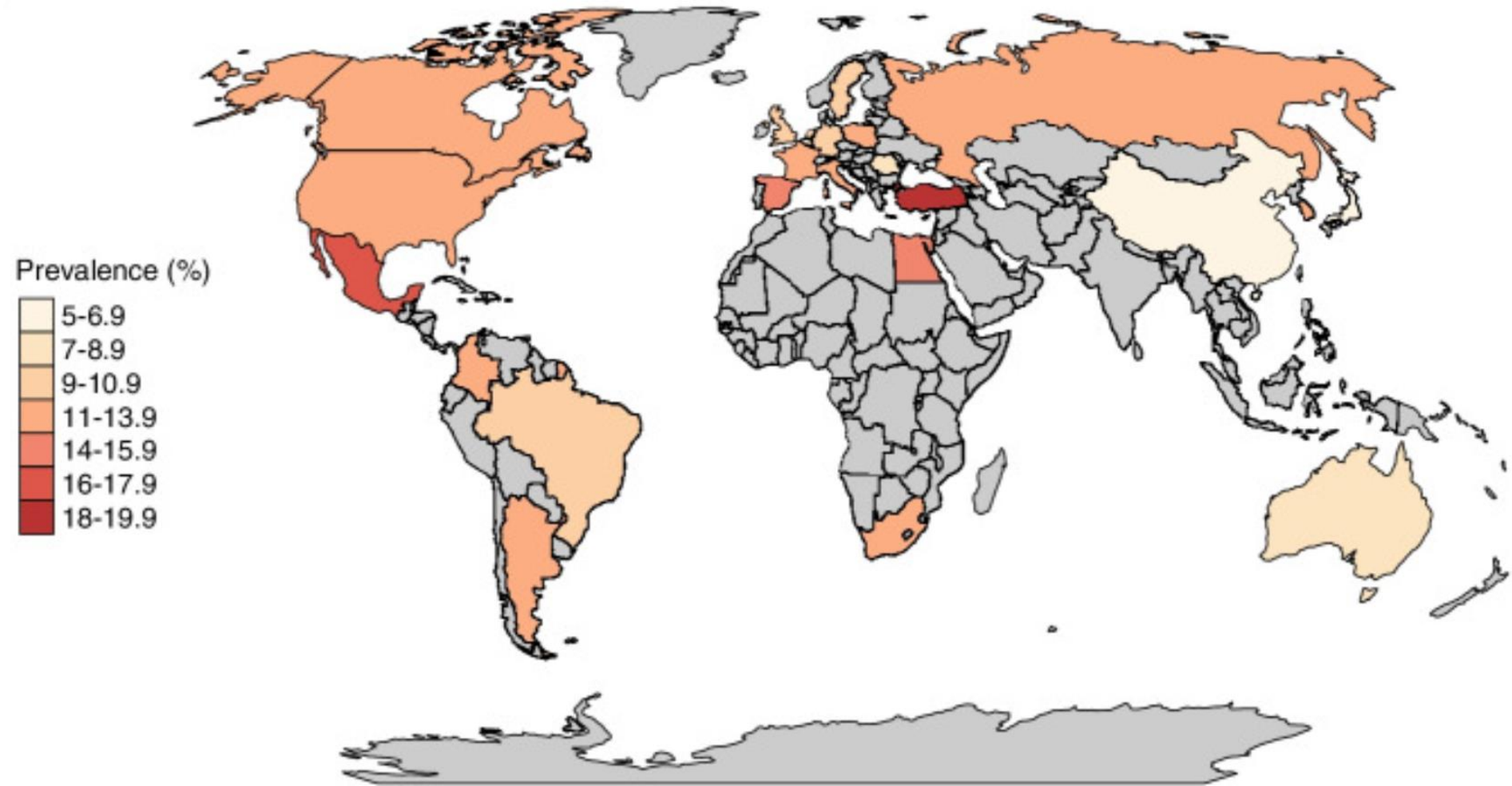
GI symptoms during standardised nutrient challenge before and 4 and 36 weeks after placement of a DBS



Mechanisms of weight reduction with DJBS:

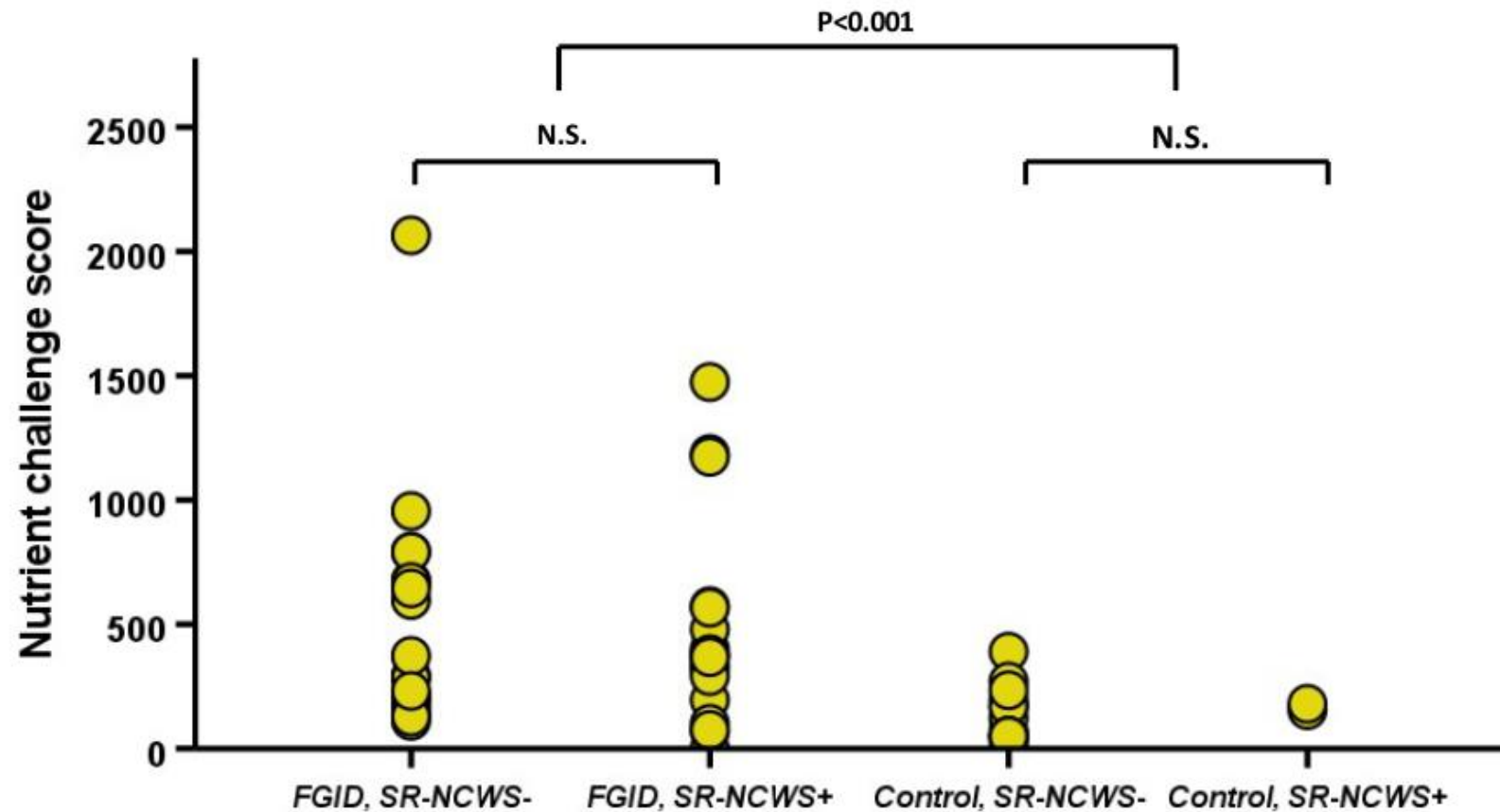
Reduced food intake due to meal related symptoms

Global prevalence and burden of meal-related abdominal pain in DGBI



Symptom response to a standardized nutrient challenge

Shah A, ... Holtmann GJ. Gut Microbes. 2022 Jan-Dec;14(1):2132078.



Patient:



Referral...

33 pages, chronic gastrointestinal symptoms

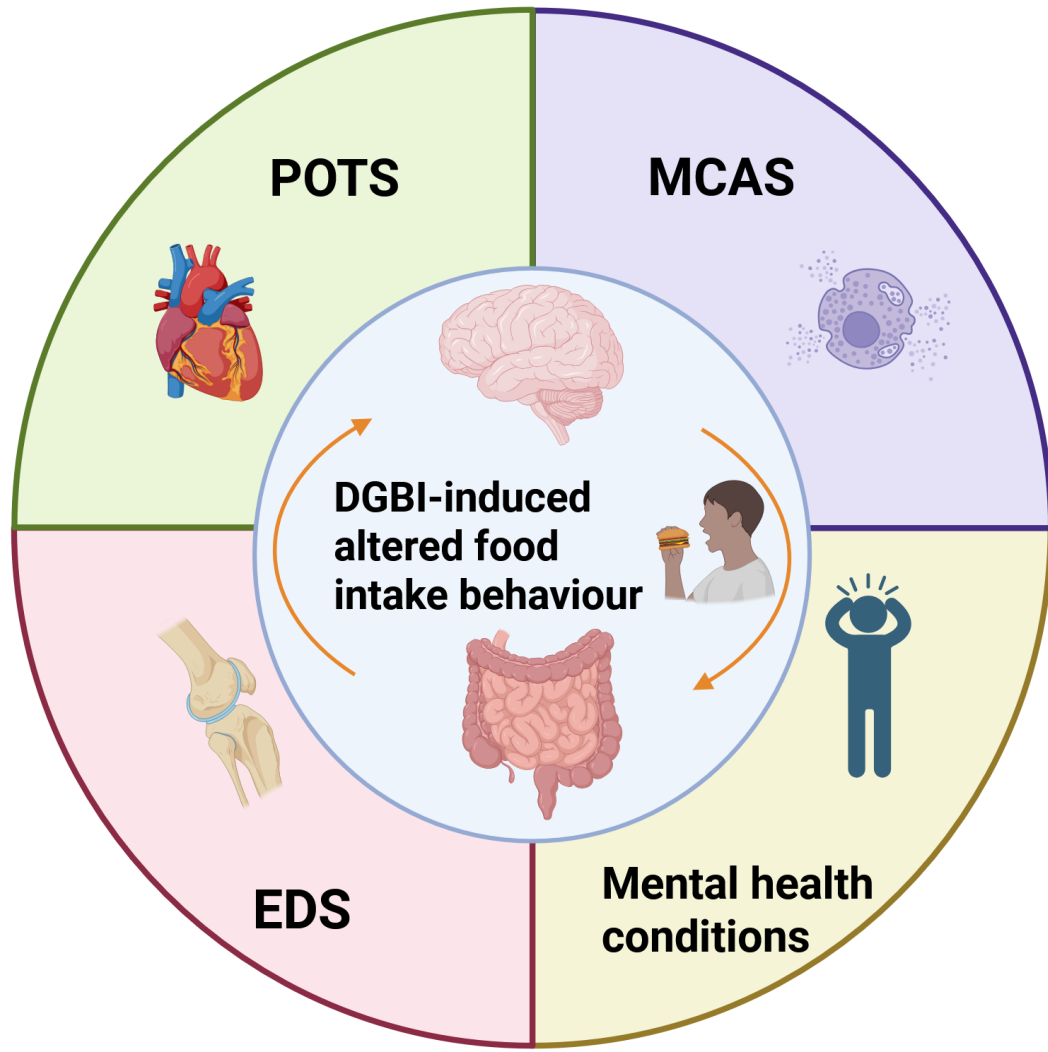
- 24 yrs, female, single, has started to study psychology
- For years abdominal pain, bloating, has symptoms after meals, wheat products appear to aggravate symptoms,
- Multiple GPs, frequent health care utilization, private specialists, allied health providers, gastroenterologists, all investigations known to mankind done, repeated ED presentations.
- POTS, JHD, MCA, vascular abnormalities
- Tube feeding, PEG, PEJ successfully trialed, now relapsed
- Lost weight, BMI now 27



**Patient reports severe
food intolerances and
meal-related symptoms**

The Suggested Relationships Between Common GI Symptoms and Joint Hypermobility, POTS, and MCAS

Eamonn M. M. Quigley, MD, FRCP, FRCPI, Oscar Noble, MD, and Usman Ansari, MD
Division of Gastroenterology and Hepatology, Lynda K. and David M. Underwood Center for Digestive Disorders, Houston Methodist Hospital and Weill Cornell Medical College, Houston, Texas



Other medical diagnoses include:

1. Mast Cell Activation Syndrome (MCAS)
2. Postural Orthostatic Tachycardia Syndrome (POTS)
3. Ehlers-Danlos Syndrome (EDS)
4. Median Arcuate Ligament Syndrome (MALS)
5. Attention-Deficit/Hyperactivity Disorder (ADHD)

Multi-system co-morbidities including MCAS, POTS, EDS, MALS, ADHD!

Therapeutic approaches

- Elimination Diet
- Low FODMAP diet
- High Fibre, Low Protein Diet
- Low Fiber, High Protein Diet
- PPI, H2RA, Prokinetics
- Antidiarrheal medications
- Antibiotics, Probiotics, Prebiotics
- Antidepressants
- Kiwi Extract
- Peppermint Oil
- Cholestyramine
- Nagasogastric tube, PEG, PEJ
- TPN?
- ...



ALL FAILED!

THE TYPICAL NIGHTMARE



GASTROENTEROLOGIST



The clinical approach

Step 1: We establish a diagnosis

This provides a (comprehensive) pathophysiologic concept.

Step 2: We initiate a treatment that is proven for a given diagnosis

Treatment algorithm with escalation steps and long-term plan

Step 3: We re-evaluate and refine treatment

Refinement of treatment, long-term plan

Step 4: Critically reflect and potentially develop new or better therapies

What if....

- There is frequently no diagnosis but a 'conglomerate of rare comorbidities'
- No established pathophysiologic concepts
- Patients in need of treatment (malnourished)
- Frequently present after prolonged exclusion diet, enteral or parenteral nutrition
- Difficult to manage in the routine clinical setting

Options...

....fight

....flight

....denial

....fight

....flight

....denial

....fight

....flight

....denial

What are the challenges for patients and health services?



Increasing numbers of ***patients present with severe meal related symptoms*** undergo extensive and often unnecessary diagnostic work-up.



Frequently, ***trial-and-error treatments and elimination diets fail.***



Patients with subsequent ***nutritional deficiencies are referred to specialized centers*** for management.



Demand for ***long-term enteral feeding or even TPN surges*** due to the failure to treat food intolerances and subsequent nutritional deficiencies.

The health care provider's perspective

These patients are ***difficult to manage and consume considerable resources***, as reflected by the occasions of service and emergency department presentations.

Patients with food allergies ***require specialized care and frequent visits, straining healthcare resources***.

These conditions often involve a ***multidisciplinary approach, requiring input from gastroenterologists, dietitians, and mental health professionals***.

Coordinating care among these specialists and primary care can be ***resource-intensive***.



The patient's perspective



The perceived barrier, stigma and impact of social media

Is this an eating disorder?
Do I have rare medical diagnoses?

...the patient's view

'...I wish there would be a solution for my problem..'

'...Without proper food I have no energy/cannot work and provide for my family..'

'...I do not want to struggle every day when I eat...'

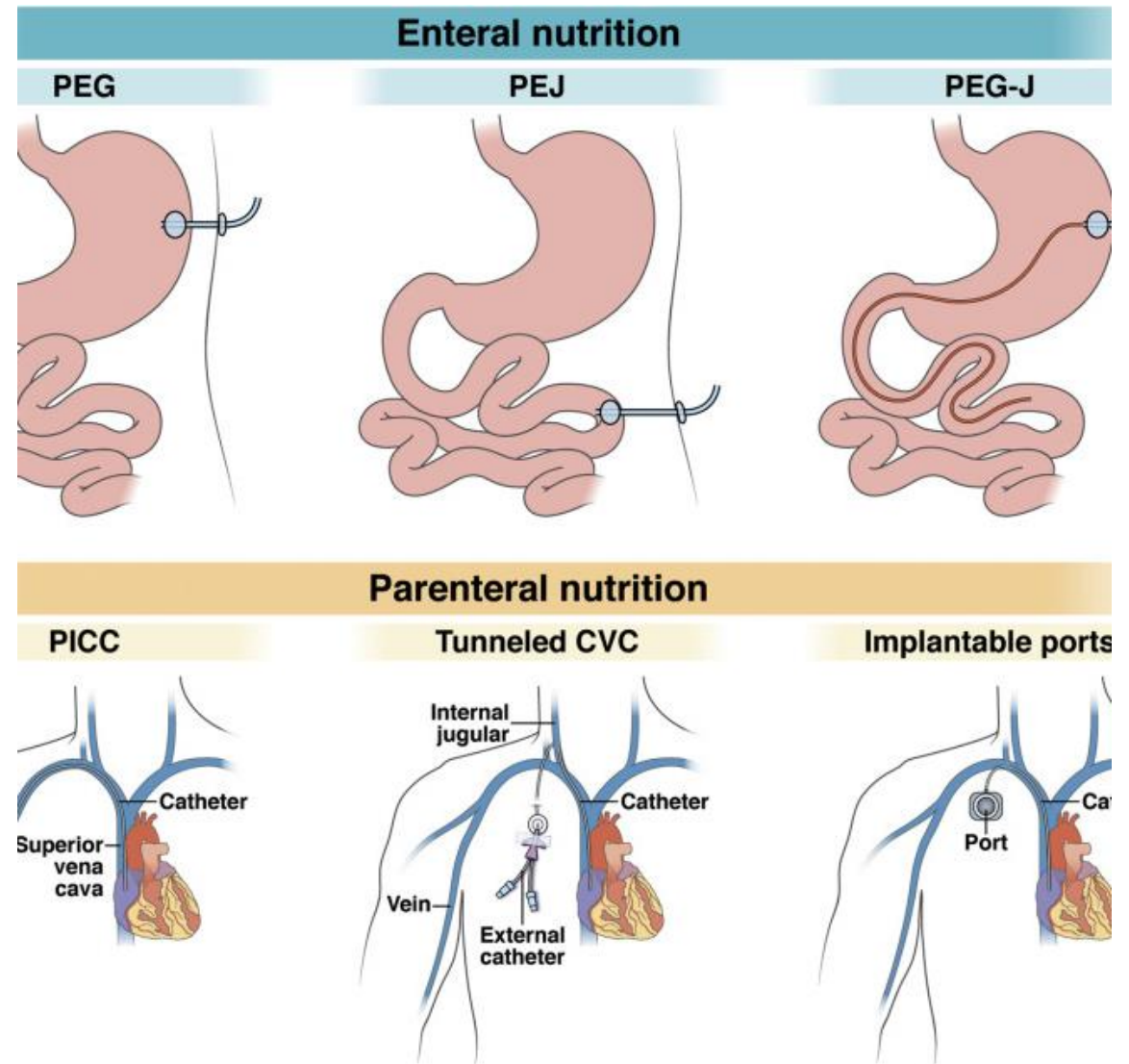
'...I want to know what is wrong with me...'

"...Give me my normal life back..."

Avoiding food seems to be the solution..

Enteral and parenteral nutrition in DGBI

Hadefi A, Arvanitakis M. How to Approach Long-term Enteral and Parenteral Nutrition. Gastroenterology. 2021 Dec;161(6):1780-1786



Enteral and total parenteral nutrition right tools for DGBI?



Enteral nutrition/TPN



DGBI

Complications of Total Parenteral Nutrition (TPN)

- **TPN is life-saving in patients with intestinal failure**
- **Catheter related complications, including sepsis**
- **Metabolic liver disease**
- **Metabolic bone disease**

Is this a real problem?

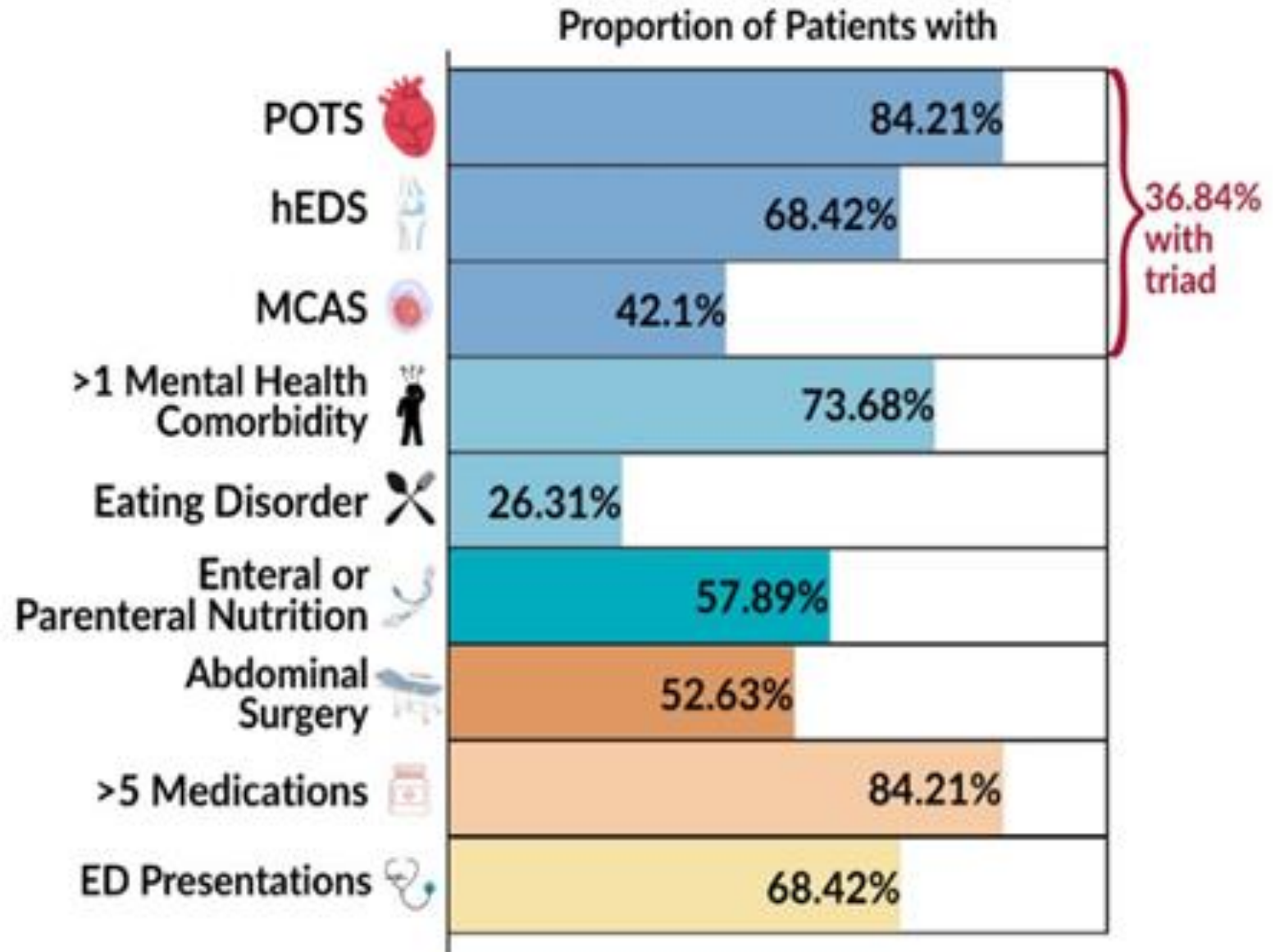
No Australian data on this specific cohort of patients....

Pilot Study

- **Single-center retrospective cohort study was conducted at the Princess Alexandra Hospital.**
- **Patients seen over a 24-month period were included.**
- **For each patient, one age- and gender matched control with DGBI without altered food intake was selected.**
- **Health care utilization was assessed by measuring;**
 - outpatient appointments with different healthcare providers,
 - inpatient encounters,
 - emergency department presentations,
 - medication use,
 - endoscopic procedures and surgical interventions.

Pilot Study: Results

- 19 females with DGBI with altered food intake behaviour were included.
- They had higher GI symptom score compared to age and gender matched controls: 52.5 [15.8] vs 38.4 [15.54], $p = 0.025$.
- On average they had seen 17.7 different healthcare providers.



Queensland Gastroenterology Clinical Network (QGCN)

- **Decision to form a working group to formulate guidelines for the management of the increasing number of patients with DGBI with altered food intake behavior requiring tube feeding or/and total parenteral nutrition with and without rare multi-system co-morbidities.**
- **Partnering with the Australian Gastrointestinal Research Alliance (AGIRA).**
- **Later open invitation to other interested stakeholders across Australia and New Zealand.**
- **26 members of working group: Gastroenterology, Pediatrics, Dietetics, Psychology, Psychiatry and a Consumer representative.**

Management of Patients with Disorders of Gut-Brain Interaction and Altered (Reduced) Food Intake Behaviour

Short title: DGBI-induced altered food intake behaviour

Guideline working team:

Ayesha Shah^{\$\$#@1,2}, Jason P. Connor^{*@3}, Nicholas J. Talley^{%%\$#@4}, Andrew Day⁺⁵, Basil Almehdawy^{*2}, Chamara Basnayake^{#6,7}, Rebecca Burgell^{#8}, Sharon Carey^{~&9,10}, Charles Cock^{#11}, Charlotte Daker⁺¹², Kerith Duncanson^{@\$4}, Vishal Kaushik^{*13}, Simon R. Knowles^{#@14}, Dan Kent^{*15}, Trina Kellar^{*#13}, Natasha Koloski^{*@\$1,2}, Katherine Lane^{*16}, Neal Martin^{*1,2}, Nikhil Thapar^{*>2,17,18}, Paul Stanley^{*1}, Allison Malcolm^{#19,20}, Kate Elizabeth Murphy¹⁶, Gemma Sharp²¹, Caroline Tuck^{@14}, Michael Jones^{\$,22}, Gerald Holtmann^{*\$@^1,2}

@ Member of the guideline steering committee



Guidance

- **23 statements supported (24/26 members of the working team provided feedback, participants not providing feedback were counted as not supporting the respective statement).**
- **Lack of prospective, controlled trials noted, mainly cohort studies on managing patients with DGBI, most statements are based on expert opinion.**

Key statements: Definition of DGBI-AFIB

‘DGBI and altered food intake behavior’ , are defined by gastrointestinal symptoms that fulfil ALL the following criteria:

1. meet the current Rome criteria for DGBI (e.g., functional dyspepsia or irritable bowel syndrome)
2. are aggravated by food intake and result in altered (reduced) food intake
3. result in subsequent (unintended) body weight reduction (>5% of body weight over 6-12 months)
4. predate the altered food intake behaviour and weight loss and
5. an eating disorder has been ruled out or does not explain the clinical presentation.

Key statements: Overlap with Eating Disorders

- Weight loss (**>5% of body weight**) due to ***altered food intake behaviour resulting from meal-related symptoms*** can occur in patients with DGBI, such as functional dyspepsia with postprandial distress syndrome, (supported 92%).
 - ***Eating disorders*** need to be assessed and considered in ***the differential diagnosis of DGBI and altered food intake behaviour***, (supported 92%).
-

Differentiation DGBI-induced altered food intake and Eating disorders

	Disorder of Gut-Brain Interaction (DGBI) with altered food intake	DSM-5 Avoidant/ Restrictive Food Intake Disorder (ARFID)	DSM-5 Anorexia nervosa (AN)	DSM-5 Bulimia nervosa (BN)	DSM-5 Binge eating disorders (BED)	DSM-5 PICA
Patients meet the criteria for DGBI (Rome IV criteria), predating the onset of altered food intake behavior.	Required	Does not exclude ARFID	Does not exclude AN	Does not exclude BN	Does not exclude BED	Not a typical feature of PICA
The DGBI-related symptoms are severe or very severe, defined by their impact on daily life. Severe symptoms cannot be ignored by the patient and impact daily life.	Required	Does not exclude ARFID	Does not exclude AN	Does not exclude BN	Does not exclude BED	Not a typical feature of PICA
Gastrointestinal symptoms are triggered or aggravated by food intake and are consistent with a DGBI before the onset of the altered food intake. These symptoms are the primary (leading) cause for the restricted food intake.	Required	Does not exclude ARFID	May exclude AN	May exclude BN	Excludes BED	Not a typical feature of PICA
Eating or feeding disturbance (e.g., apparent lack of interest in eating; avoidance based on the sensory characteristics of food; concern about aversive consequences of eating), failure to meet nutritional and/or energy requirements associated with one or more of the following: weight loss, inability to achieve expected weight gain, dependence on enteral feeding or nutritional support, interference with psychosocial functioning.	May co-occur but may not fully explain the eating or feeding disturbance.	Required	Not a typical feature of AN	Not a typical feature of BN	Not a typical feature of BED	Not a typical feature of PICA
Restriction of energy intake leads to significantly low body weight, an intense fear of gaining weight, and a distorted body image (restrictive vs. binge eating purge behavior).	Not a typical feature but restrictions of caloric intake can occur.	Not a typical feature of ARFID	Required	Not a typical feature of BN	Not a typical feature of BED	Not a typical feature of PICA
Recurrent episodes of binge eating, with consumption of excessive amounts of food with a sense of lack of control, followed by inappropriate compensatory behaviors (such as self-induced vomiting, excessive exercise, or misuse of laxatives).	Not a typical feature	Not a typical feature of ARFID	Not a typical feature of AN	Required	Not a typical feature of BED	Not a typical feature of PICA
Recurrent episodes of binge eating, defined as consuming an excessive amount of food in a discrete period, accompanied by a sense of loss of control overeating.	Not a typical feature	Not a typical feature of ARFID	Not a typical feature of AN	Not a typical feature of BN	Required	Not a typical feature of PICA
Persistent consumption of non-nutritive, non-food substances.	Not a typical feature	Not a typical feature of ARFID	Not a typical feature of AN	Not a typical feature of BN	Not a typical feature of BED	Required
Repeated regurgitation of food, which may be re-chewed, re-swallowed, or spit out. It is considered a learned behaviour that is classified as a DGBI.	Not a typical feature	Not a typical feature of ARFID	Not a typical feature of AN	Not a typical feature of BN	Not a typical feature of BED	Not a typical feature of PICA

Key statements: Overlap with Rare Co-morbidities

- Anxiety, depression, hypermobility spectrum disorders (HSDs), postural orthostatic tachycardia syndrome (POTS), mast cell activation syndrome (MCAS) and vascular compression syndromes are ***comorbidities that appear to occur in patients with DGBI and altered food intake behaviour.***
 - The diagnosis of ***HSDs, POTS, MCAS or vascular compression syndromes***, in patients with DGBI and altered food intake behaviour should ***always meet contemporary, evidence-based criteria, and these conditions should not be diagnosed based solely on clinical suspicion or self-diagnosis, (supported 92%).***
-

Key statements: Guidance on Management

- In the ***absence of data from clinical trials*** specifically targeting patients with DGBI and altered food intake behaviour, ***management for these patients*** should follow the ***established principles for managing DGBI***.
 - Besides general measures, these treatments include ***pharmacologic (and non-pharmacologic (dietary, psychological and behavioural)*** interventions, preferably with a ***multidisciplinary team***, (supported by 92%)..
 - Patients with DGBI and altered food intake behaviour should be managed by ***providers with the required specialised knowledge*** (e.g., gastroenterologists, psychiatrists, psychologists and dietitians with ***special expertise on the management of patients with DGBI***), (supported by 92%)..
-



Key statements: Nutritional Support

- For all ***malnourished patients*** with DGBI and altered food intake behaviour, ***oral nutrition supplements*** should be ***comprehensively trialled with dietetic oversight*** before consideration of enteral or parenteral nutrition, (supported by 92%).
 - For patients with DGBI and altered food intake behaviour, ***enteral and/or parenteral nutrition should be avoided***, (supported by 92%).
-

Key statements: Nutritional Support

- If enteral or parenteral nutrition is considered in patients with DGBI and altered food intake behaviour to address ***life-threatening nutritional deficiencies***, the patients should be managed at centres with appropriate support from a ***multidisciplinary team with medical (gastroenterology, psychiatry), allied health (dietetics, psychology) and nursing staff*** with expertise in both enteral and parenteral nutrition and the management of patients with complex DGBI, (supported by 92%).
-

Important questions and future directions?

- **What is the incidence and prevalence of DGBI-induced altered food intake and associated comorbidities?**
- **Is there a valid diagnostic tool for diagnosing DGBI-induced altered food intake behaviour?**
- **Are clinical profiles of patients with DGBI-induced altered food intake behaviour different compared to patients with DGBI?**
- **Do patients with DGBI-induced altered food intake behaviour have unique phenotype/pathophysiologic profile?**

Parachute use to prevent death and major trauma related to gravitational challenge: systematic review of randomised controlled trials

Gordon C S Smith, Jill P Pell



HULTON/GETTY

‘...The evidence for the use of a parachute might be limited, but I still would use one..’

- BMJ, Vol 327, 2004

Perspectives

There are limitations in relation to the evidence that informs strategies for managing patients with DGBI-induced altered food intake.

In this setting consensus-based guidelines incorporating common sense, human factors, and lessons from other fields are critical

Informed decisions should be made based on available information and practical experience while patients are managed and outcomes are monitored and more (urgently needed) specific evidence is generated.

Take home messages

- **DGBI-induced altered food intake behaviour needs to be considered when patients present with severe meal-related symptoms and weight loss.**
- **Hypermobile Ehler-Danlos Syndrome, Postural orthostatic tachycardia syndrome (POTS), Mast cell activation syndrome might be risk factors, but need to be diagnosed based upon established diagnostic criteria.**
- **Principles established for the management of complex DGBI need to be applied when these patients are managed.**
- **A multidisciplinary integrated care model is recommended to manage patients with DGBI and altered food intake behaviour effectively.**
- **Research is needed to define risk factors, validate diagnostic criteria, pathophysiologic mechanisms and management strategies.**



Centre of Research Excellence
in Digestive Health



Approach to Patients with Disorders of Gut-Brain Interaction-Induced Altered Food Intake

What the clinician needs to know.

There has been a rise in the number of adolescents and young adults presenting with gastrointestinal (GI) symptoms resembling irritable bowel syndrome and other Disorders of Gut-Brain Interaction (DGBI) in the Australian healthcare system, and 'severe meal-related symptoms. These symptoms can lead to altered food intake and subsequent weight loss, or even nutritional deficiencies. For this syndrome, the term DGBI-induced Altered Food Intake (DGBI-AFI) has now been coined.

Join us for an informative educational event focused on this condition. This event is intended to provide clinicians with critical insights into these challenging conditions. Don't miss this opportunity to deepen your expertise and improve patient care!

**11th Dec
2025**

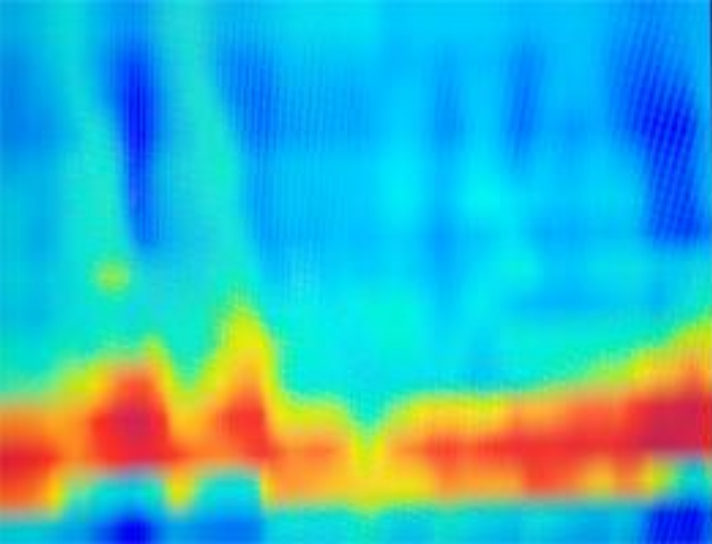
17:30 - 19:30 TRI

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Via TEAMS**

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Save the date!



2026 Australasian Neurogastroenterology and Motility Masterclass



Translational Research Institute
Brisbane, Queensland, Australia



Friday 13 - Saturday 14
MARCH 2026

