

# **Dietary Strategies in IBD**

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**Canada Future Directions in IBD 2019**

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# Disclosures

- Dr. Stapleton has received honoraria (advisory board and speaker fees) from:
  - Ferring, Pfizer, Fresenius Kabi, Takeda, Baxter, Abbvie, Allergan
- Dr. Wine has received honoraria from:
  - Janssen (travel support)
  - AbbVie (advisory board)
  - Nestle (speaker)

# Objectives

- Review the approach to assessment of nutritional status in the IBD patient
- Examine dietary interventions that are appropriate in different clinical situations

# Nutrition Assessment and Malnutrition in IBD

- How *common* is malnutrition?
- How much do current practices *worsen* malnutrition in hospital?
- How should we *screen* IBD patients for malnutrition?
- How should we *assess* nutrition in IBD?

# Which Patients Receive a Dietitian Consult

## NUTRITION CARE IN CANADIAN HOSPITALS STUDY

- Type of hospital, presence of diet technician, surgery vs. medical patient **did not** influence if a dietitian consult occurred
- Only 1 of 18 hospitals had standardized screening program
- Dietitians saw 23% of patients, typically based on referral
  - 45% of these patients were **well nourished**
  - 36% had mild/moderate and 19% had severe malnutrition
- **75% of mild/moderate and 60% of severely malnourished patients were missed using a referral process**
- Nutrition screening can help make sure dietitians are seeing the **RIGHT** patients.



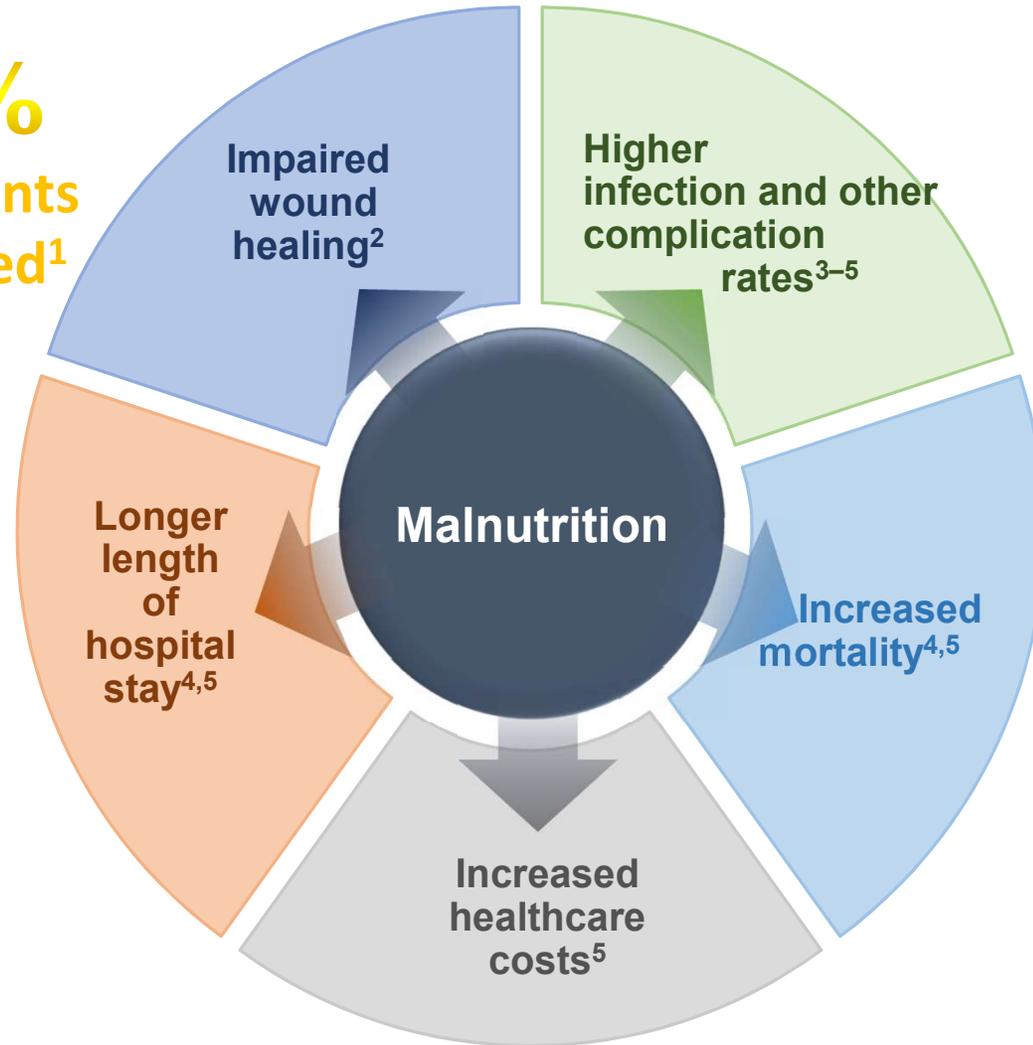
Canadian  
Malnutrition  
Task Force™

le Groupe de  
travail canadien  
sur la malnutrition™

Advancing Nutrition Care in Canada / Améliorer les soins nutritionnels au Canada

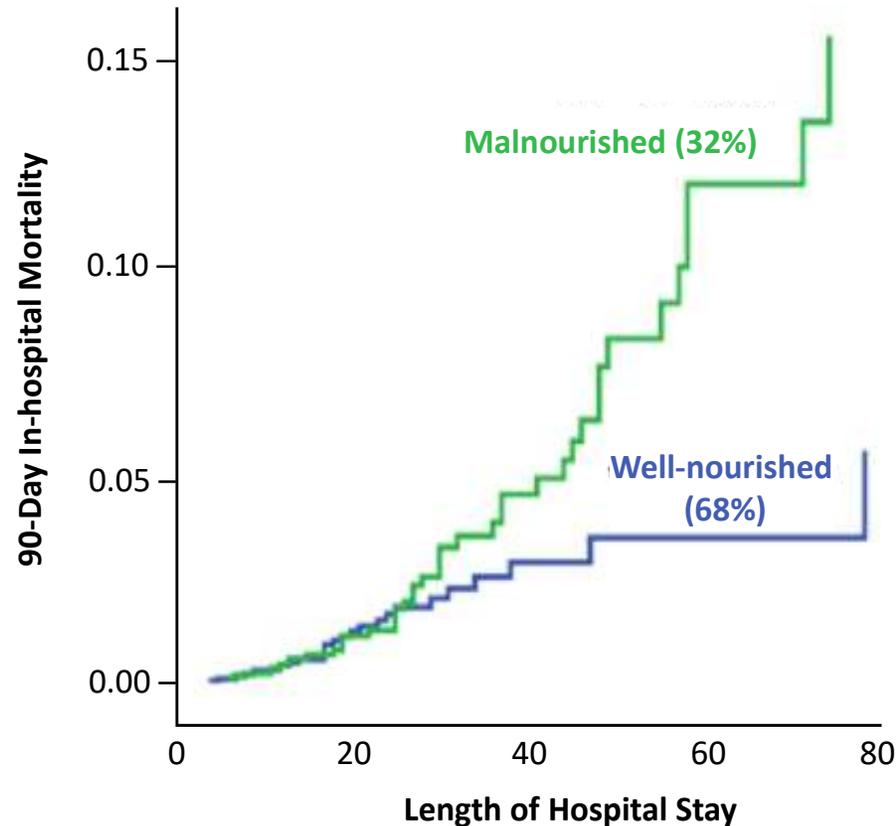
(Keller et al., Clin Nutr 2015)

Around **42%**  
of hospital patients  
are malnourished<sup>1</sup>



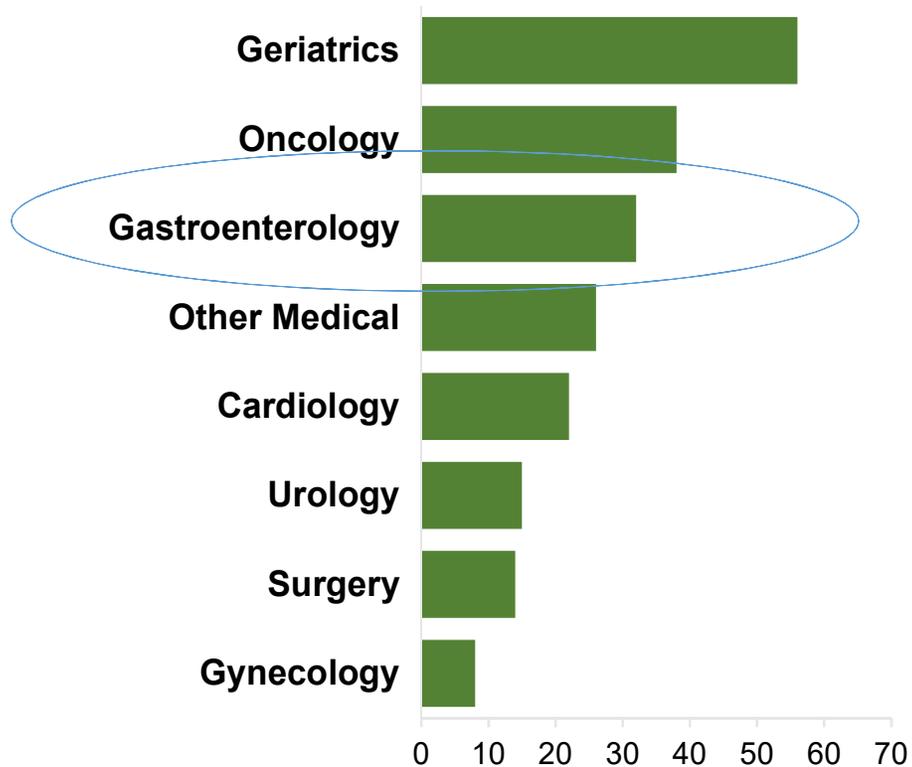
1. Norman K, et al. *Clin Nutr.* 2008;27:5–15; 2. Haydock DA et al. *JPEN J Parenter Enteral Nutr.* 1986;10:550-554; 3. Schneider SM, et al. *Br J Nutr.* 2004;92:105-111; 4. Goiburou ME, et al. *Nutr Hosp.* 2006;21:604-610; 5. Correia M, et al. *Clin Nutr.* 2003;22:235-239.

# Malnutrition Is Associated With Increased In-hospital Mortality



- 3,122 patients
  - 56 hospitals
- 32% malnourished
- 2x odds of 90-day in-hospital mortality if malnourished
  - (CI: 1.09-3.34, p=0.023)

# The German Hospital Malnutrition Study



**Risk Factors for Malnutrition by Multivariate Logistic Regression Models**

	OR (95% CI)	P
Age	1.43 (1.35-1.51)	<0.001
No of Drugs	1.096 (1.06-1.13)	<0.001
Malignant Disease	1.519 (1.18-1.93)	0.001

# Iatrogenic Malnutrition

- Hospitalized patients with Ulcerative Colitis (UC)
  - 158 patients, 187 admissions
  - “Justifiable” NPO or clear fluids
    - intractable nausea or vomiting
    - Pancreatitis
    - bowel obstruction
    - toxic megacolon
    - awaiting endoscopy
    - alternative enteral nutrition provided

# Iatrogenic Malnutrition

- 252 NPO orders in 142 admissions (76%)
  - **112 (44%) unjustified – average 3 days duration**
  - 32 admissions (17%) had RD referral
  - 68 (36%) had weight recorded

# Iatrogenic Malnutrition

- Hospitalized patients
  - 46.6% of admissions – at least one NPO order
    - Mean duration 12 hours (2 missed meals)
  - 23% of NPO orders avoidable
  - 42% unavoidable but too long in duration

**44% of missed meals in one year did not need to be missed**

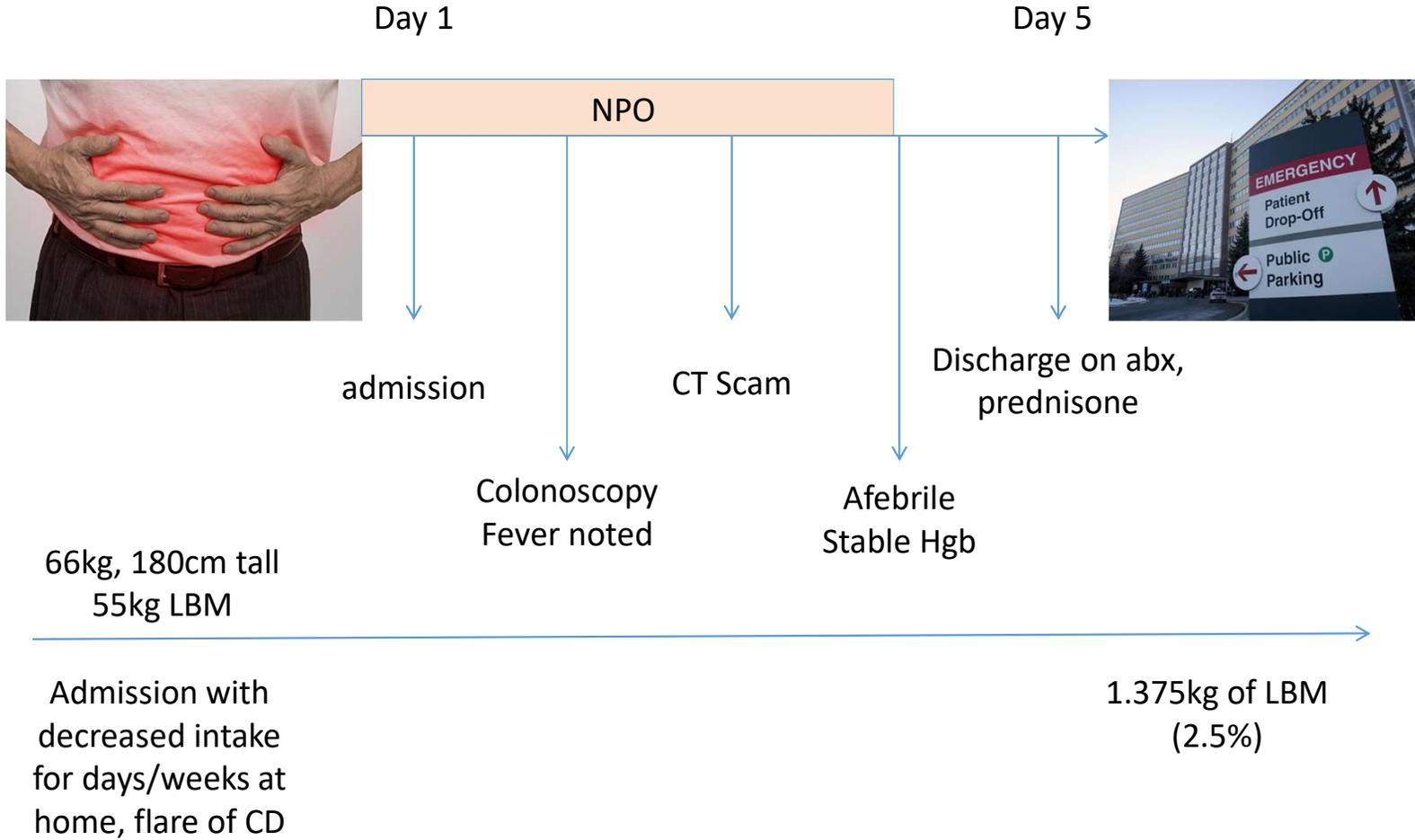
# Iatrogenic Malnutrition

- General medical patients
  - 924 NPO orders assessed
  - Indicated intervention was not performed for 183 (19.8%) orders
    - due to a change in plan (75/183, 41.0%)
    - scheduling barriers (43/183, 23.5%)
  - Median duration of NPO orders
    - from 8.3 hours for kidney ultrasound to 13.9 hours for upper endoscopy

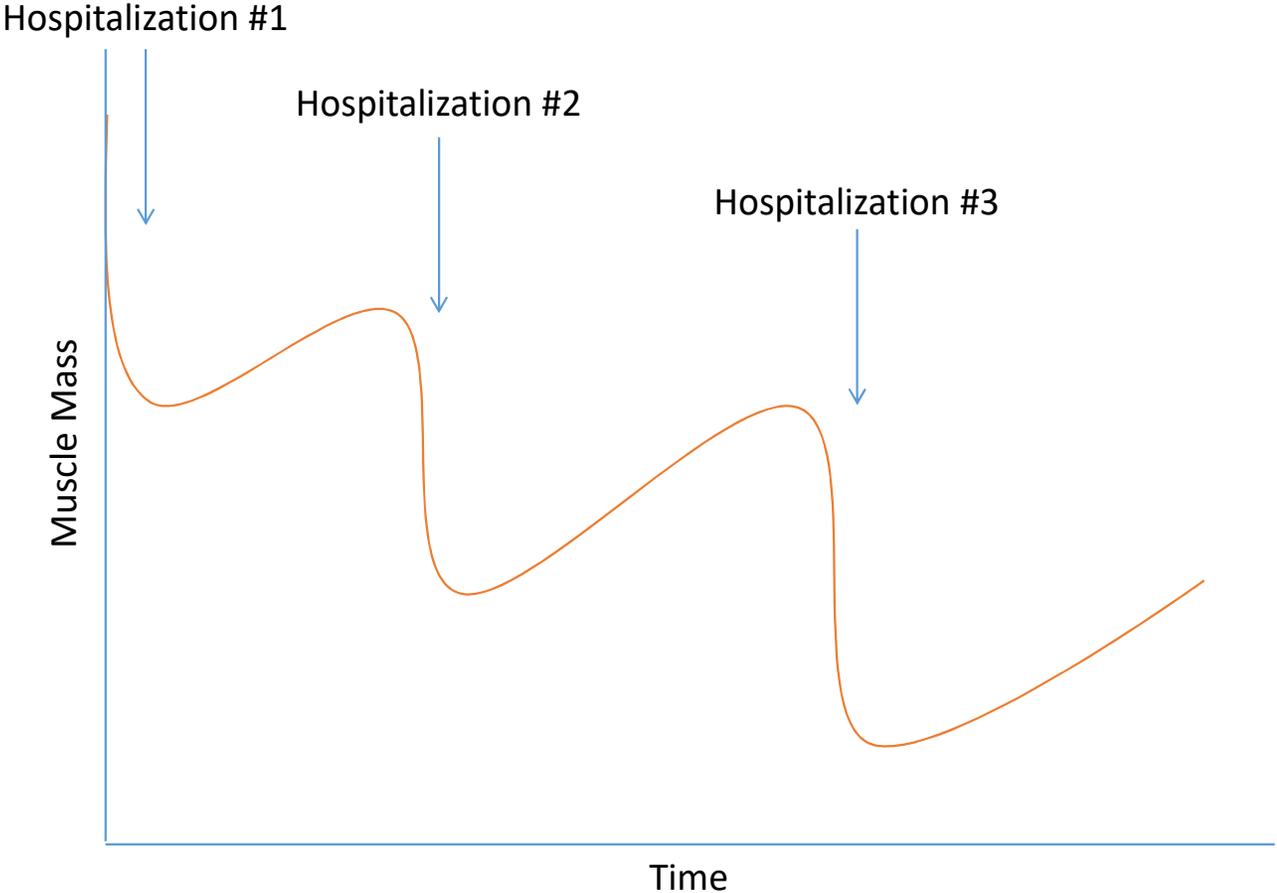
NPO Too often

NPO Too long

NPO for too many (incorrect) reasons



# The Catabolic Crisis



# Nutrition Screening: What is it?

- A process to identify an individual who is:
  - ✓ At **risk** of malnutrition (risk factors are present that impair intake and/or increase the body's needs for nutrients and/or energy)
  - ✓ **Malnourished**
  - ✓ Likely to benefit from further nutrition assessment and treatment
- It is a **rapid and simple process** conducted by **admitting** or front line staff, typically a nurse not a nutrition professional.

# Canadian Nutrition Screening Tool (CNST)

- **Simple, easy to use, 2 question tool**

- Rigorously validated and tested for reliability in 3 Canadian hospitals using regular personnel (n=140).
  - Criterion validity: SE 73% & SP 86%;
  - Inter-rater reliability (n = 122): Kappa = 0.88; 95% CI (0.80-0.97)
  - Nursing personnel say that the CNST was easy to use
- 
- These results indicate that screening can be readily and reliably completed by a staff member with minimal training.

# Canadian Nutrition Screening Tool

## Identify patients who are at risk for malnutrition

Ask the patient the following questions*	Date:		Date:	
	Admission		Rescreening	
	Yes	No	Yes	No
Have you lost weight in the past 6 months <b>WITHOUT TRYING</b> to lose this weight? <small>If the patient reports a weight loss but gained it back, consider it as NO weight loss.</small>				
Have you been eating less than usual <b>FOR MORE THAN A WEEK?</b>				

**Two “YES” answers indicate nutrition risk<sup>†</sup>**

\* If the patient is unable to answer the questions, a knowledgeable informant can be used to obtain the information. If the patient is uncertain regarding weight loss, ask if clothing is now fitting more loosely.

# Subjective Global Assessment: Components

## History:

Changes in dietary intake

Gastrointestinal and other symptoms that impair food intake/absorption

Functional capacity

Potential stress of disease and/or cachexia

Changes in weight over past 6 months

## Physical:

Loss of subcutaneous fat: triceps, chest, trunk

Muscle wasting: deltoids, quadriceps, biceps, ...

Edema: ankle, sacral, ascites (only due to malnutrition)

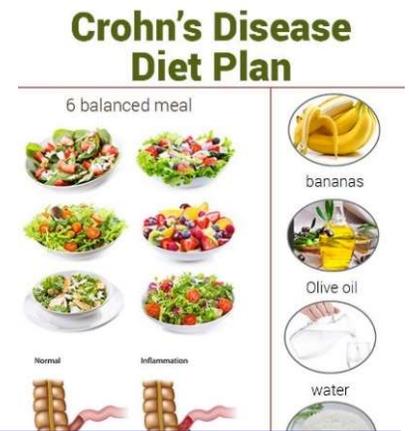
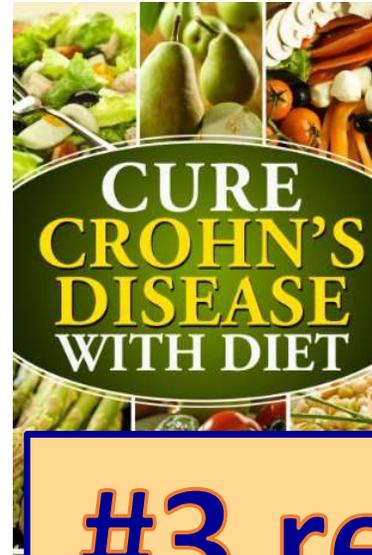
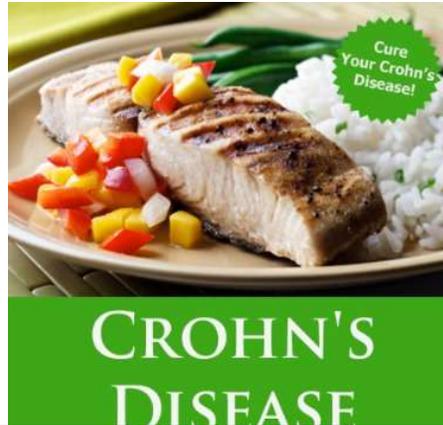
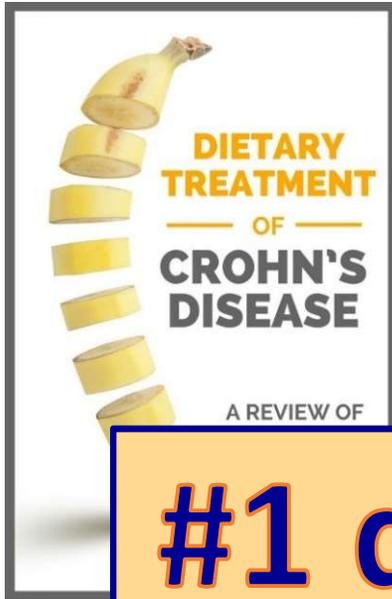
# Why use SGA?

- Predicts outcome
- Independent of body weight
- Intervention improves outcome

# Obesity and IBD

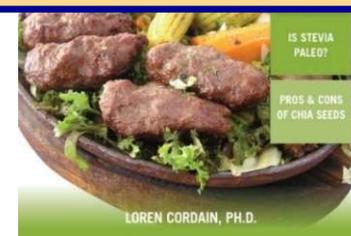
- ~20–40% of patients with IBD in Western countries are obese
- Premorbid obesity, in particular visceral adiposity, might increase the risk of developing Crohn's disease
- Obesity might contribute to the pathogenesis of IBD through dysbiosis, mucosal barrier dysfunction with bacterial translocation and activation of adipocytes
- Risk of complications, such as surgery, hospitalization and infection, might be increased in patients with IBD who are obese
- Obesity is associated with rapid clearance of biologic agents, resulting in low trough concentrations, and could result in suboptimal response to biologics
- Treating obesity could be a potential adjunct therapeutic target in patients with IBD who are obese
- **Malnutrition and obesity can coexist in patients with IBD**

# Diet and Crohn Disease: What's out there?



**#1 question I get**

**#3 research priority**



Grant *et al.* *JPGN* 2019;69:317-23.

# Dietary Interventions in IBD:

- What advice do you currently give to your patients when they ask about diet?

## **Need to differentiate between:**

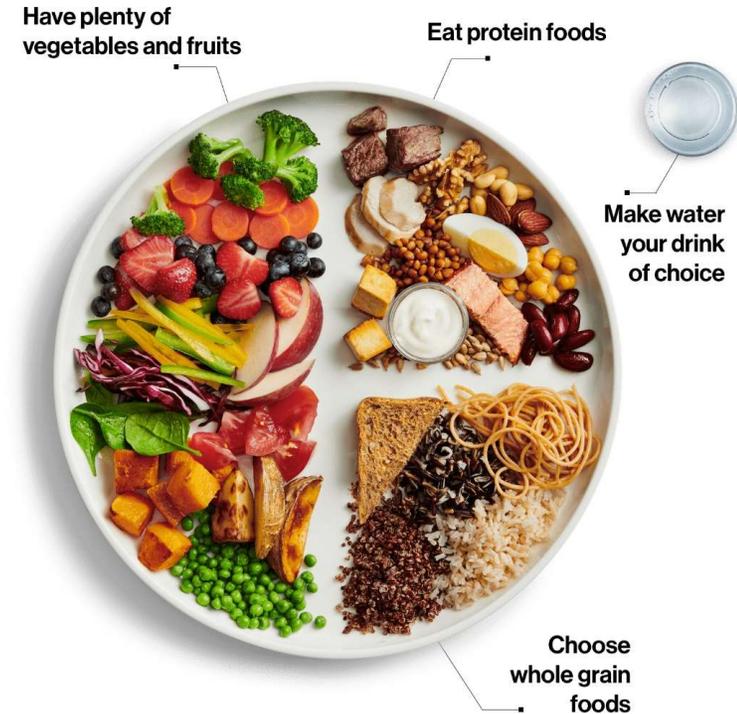
1. Dietary support/rehabilitation
2. Advice on diet for IBD:
  - What to avoid
  - What to eat
3. Diet as primary (or adjuvant) treatment (*e.g.*, EEN, CDED, SCD...)

# Dietary support/rehabilitation

- Fluid and electrolyte balance and hydration are the priority for sick patients.
- Avoid development of catabolic state – give enough protein.
- Avoid frequent NPOs.
- Bowel rest is not a treatment for IBD (but may reduce number of BMs).
- Oral nutrition is the default; if not tolerating consider NG and only then TPN.
- Watch out for refeeding syndrome in severely malnourished patients.
- Oral iron is less effective during active disease; prefer IV in most cases.

# General Advice on Diet in IBD

- What I always used to say to my patients:
  - No single diet has been shown to cause IBD and no single diet will treat or prevent the disease.
  - If anything makes your symptoms worse... avoid it!
  - As a general rule, we recommend to follow the Canada Food Guide for a healthy diet.



However... this is an evolving field!

# What do the guidelines say?

## British Society of Gastroenterology consensus guidelines on the management of inflammatory bowel disease in adults

Lamb CA, *et al.* *Gut* 2019;0:1–106. doi:10.1136/gutjnl-2019-318484

**Good Practice Recommendation 20.** IBD patients should be encouraged to eat a varied diet that meets their energy, macro- and micronutrient requirements. All who are at risk of malnutrition should have dietitian or nutrition team review, and where nutritional requirements cannot be met, supplementation with enteral or parenteral nutrition are indicated (Agreement: 100%).

### Box 8 Practical dietary advice in IBD

#### In general:

- ▶ Some dietary components (ie, cereals, dietary fibre, sugar, fat, fruit, vegetables and protein) have been associated with IBD; however, a relapse or ongoing symptoms cannot be attributed to one dietary component
- ▶ Non-evidence based self-directed exclusion diets are to be discouraged as they can lead to limited diet quality and nutrient deficiency
- ▶ All IBD patients should be advised to eat a varied diet to meet energy and nutrient requirements, including dietary fibre. The diet should be based on local healthy eating guidelines and include a wide variety of fruit and vegetables, cereals, grains, nuts and seeds, protein-rich foods with a moderation/reduction of high fat, particularly animal fat, high sugar and processed meats
- ▶ Patients with stricturing Crohn's disease: consider limiting dietary fibre and fibrous foods. Supplementation with enteral or parenteral nutrition may be required to achieve energy and nutritional requirements
- ▶ Patients with functional bowel symptoms (in remission/mildly active disease): consider giving dietary advice as for irritable bowel syndrome (eg, low FODMAP diet)

# General Advice on Diet in IBD

- What am I saying today?

- No single diet has been shown to cause IBD and no single diet will treat or prevent the disease.
- Beware of unsupervised exclusion diets! Especially those driven by serum IgG.
- As a general rule, we recommend to follow the Canada Food Guide for a healthy diet, but there are emerging data to specifically support the following:



# General Advice (poor human data...)

- Diet is likely a factor in IBD pathogenesis – we just don't understand how.
- There is an association with a 'Western diet'.
- Animal data suggest negative effects of preservatives, emulsifiers, animal fat, and a few other ingredients.
- Diet is an important part of your QOL – be careful not to suffer too much when the evidence is not there.
- Overall, following the CFG, or a Mediterranean-like diet should be encouraged.
- Eat fresh.
- Eat diverse.
- Make your own food (from scratch).
- Eat more plant-based food.
- Think of your bacteria (and what they like to eat).

However... this is  
an evolving field!

# Diet as primary (or adjuvant) treatment for IBD

## Dietary interventions for induction and maintenance of remission in inflammatory bowel disease (Review)



**Cochrane**  
**Library**

Cochrane Database of Systematic Reviews

Limketkai BN, Iheozor-Ejiofor Z, Gjuladin-Hellon T, Parian A, Matarese LE, Bracewell K, MacDonald JK, Gordon M, Mullin GE

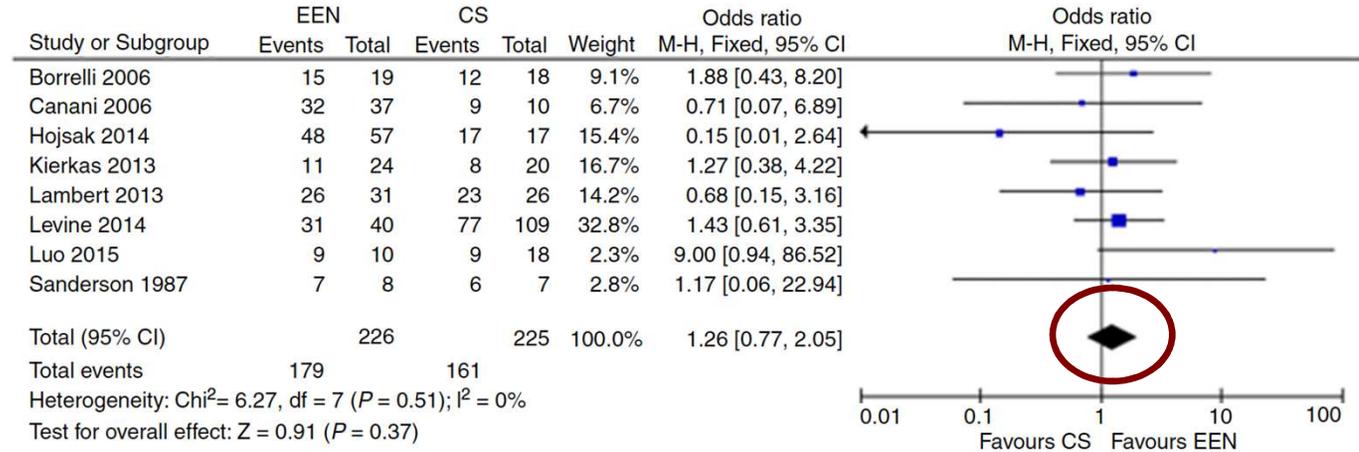
### Authors' conclusions

The effects of dietary interventions on CD and UC are uncertain. Thus no firm conclusions regarding the benefits and harms of dietary interventions in CD and UC can be drawn. There is need for consensus on the composition of dietary interventions in IBD and more RCTs are required to evaluate these interventions. Currently, there are at least five ongoing studies (estimated enrollment of 498 participants). This review will be updated when the results of these studies are available.

Limketkai *et al.*, Cochrane Review, Feb, 2019

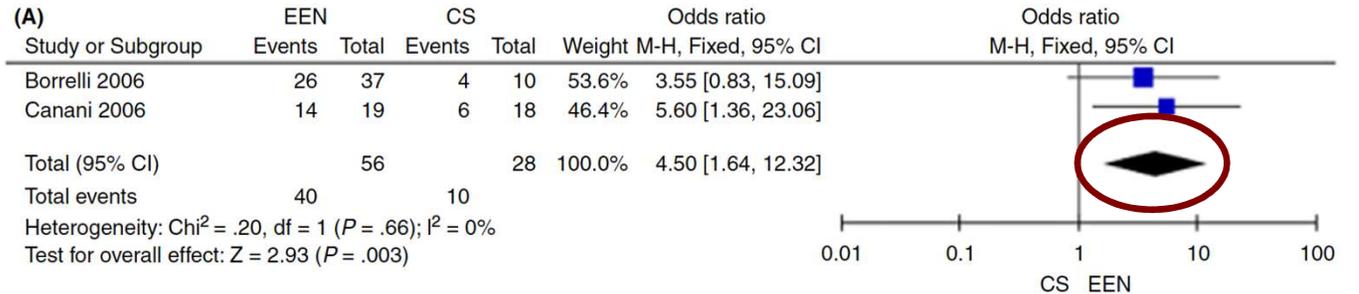
# Meta-analysis: EEN vs. Steroids

**Induction of remission:**  
 equivalent; OR 1.26  
 (0.77, 2.05)  
 favouring EEN



**FIGURE 2** Comparison of remission induction for EEN vs CS

**Mucosal Healing:**  
 EEN is superior: OR  
 4.5 (1.46, 12.23)

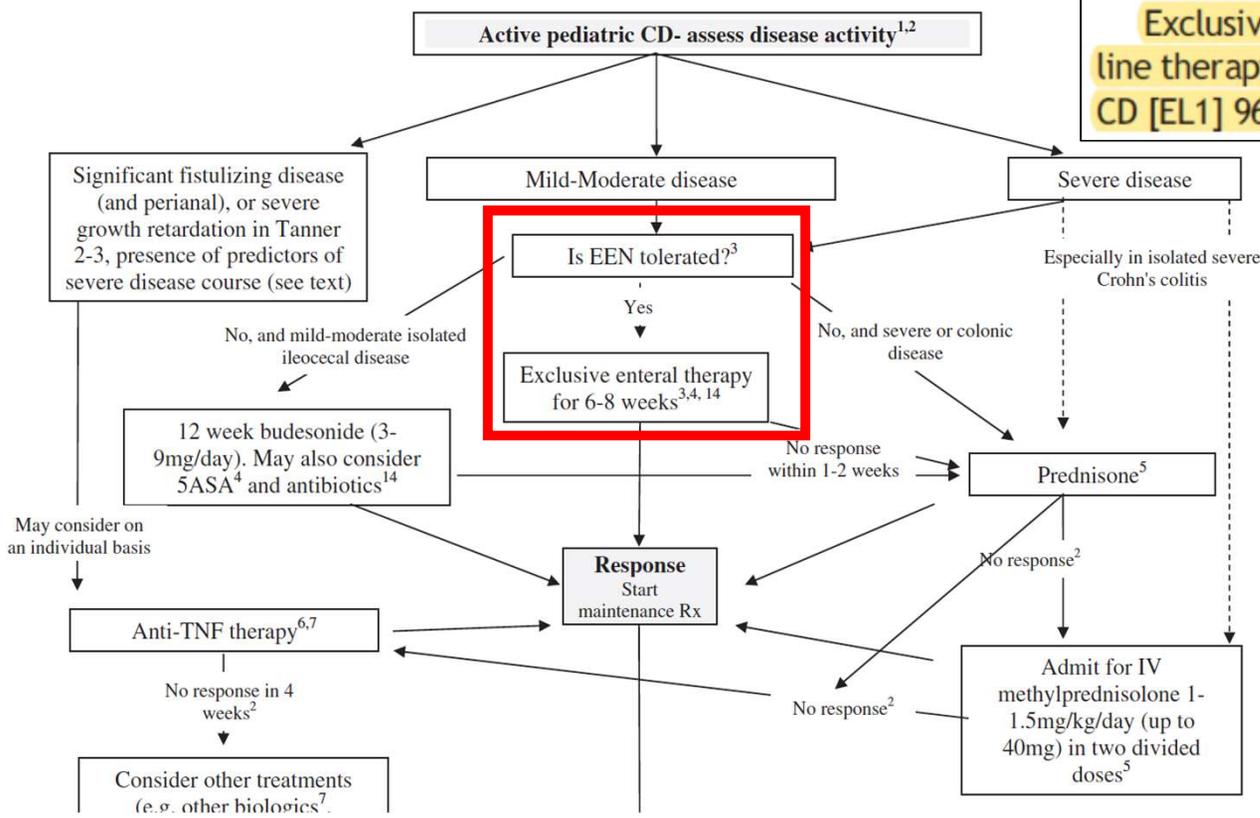




# Consensus guidelines of ECCO/ESPGHAN on the medical management of pediatric Crohn's disease

Therapeutic paradigm for pediatric Crohn's disease (excluding perianal disease)

**Statement 1**  
 Exclusive Enteral Nutrition (EEN) is recommended as first line therapy to induce remission in children with active luminal CD [EL1] 96% agreement



# British Society of Gastroenterology consensus guidelines on the management of inflammatory bowel disease in adults

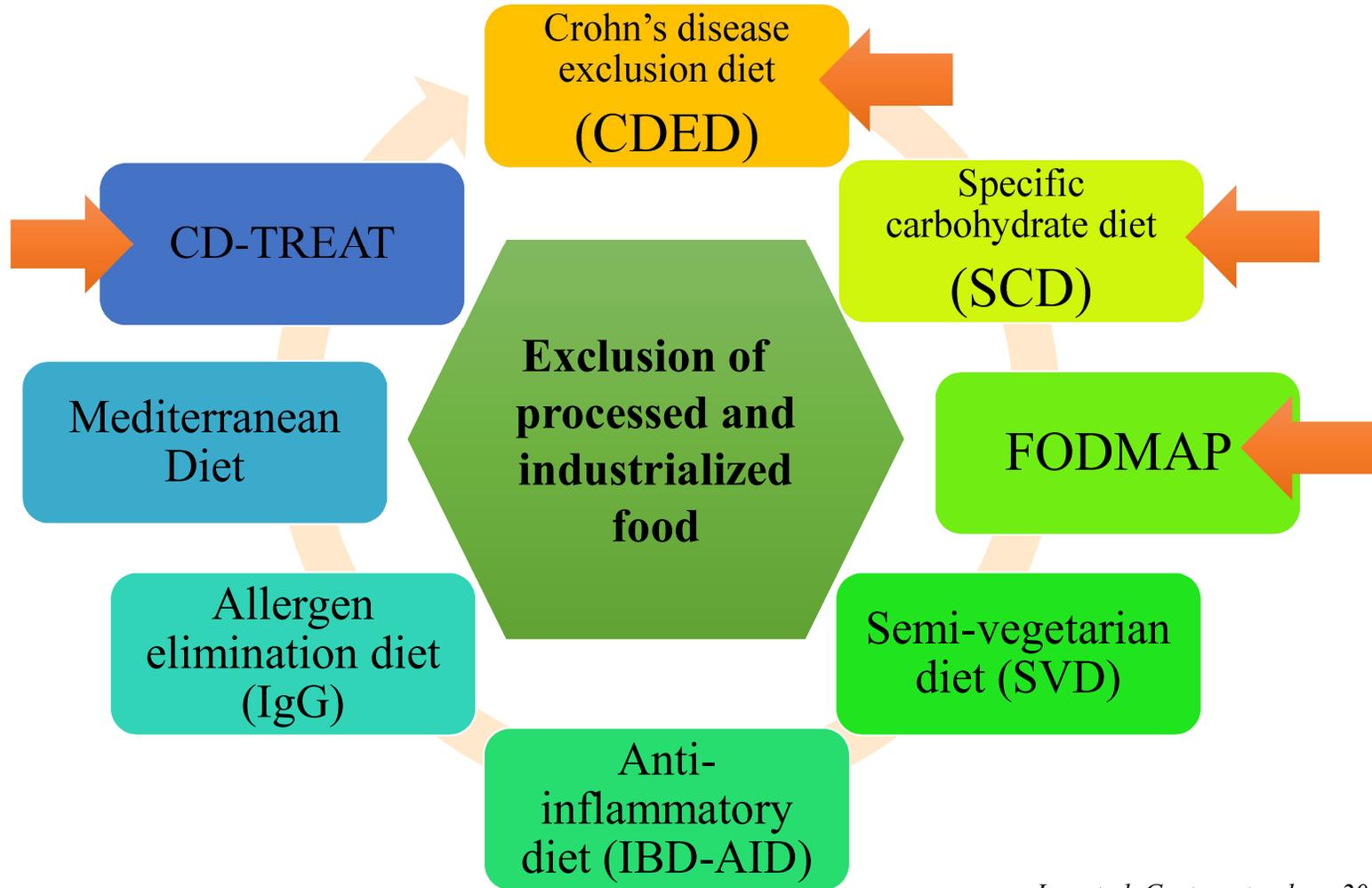
**Statement 34.** We suggest that Exclusive Enteral Nutrition (EEN) may be used to induce remission in mild to moderate Crohn's disease patients where avoidance of corticosteroid is desired, and in those who are motivated to adhere strictly to EEN for up to 8 weeks (GRADE: weak recommendation, very low-quality evidence. Agreement: 86.4%).

**Statement 104.** We suggest that a low FODMAP diet may be used to treat functional bowel symptoms in IBD patients (GRADE: weak recommendation, low-quality evidence. Agreement: 84.4%).

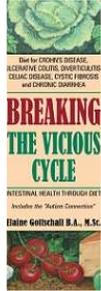
## 4.2.3.2 Elimination diets

There is much interest in elimination diets being used to induce or maintain disease remission. Following a course of EEN, patients can be unsure what foods to add back into their diet first. A low fat, low fibre, exclusion (LOFFLEX) diet was developed to provide a dietary intervention for 2–4 weeks based on a small number of foods unlikely to trigger symptoms (an exclusion diet) followed by gradual food reintroduction with a new food every few days. The LOFFLEX diet has been shown to maintain disease remission in 56% of patients at 2 years,<sup>437</sup>

# Elimination Diets for IBD (mostly Crohn disease)

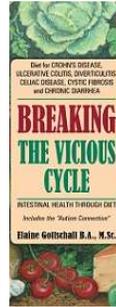


# Specific Carbohydrate Diet (SCD)

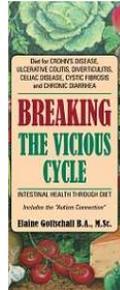


**Disaccharide and polysaccharide carbohydrates are poorly absorbed in the gastrointestinal tract**

**Causing bacterial and yeast overgrowth**



**Resulting in overproduction of mucus and inflammation/ injury in the intestinal wall**



James D. Lewis, Maria T. Abreu . *Gastroenterology* 2017;152:398–414

<http://www.breakingtheviciouscycle.info/>

TABLE 1. Specific carbohydrate diet instructions

## Foods that may be eaten

- Fresh/frozen vegetables and legumes
- Fresh/raw/dried fruits, unsweetened juices (not from concentrate)
- Navy beans, lentils, peas, split peas, most nuts (unroasted preferably nuts coming directly from shells so that nothing is added), natural peanut butter (with no sugar), lima beans, string beans
- Fresh/frozen meats, poultry, fish, eggs
- Some (natural/hard) cheeses (cheddar, Colby, Swiss, Havarti), homemade yogurt fermented >24 hours (no sugar added), dry curd cottage cheese
- Honey
- Tea, coffee, mustard, vinegar, most oils

## Foods to avoid

- Canned vegetables
- Canned fruits, unless packed in own juices
- All grains, including flours
- Potatoes, yams, parsnips
- Chickpeas, bean sprouts, soybeans, mung beans, fava beans, and garbanzo beans
- Seaweed and byproducts, including agar and carageenan
- Processed, canned, breaded, smoked meats/fish
- All milk, buttermilk, commercially prepared yogurt and sour cream, heavy cream, soy/rice/potato/oat/hemp milk
- Instant tea or coffee, coffee substitutes, beer
- Canola oil, mayonnaise (due to additives), cornstarch, chocolate or carob, bouillon cubes or instant soup bases, all products made with refined sugar, sugar substitutes, Stevia, pectin, ketchup, ice cream, molasses, corn or maple syrup, baking powder, medication containing sugar, all seeds, balsamic vinegar, fructo-oligo saccharides

# Clinical/Laboratory Improvements with SCD in Pediatric IBD

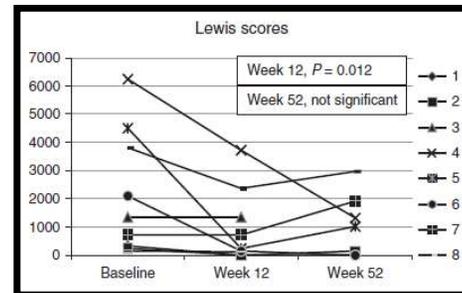
**12 Children, 9 CD, 3 UC  
SCD for 12 weeks**

**TABLE 2.** Mean Clinical Disease Activity Index and Mean Laboratory Measures for Patients With Inflammatory Bowel Disease on the Specific Carbohydrate Diet (Mean ± SD)

Elements	Enrollment	2 wk	8 wk	12 wk
PCDAI	28.1 ± 8.8	14.8 ± 12.8	7.9 ± 11.23	4.6 ± 10.3
PUCAI	28.3 ± 23.1	8.3 ± 2.9	6.7 ± 2.9	6.7 ± 11.6
CRP (mg/L)				
Seattle (normal < 8.0)	24.1 ± 22.3	18.3 ± 27.0	7.9 ± 1.6	7.1 ± 0.4
Atlanta (normal < 4.9)	20.7 ± 10.9	13.4 ± 15.4	12.0 ± 14.6	4.8 ± 4.5
Sedimentation rate (mm/h)				
Seattle (normal 0-20)	15.3 ± 11.0	11.0 ± 9.6	8.3 ± 6.0	7.4 ± 5.5
Atlanta (normal 0-32)	35.7 ± 1.2	26.7 ± 16.6	11.7 ± 6.4	12.0 ± 12.7
Albumin (g/dL)				
Seattle (normal 3.8-5.4)	4.1 ± 0.77	4.1 ± 0.7	4.5 ± 0.6	4.4 ± 0.4
Atlanta (normal 3.5-5.5)	3.2 ± 0.76	3.4 ± 0.5	3.7 ± 0.6	3.4 ± 0.7
Calprotectin (µg/g)				
Seattle (normal < 50)	642.3 ± 648.6	—	—	202.6 ± 245.2
Atlanta (normal < 50)	110.0 ± 100.0	—	—	209.0 ± 159.8

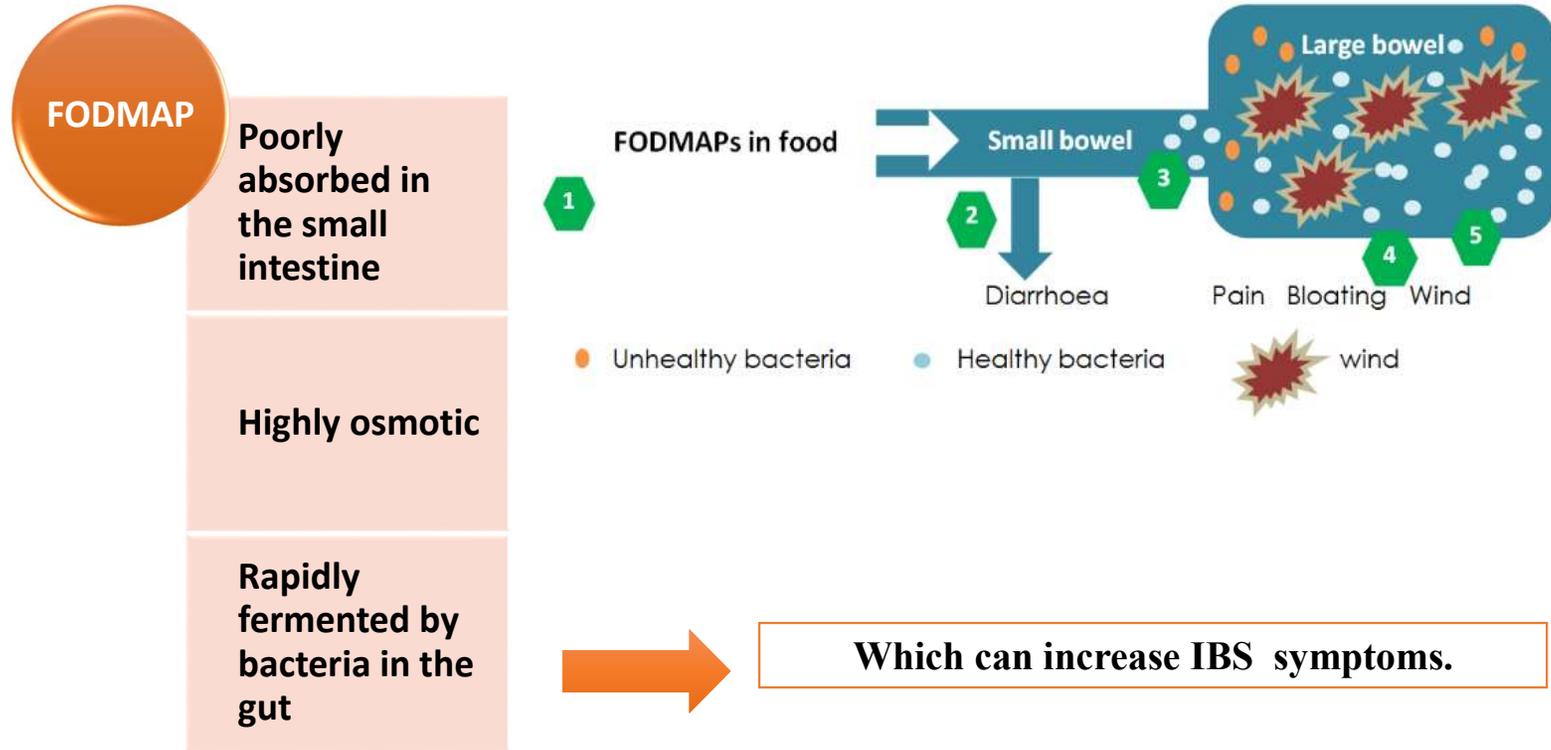
PCDAI indicates pediatric Crohn's disease activity index; PUCAI, pediatric ulcerative colitis activity index.

**9 Children CD  
SCD for 12 weeks  
7 patients for 52 weeks**



**3 patients  
with  
normal  
intestinal  
mucosa**

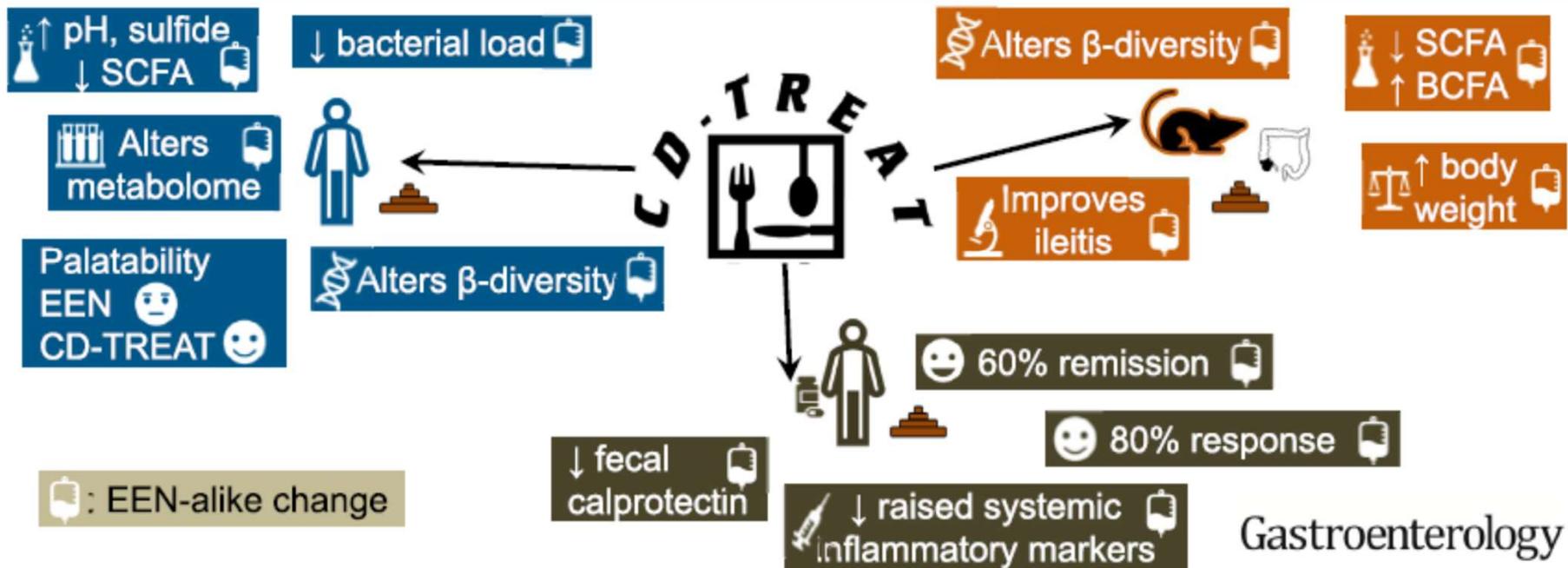
# FODMAP- Fermentable Oligosaccharides, Disaccharides, Monosaccharides and Polyols



James D. Lewis, Maria T. Abreu . *Gastroenterology* 2017;152:398–414

Gibson PR et al. *Aliment Pharmacol Ther* 2005; 21: 1399–1409.

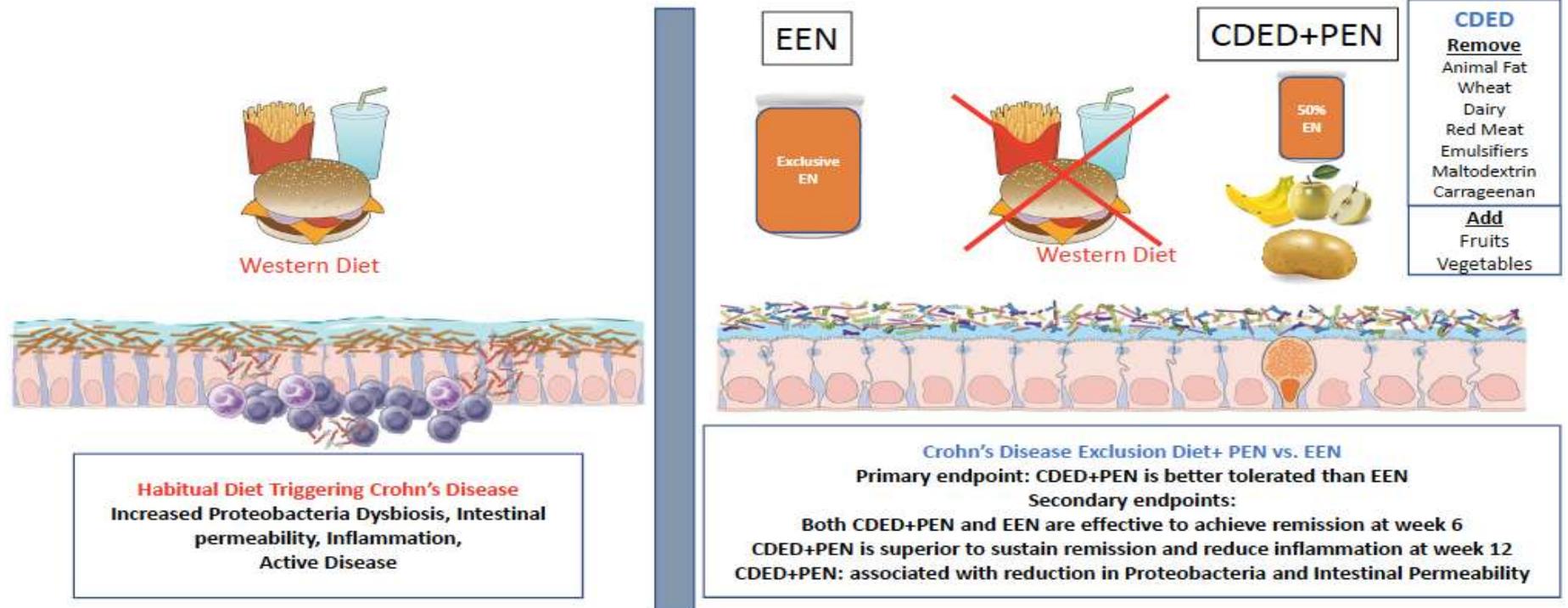
## CD-TREAT: Crohn's Disease Treatment-with-EATing



- Proof-of-concept... novel diet trialed in healthy volunteers, subsequently in rats with gut inflammation/dysbiosis similar to human CD, and in a pilot trial in children with active CD.
- Efficacy of CD-TREAT on human CD clinical outcomes needs to be ascertained in large well-controlled clinical trials.
- CD-TREAT has the potential to be used interchangeably with EEN: adults; long-term dietary maintenance therapy.

# Crohn's Disease Exclusion Diet is Equally Effective but Better Tolerated than Exclusive Enteral Nutrition for Induction of Remission in Mild to Moderate Active Paediatric Crohn's Disease: A Prospective Randomized Controlled Trial

Dietary Therapy: Crohn's Disease Exclusion Diet + Partial Enteral Nutrition vs. Exclusive Enteral Nutrition



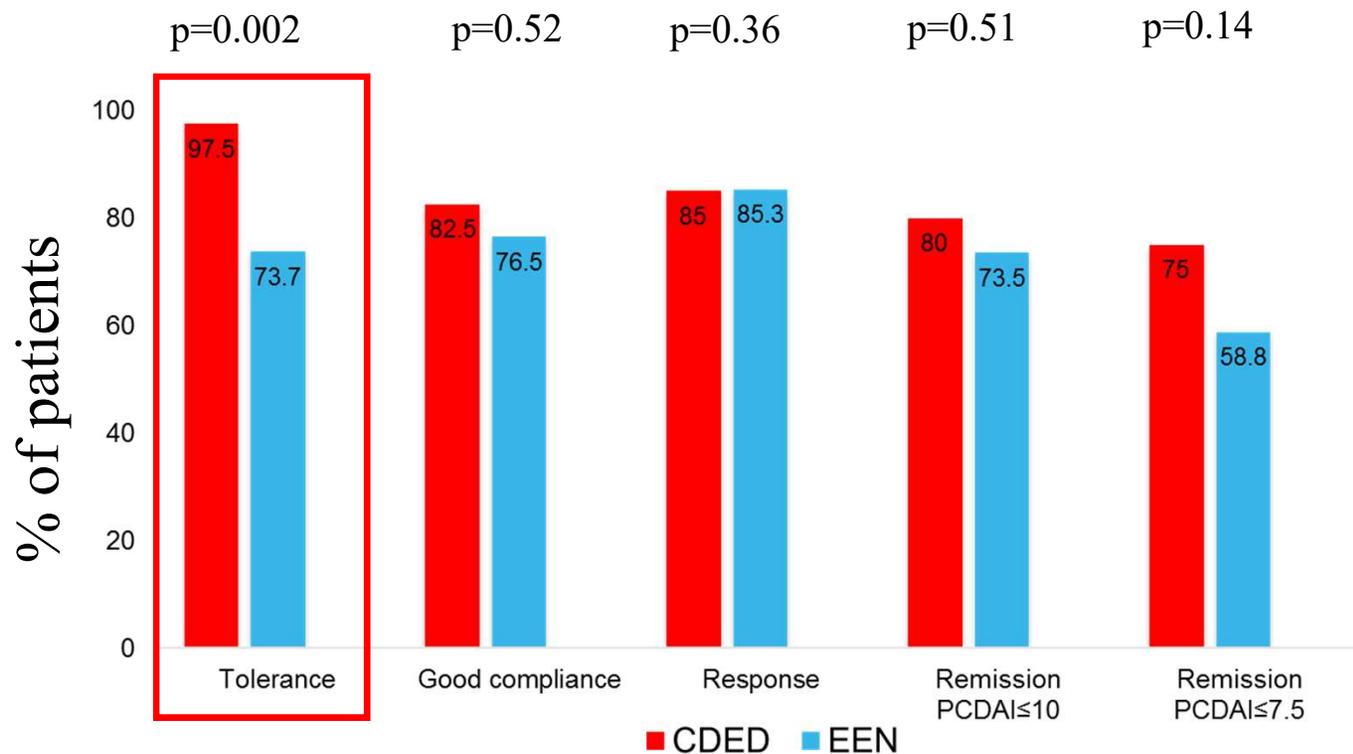
# Dietary Interventions for IBD: Summary

- These are prescribed diets – they need training and support.
- Needs support from a specialized multidisciplinary team.
- Diet does not replace other treatments (in most cases).
- Some of these principles may be applicable to other setting but no evidence yet to support this.
- Urgent need for well-conducted, human research on diet in the pathogenesis and treatment of IBD.

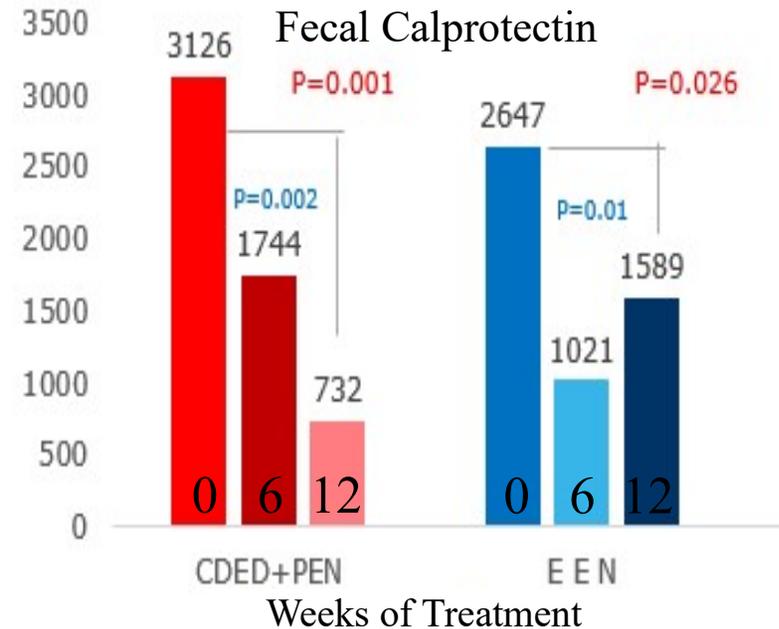
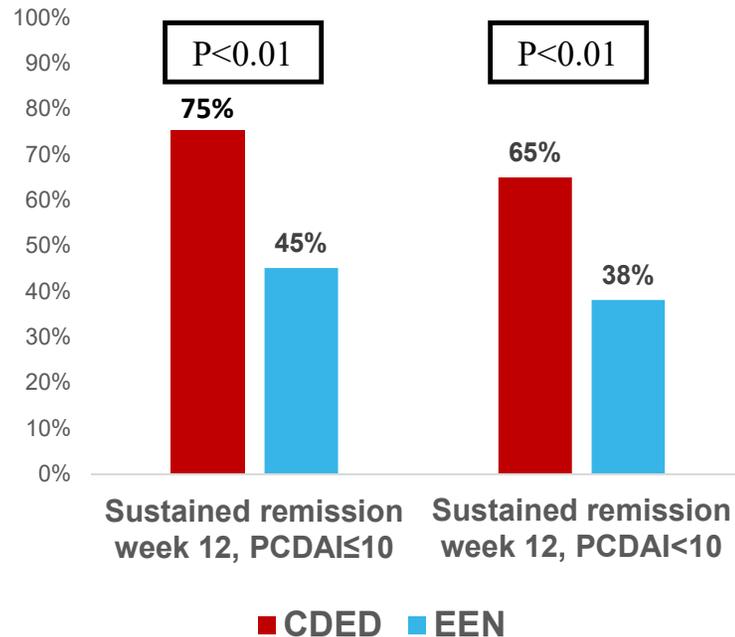


# Extra Slides

# Results: Week 6 Primary and Secondary Endpoints



# Sustained Remission & Fecal Calprotectin are Superior at week 12 with CDED



# CDED diet details (available in the Suppl of Gastro paper)

Stage 1 (First 6 weeks) Mandatory or Allowed Foods Coupled with Modulen	Stage 2 (Second 6 weeks) Mandatory or Allowed Foods Coupled with Modulen
The diet should be administered by a trained dietitian or physician	The diet should be administered by a trained dietitian or physician
Mandatory Daily Foods and Quantities	Mandatory Daily Foods and Quantities
Fresh Chicken breast 150-200 gr /day	Fresh Chicken breast 150-200 gr /day
2 Eggs/ day	2 Eggs/ day
2 Bananas /day	2 Bananas /day
1 Fresh Apple/ day	1 Fresh Apple/ day
2 Potatoes /day	2 Potatoes /day (or ½ sweet potato and one potato)
Potatoes must be cooked and refrigerated before use	Potatoes must be cooked and refrigerated before use
Allowed Foods Daily	Allowed Foods Daily
Fresh Strawberries	Fresh Strawberries
Fresh Melon (1 slice)	Fresh Melon (1 slice)
Rice flour	Rice flour
White rice and rice noodles ( unlimited)	White rice and rice noodles( unlimited)
2 Tomatoes (additional allowed for cooking)	2 Tomatoes(additional allowed for cooking)
2 Cucumbers (medium size)	2 Cucumbers (2 medium size)
2 Avocado halves	2 Avocado halves
1 Carrot	1 Carrot
Spinach 1 cup uncooked leaves	Spinach 1 cup uncooked leaves
Lettuce (3 leaves)	Lettuce (3 leaves)
Onion	Onion
Fresh green herbs (Basil, Parsley, Coriander, Rosemary, Thyme, Mint , Dill etc)	Fresh green herbs (Basil, Parsley, Coriander, Rosemary, Thyme, Mint, Dill etc)
1 glass freshly squeezed orange juice from fresh oranges ( not from cartons or bottles)	1 glass freshly squeezed orange juice from fresh oranges (not from cartons or bottles)
Water, sparkling water	Water, sparkling water
Salt, pepper, paprika, cinnamon, cumin, tumeric	Salt, pepper, paprika, cinnamon, cumin, tumeric
3 tablespoons honey	3 tablespoons honey
4 teaspoons sugar	4 teaspoons sugar
Fresh ginger and garlic cloves, lemons and limes	Fresh ginger and garlic cloves
*****	One slice whole grain bread daily
*****	Quinoa
*****	3 Tablespoons cooked lentils or peas
*****	6 almonds or walnut halves (unprocessed)
*****	Baking soda

Foods allowed only once a week	Foods allowed only once a week
Fresh lean fish (not deep fried, dietitian guidance required)	Fresh lean fish (not deep fried, dietitian guidance required)
*****	200 gr Sirloin or fillet steak (Maximum)
*****	1 slice whole grain bread (Maximum)
*****	1 can tuna (in olive or canola oil) <b>drained</b>
*****	½ cup oatmeal or cut oats
*****	<b>Additional daily foods from week 7</b>
*****	Broccoli, Cauliflower 2 florettes daily
*****	4 fresh mushrooms (not canned)
*****	½ red bell pepper
*****	1 zucchini or slice squash
*****	1 pear or kiwi or ripe nectarine
*****	<b>Additional daily foods from week 10</b>
*****	Most vegetables (restricted amounts with dietitian guidance )
*****	Most fruits (restricted amounts with dietitian guidance)
*****	Quinoa
*****	3-4 Tablespoons cooked lentils or peas
Stage 1 Disallowed Foods Partial List	Stage 2 Disallowed Foods Partial List (unless allowed above )
Dairy	Dairy
Animal fat	Animal fat
Wheat	Wheat
Emulsifiers	Emulsifiers
Artificial Sweeteners	Artificial Sweeteners
Other cuts or parts of chicken	Other cuts or parts of chicken
Other sources animal or soy protein	Other sources animal or soy protein
Carrageenans	Carrageenans
Maltodextrins( and sucralose)	Maltodextrins ( and sucralose)
Sulfite containing foods	Sulfite containing foods
Xanthan gum	Xanthan gum
Packaged, canned or frozen precooked foods, doughs, baked goods	Packaged, canned or frozen precooked foods, doughs, baked goods
Frozen , canned fruits and vegetables	Frozen , canned fruits and vegetables
Oral Iron supplements	Oral Iron supplements
Soy or Gluten free products	Soy or Gluten free products
Ready to use sauces, syrups, spreads, dressings, margarine, butter	Ready to use sauces, syrups, spreads, dressings, margarine, butter
Vinegar, soy sauce, ketchup, mayonnaise	Vinegar, soy sauce, ketchup, mayonnaise
Alcoholic beverages, soft drinks, juices	Alcoholic beverages, soft drinks, juices
Deep fried or oily foods	Deep fried oily foods

# Fibre and/or Western Diet?

Anathakrishnan 2015

**Table 3.** Risk of CD Associated With Fiber Intake From Specific Dietary Sources

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	P value (linear trend)
<b>Fruits</b>						
No. of cases	73	49	54	53	40	
Age-adjusted HR (95% CI)	1.0	0.65 (0.45-0.93)	0.70 (0.49-1.00)	0.67 (0.47-0.96)	0.51 (0.35-0.76)	.003
Multivariate HR (95% CI) <sup>a</sup>	1.0	0.69 (0.48-0.99)	0.75 (0.52-1.08)	0.74 (0.51-1.06)	0.57 (0.38-0.85)	.02
<b>Vegetables</b>						
No. of cases	66	49	49	58	47	
Age-adjusted HR (95% CI)	1.0	0.75 (0.52-1.09)	0.70 (0.48-1.02)	0.89 (0.62-1.27)	0.72 (0.49-1.04)	.22
Multivariate HR (95% CI) <sup>a</sup>	1.0	0.76 (0.53-1.10)	0.69 (0.48-1.01)	0.88 (0.61-1.25)	0.74 (0.50-1.07)	.25
<b>Cruciferous vegetables</b>						
No. of cases	64	49	54	50	52	
Age-adjusted HR (95% CI)	1.0	0.71 (0.49-1.03)	0.81 (0.56-1.17)	0.75 (0.52-1.09)	0.80 (0.55-1.15)	.40
Multivariate HR (95% CI) <sup>a</sup>	1.0	0.70 (0.48-1.02)	0.81 (0.56-1.17)	0.75 (0.52-1.09)	0.78 (0.54-1.13)	.35
<b>Cereals</b>						
No. of cases	63	45	54	60	47	
Age-adjusted HR (95% CI)	1.0	0.69 (0.47-1.01)	0.82 (0.57-1.19)	0.92 (0.64-1.33)	0.72 (0.49-1.06)	.40
Multivariate HR (95% CI) <sup>a</sup>	1.0	0.72 (0.49-1.07)	0.89 (0.61-1.29)	1.05 (0.72-1.51)	0.85 (0.57-1.26)	.95
<b>Whole grain</b>						
No. of cases	53	65	42	58	51	
Age-adjusted HR (95% CI)	1.0	1.15 (0.80-1.66)	0.77 (0.51-1.16)	1.04 (0.71-1.52)	0.94 (0.63-1.40)	.65
Multivariate HR (95% CI) <sup>a</sup>	1.0	1.17 (0.81-1.69)	0.81 (0.53-1.22)	1.14 (0.77-1.68)	1.07 (0.71-1.60)	.79
<b>Bran</b>						
No. of cases	56	54	53	62	44	
Age-adjusted HR (95% CI)	1.0	0.91 (0.62-1.32)	0.87 (0.59-1.28)	1.04 (0.72-1.51)	0.75 (0.50-1.12)	.26
Multivariate HR (95% CI) <sup>a</sup>	1.0	0.93 (0.64-1.36)	0.92 (0.63-1.36)	1.13 (0.77-1.66)	0.85 (0.56-1.28)	.65
<b>Legumes</b>						
No. of cases	55	59	49	52	54	
Age-adjusted HR (95% CI)	1.0	1.04 (0.72-1.50)	0.87 (0.59-1.28)	0.94 (0.63-1.38)	0.99 (0.67-1.46)	.90
Multivariate HR (95% CI) <sup>a</sup>	1.0	1.02 (0.70-1.48)	0.88 (0.60-1.30)	0.95 (0.64-1.40)	0.98 (0.66-1.44)	.88

NOTE. Cumulative average energy-adjusted intake from the 1984 questionnaire for NHS I and the 1991 questionnaire for NHS II.  
<sup>a</sup>Adjusted for age, cohort, smoking (never, past, current), body mass index (<20 kg/m<sup>2</sup>, 20-24.9 kg/m<sup>2</sup>, 25-29 kg/m<sup>2</sup>, >30 kg/m<sup>2</sup>), use of oral contraceptives (never, ever), use of postmenopausal hormone therapy (premenopausal, postmenopausal hormone never user, past user, current user), regular use of NSAIDs (yes, no), and regular use of aspirin (yes, no).

170,776 nurses 26 yrs follow up  
 Fruits: OR 0.57 P=0.02

## D'Souza et al. IBD 2008

Inflamm Bowel Dis • Volume 14, Number 3, March 2008

Dietary Patterns and Risk for CD

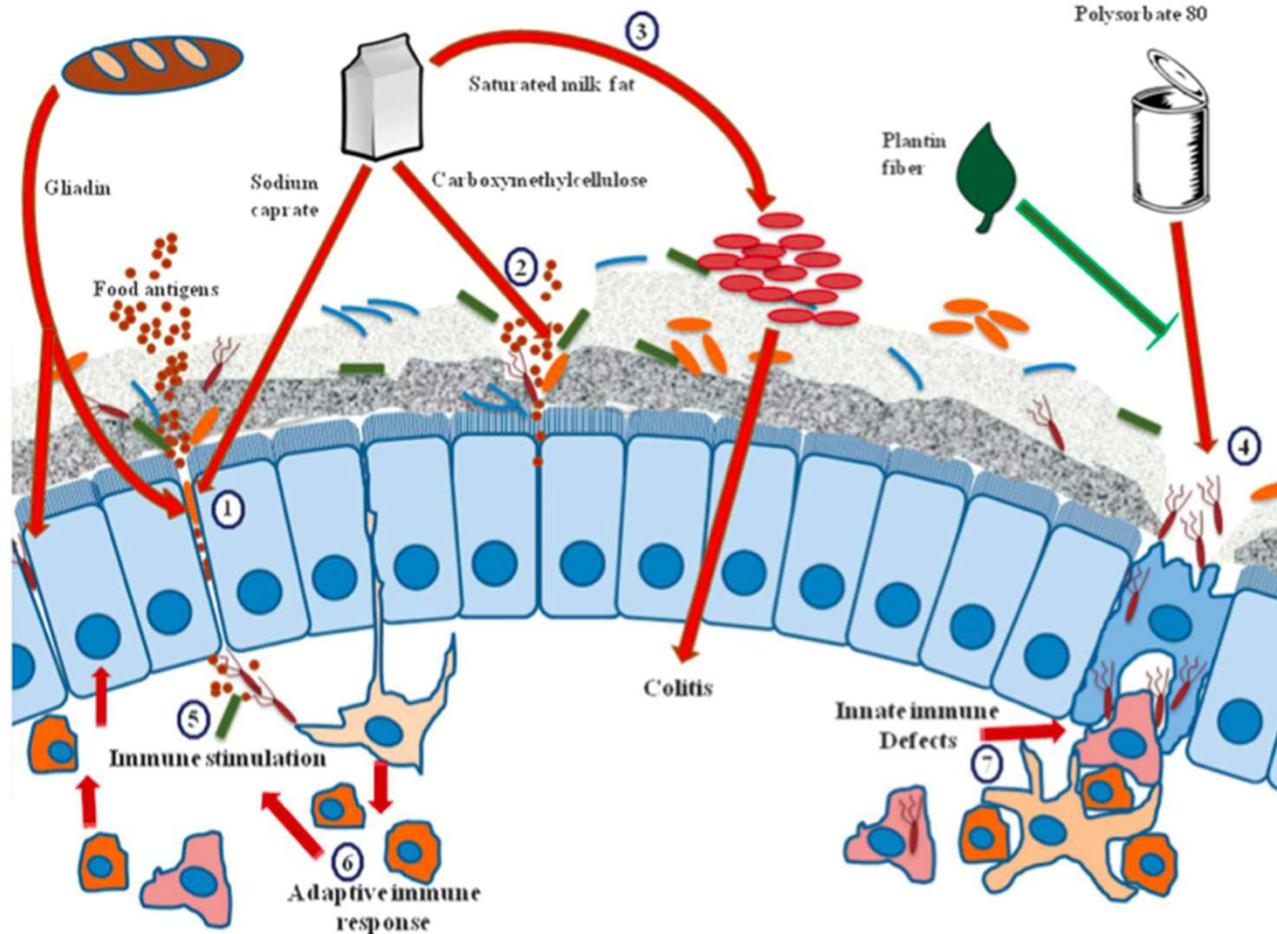
**TABLE 3.** Odds Ratios and 95% CI for Tertiles of Pattern Scores as Risk Factors for CD in Children

	Odds Ratios and 95% CI			Trend (P-value)
	Tertile 1	Tertile 2	Tertile 3	
<b>Boys</b>				
Partial western	Reference	2.1 (0.9-4.7)	1.8 (0.7-4.4)	0.186
Prudent	Reference	0.5 (0.2-1.1)	0.2 (0.1-0.5)	<0.001
Miscellaneous	Reference	0.9 (0.4-2.0)	0.5 (0.2-1.2)	0.206
Meat	Reference	0.7 (0.3-1.7)	0.8 (0.4-1.9)	0.751
<b>Girls</b>				
Western	Reference	2.1 (0.8-5.2)	4.7 (1.6-14.2)	0.006
Prudent	Reference	0.7 (0.3-1.7)	0.3 (0.1-0.9)	0.029
Cheese-snacks	Reference	0.8 (0.3-2.0)	0.7 (0.3-1.8)	0.510
Beverages	Reference	1.0 (0.5-2.4)	0.5 (0.2-1.2)	0.094

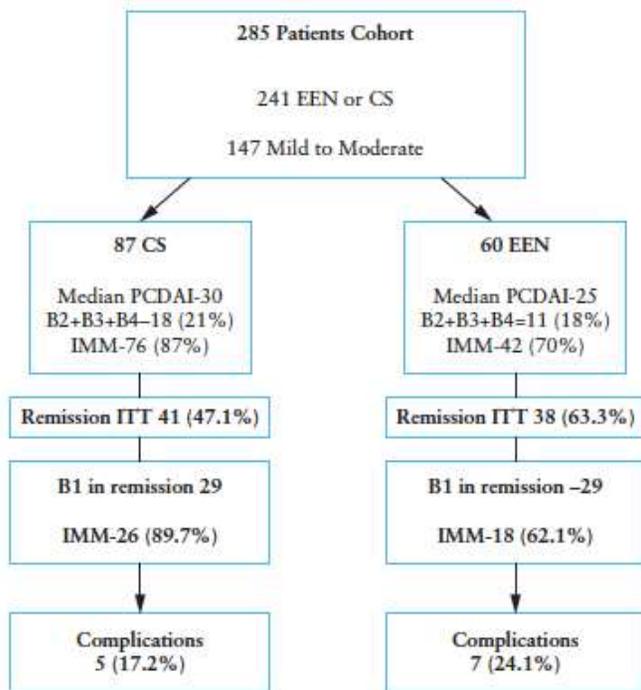
Prudent OR 0.2 P<0.001  
 Prudent OR 0.3 P=0.026  
 Western OR 4.7 P=0.006

→ Some food patterns are associated with IBD, especially Crohn disease

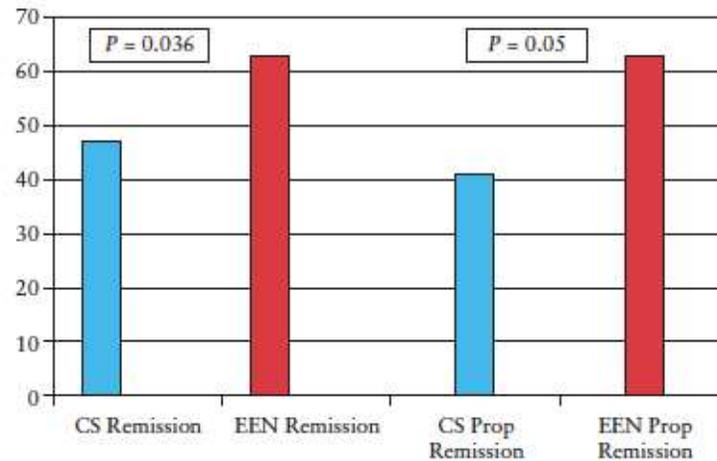
# EEN: Potential Mechanisms of Action



# Differences in Outcomes Over Time With Exclusive Enteral Nutrition Compared With Steroids in Children With Mild to Moderate Crohn's Disease: Results From the *GROWTH CD* Study



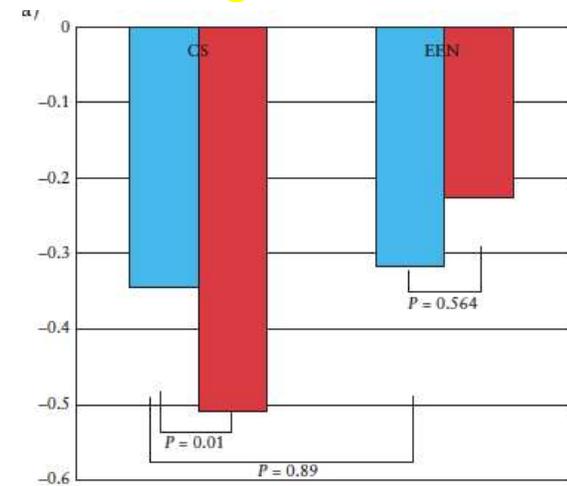
## Induction of Remission



ITT

Propensity  
EEN

## Height Z Score



CS

# Mucosal Healing and Bacterial Composition in Response to Enteral Nutrition Vs Steroid-based Induction Therapy—A Randomised Prospective Clinical Trial in Children With Crohn’s Disease

Bénédicte Pigneur,<sup>a,b,○</sup> Patricia Lepage,<sup>c</sup> Stanislas Mondot,<sup>c</sup> Jacques Schmitz,<sup>a</sup> Olivier Goulet,<sup>a</sup> Joël Doré,<sup>d,\*</sup> Frank M. Ruemmele<sup>a,b,\*</sup>

**Table 2.** Characteristics of the EEN and CS groups at Week 8.

	EEN group [n = 13]	CS group [n = 6]	p-Value
z-score BMI	-0.05 ± 0.9	0.35 ± 1.0	NS
Harvey-Bradshaw Index <5	13 [100%]	5 [83%]	<0.05
Haemoglobin [g/dL]	11.0 ± 1.1	11.9 ± 0.9	NS
CRP [mg/L]	Median 10.7 [8.7–12.1]	Median 12.2 [10–12.6]	
ESR [mm]	12.3 ± 19.3	42.8 ± 74.8	NS
	Median 6 [1–75]	Median 14 [6–195]	
Alb	16.5 ± 24.5	21.2 ± 23.7	NS
	Median 8 [4–94]	Median 12 [7–69]	

	EEN (13)	Steroids (6)	p-Value
Median CDEIS	1 (0-21)	7 (3-14)	<0.05
	p<0.05		

Pigneur *et al.*, JCC 2019;13:846-55.