



# 2018 SCSG POST- DDW SYMPOSIUM



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An aerial photograph of a tropical coastline, showing a mix of green land, blue water, and some buildings. The entire image is covered with a semi-transparent green filter. The title text is centered in the upper half of the image.

# DIETITIAN 101: GI Nutrition Tips and Tricks

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# Overview

- GI Nutrition Tips and Tricks for:
  - Constipation & Diarrhea
    - *Understanding Fiber*
  - Gas & Bloating
    - *Low FODMAPs Diet and Beyond*
    - *Supplements to Consider*



# Basics: Constipation

- **Definition**

- A variety of symptoms including:

- *Hard stools*








- *Excessive straining*

- *Infrequent bowel movements*

- Acute (typically <1 week duration) or chronic, which typically lasts >4 weeks or, in accordance with consensus criteria, >3 months

- Can be Chronic Idiopathic Constipation (CIC), IBS-Constipation, slow transit or dyssynergia

## Bristol Stool Chart

Type 1		Separate hard lumps, like nuts (hard to pass)
Type 2		Sausage-shaped but lumpy
Type 3		Like a sausage but with cracks on the surface
Type 4		Like a sausage or snake, smooth and soft
Type 5		Soft blobs with clear-cut edges
Type 6		Fluffy pieces with ragged edges, a mushy stool
Type 7		Watery, no solid pieces. <b>Entirely Liquid</b>









# Basics: Constipation

- **Causes**

- Low fiber diet
- Dehydration
- Lack of physical activity
- Advanced age
- Certain medications
- Pregnancy
- Travel (change in diet)
- Laxative abuse
- Ignoring the urge to pass stool
- Chronic disease such as Parkinson's, scleroderma, anxiety, etc..

## Bristol Stool Chart






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# Basics: Diarrhea

- **Definition**

- Characterized as loose, watery stool
- Usually 3+ stools per day
- Acute (typically <1 week duration)
- Chronic, which typically lasts >4 weeks or, in accordance with consensus criteria, >3 months







## Bristol Stool Chart

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# Basics: Diarrhea

- **Causes**
  - Food intolerances and sensitivities
  - Medication / supplement induced
  - Functional bowel disorders
  - Intestinal diseases
  - Bacterial, viral or parasitic infections






## Bristol Stool Chart

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# Next Steps?

- **What to do?**
  - Medications
  - Procedures / Testing
  - Look for food triggers
  - Add in a prokinetic or antidiarrheal supplement
  - **FIBER!**

## Bristol Stool Chart

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# Understanding Fiber

## *Commonly Used Fibers*

Acacia gum (Heather's)

Calcium polycarbophil (FiberCon)

Cellulose

Chia seeds

Corn Fiber (FiberCel)

Flax seeds

Glucomannan (Konjac)

Inulin

Methylcellulose (Citrucel)

Oats/beta-glucan

Partially hydrolyzed guar gum

Polydextrose (fiber gummies)

Psyllium (Metamucil / Konsyl)

Wheat bran

Wheat dextrin (Benefiber)



# Fiber Characteristics

## **Fiber Considerations**

- *Solubility*
- *Fermentability*
- *Viscosity*

## **Other considerations:**

- *Effect on gut microbiome*
- *Creation of metabolites (SCFA)*
- *pH changes of stool*



# Fiber Characteristics

## **Solubility**

*Definition:* capable of being dissolved in fluid

- *Soluble*
  - Absorbs water; water holding capacity
  - Bulks stool
- *Insoluble*
  - Does not absorb water
  - Moves waste quickly through the large intestine



# Fiber Characteristics

Coarse fiber particles mechanically irritate the gut mucosa stimulating water and mucous secretion - ***bulk, soften, move***



# Fiber Characteristics

## *Soluble*

- *Food Examples – Fleshy parts of fruits and vegetables - as opposed to skins*

- Applesauce
- Apricots
- Avocado
- Banana
- Carrots
- Eggplant
- Garlic
- Green beans



Melons

Oats

Onion

Peaches

Potato

Pumpkin

Zucchini





# Fiber Characteristics

## *Soluble*

- *Supplement Examples* – wheat dextrin (Benefiber), psyllium husk, guar gum, methylcellulose (Citrucel)(?), polycarbophil (FiberCon)(?)



# Fiber Characteristics

## *Insoluble*

- *Food Examples – Skins of fruits and vegetables - as opposed to flesh*

- Beans
- Berries
- Brown rice
- Celery
- Cherries
- Corn
- Flaxseeds



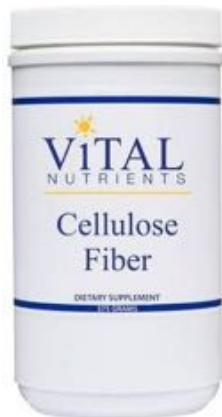
- Kale
- Mushrooms
- Nut (whole)
- Okra
- Tomatoes
- Wheat bran



# Fiber Characteristics

## *Insoluble*

- *Supplement Examples* – cellulose, sterculia (karaya gum), methylcellulose (Citrucel)(?), polycarbophil (FiberCon)(?)



# Fiber Characteristics

## Viscosity

*Definition:* the state of being thick, sticky and semifluid in consistency; resist flow (magnitude of internal friction)

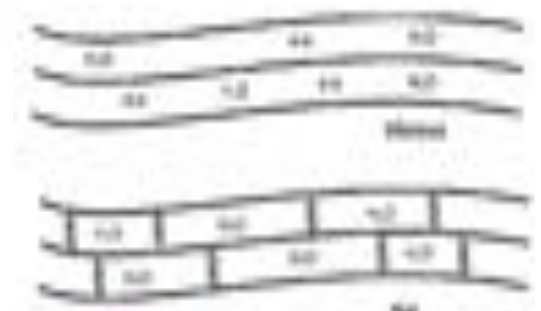


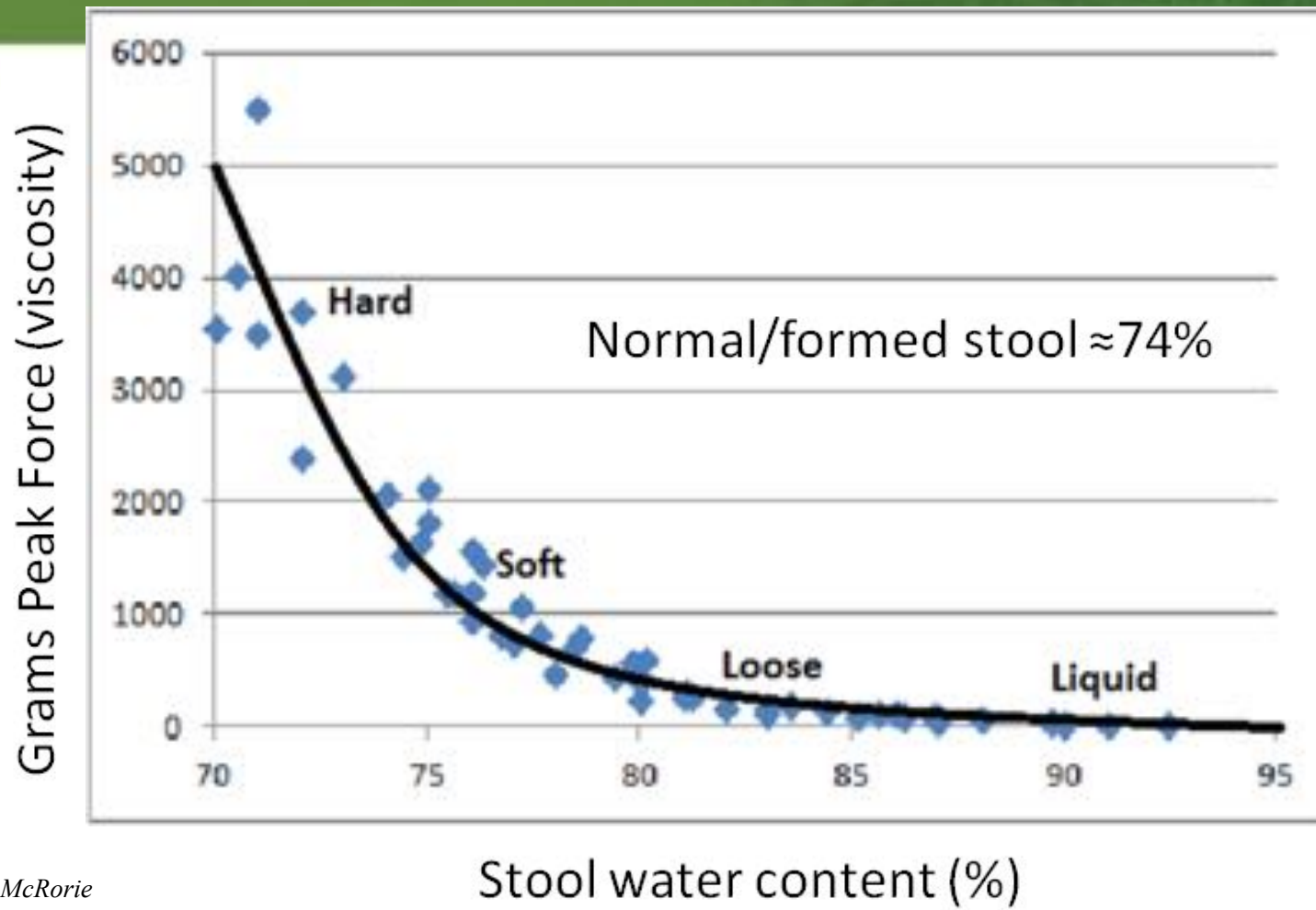
### •*High Viscosity*

- Forms a gel; high resistance to flow
- SOURCES: Barley, oats, psyllium, guar gum

### •*Low Viscosity*

- Does not form a gel; low resistance to flow
- SOURCES: Wheat dextrin (Benefiber) / bran, polydextrose (fiber gummies), inulin





Courtesy John McRorie



# Fiber Characteristics

## **Fermentability**

*Definition:* the chemical breakdown of a substance by bacteria, yeasts, or other microorganisms, typically involving effervescence and the giving off of heat

- *High Fermentability*
- FOODS: Fructans (garlic, onion), galacto-oligosaccharides (green peas, beans, soy)
- SUPPLEMENTS: Wheat dextrin, inulin, polydextrose, guar gum
- *Low Fermentability*
- FOODS: Wheat bran (½ tbsp.), flaxseed, oats
- SUPPLEMENTS: Cellulose, methylcellulose, psyllium



# Fiber RULES

## Fiber RULES:

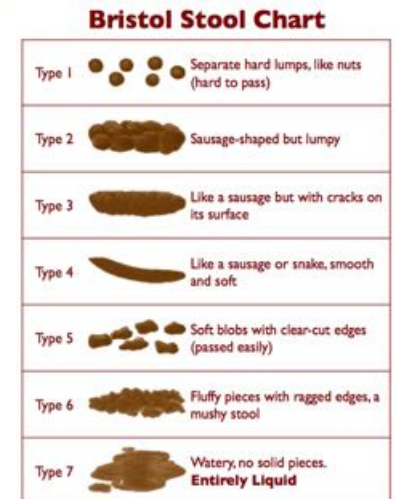
1. Always start with **solubility**
  - a. Soluble = BULKS stool; mainly for diarrhea
  - b. Insoluble = ADDS WEIGHT/IRRITATION; mainly for constipation
2. Think about **viscosity**
  - a. High viscosity = low laxation
3. Think about **fermentability**
  - a. High fermentability = low laxation & increased gas production
4. Coarse vs fine?
5. Supplement vs food?



# Fiber Lessons

## Stool regularity is defined as:

1. Increased stool output (grams of stool per day/week)
  - ***Fiber needs to be present in stool***
  - ***Low fermentation is GOOD!***
2. Stool water content highly correlated with stool consistency
  - ***Need softening, bulking agent***
  - ***Viscous and/or nonviscous soluble fiber is GOOD!***



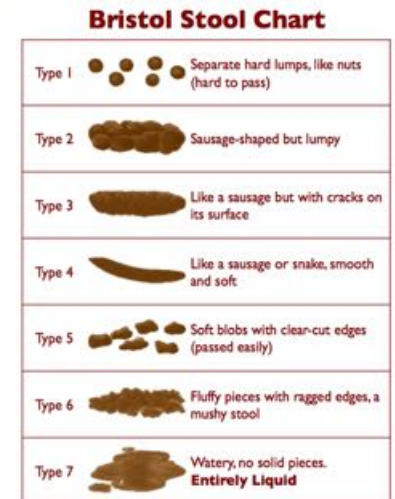
# Fiber Lessons

## 2 mechanisms drive a laxative effect:

1. High water-holding capacity of viscous and/or nonviscous soluble fiber resists dehydration - ***keep stool soft***

***AND/OR***

2. Coarse fiber particles mechanically irritate the gut mucosa stimulating water and mucous secretion - ***bulk, soften, move***








# Fiber Lessons – CHEAT SHEET

Solubility	Viscosity	Fermentability	Fibers with These Characteristics	Good For
Soluble	High	High	Guar Gum Glucommannan (konjac)	Diarrhea (non-bloated patients only)
Soluble	Low	High	Polydextrose (fiber gummies) Inulin Wheat Dextrin (Benefiber) FOS Corn fiber (Fibercel) Acacia fiber (Heathers)	Diarrhea Microscopic colitis Fecal incontinence
Soluble	High	Low	Psyllium (Metamucil / Konsyl) Beta Glucans (Oats, barley) Methylcellulose(? - Citrucel) Polycarbophil(? - FiberCon)	IBS All bowel types!
Insoluble	Low	Low	Coarse wheat bran Cellulose	CIC



# Fiber Lessons – CHEAT SHEET

Solubility	Viscosity	Fermentability	FOODS with These Characteristics	Good For
Soluble	High	High	Pectins and Gums Insides of most fruits and some vegetables and beans	Diarrhea (non-bloated patients only)
Soluble	Low	High	Insides of most fruits and some vegetables and beans	Diarrhea Microscopic colitis Fecal incontinence
Soluble	High	Low	Beta Glucans (Oats, barley) Mucilage (Chia seeds)	IBS All bowel types!
Insoluble	Low	Low	Wheat bran Lignin (flaxseeds) High fiber cereals Outer skins of most fruits, vegetables, grains, beans, nuts/seeds	CIC

Fiber Products	Fiber Source & Type of Fiber	Additives and Sweeteners	Dosing	Available Forms	Aids for
Benefiber 	Wheat Dextrin	Flavored: aspartame, gum acacia, lactose (milk), triglycerides, yellow 6, red 40	2 tbsp. = 3 g Max dose 2 tbsp.	Powder Stick Packs	Diarrhea Microscopic colitis Fecal incontinence
Citrucel 	Methylcellulose	Aspartame, FD&C Yellow #6 Lake, Sucrose	1 tbsp. = 2 g 1 caplet = 500mg Max dose 3 tbsp.	Powder Caplets	Constipation if stool is pliable
Metamucil 	Psyllium husk (smooth/fine particle)	Sucrose or aspartame, FD&C Yellow No. 6	1 tsp = 3 g 5 capsules = 2 g Max dose 2 tbsp.	Powder Capsules Wafers	IBS All bowel types!
FiberCon 	Calcium Polycarbophil	caramel, light mineral oil	1 caplet = 500mg Max dose 8 caplets	Caplets	Constipation if stool is pliable
	Psyllium Senna (Senna Prompt)	Flavored/capsules: Aspartame, Citric Acid, FD&C Yellow #6	1 tsp = 5 g 6 capsules = 3g	Powder Capsules	IBS All bowel types!

# Caution!

- *Some medications are affected by soluble viscous fibers*  
Take fiber 2 hours before or after oral prescriptions
- **NEVER** use benefiber (wheat dextrin) for a constipated patient!  
Soluble + low viscous + highly fermentable = **disaster!**
- **Hydration** is key  
35ml/kg body weight
- **Start slow** - initiation of fiber treatment = gas, bloating, discomfort  
Start with 1 tsp - increase every 2-3 days by 1 tsp up to max dose  
No more than 5g/day each week  
For BSFS type 1-2 = soften first then move



# Caution!

- Fiber supplements NOT recommended for dyssynergic defecation and slow transit constipation:
  - *88% of patients with slow transit did not respond to dietary fiber treatment (30 g of fiber per day)*
  - *63% of patients with a disorder of defecation did not respond to dietary fiber treatment (30 g of fiber per day)*
  - *~50% of patients with symptoms refractory to supplementary fiber have a prolonged intestinal transit time*

Voderholze, et al, Am J Gastro, 1997

Mertz et al, Am J Gastro, 1999



# Bloating Basics

- Affects 20-30% of general population

- 50% say severity affects daily activities*

- More frequent in women (2:1)

- 76-96% of IBS patients have bloating

- 2nd most common symptom after pain*

- Up to 60% rate bloating as most problematic symptom*

- 50% of functional dyspepsia and chronic constipation patients have bloating

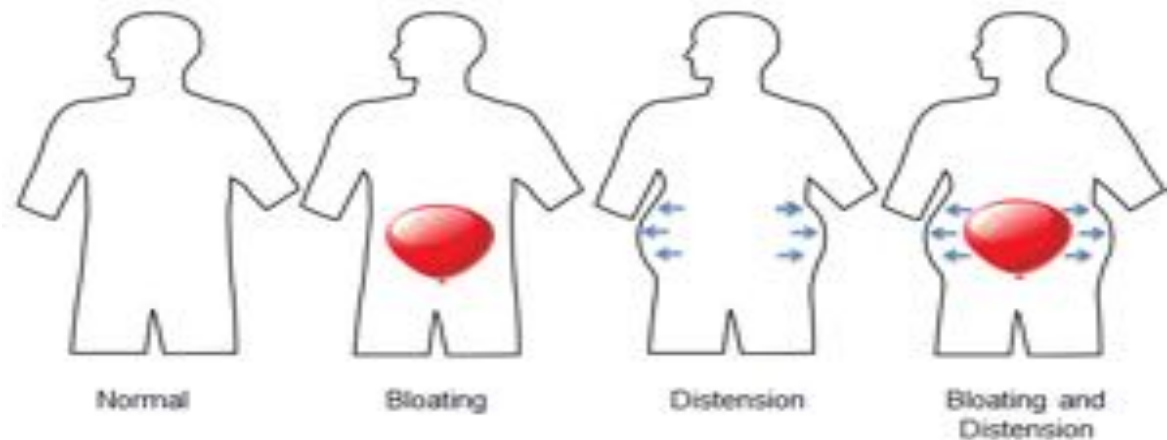


*Courtesy Lynn Connolly MD MSCR*



# Bloating Basics

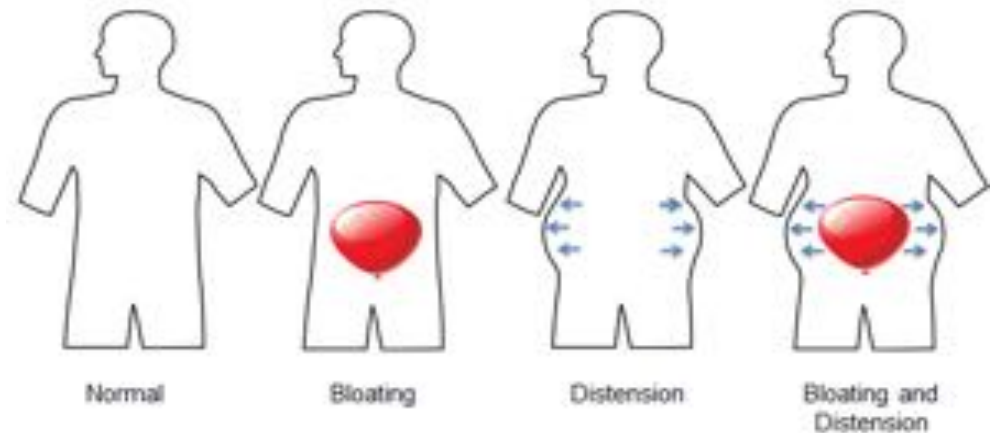
- **Bloating:** *the subjective sensation or feeling of increased abdominal pressure*
- **Abdominal Distention:** *the objective increase in diameter of the abdominal area*



Courtesy Lynn Connolly MD MSCR

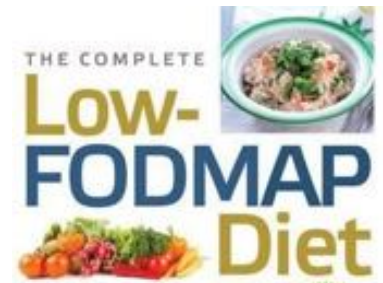
# Next Steps?

- **What to do?**
  - Medications
  - Procedures / Testing
  - **Look for food triggers**
  - Add in anti-gas supplement



# Low FODMAP Diet & Beyond

- Created at Monash University, Australia in 1999
- Acronym for specific sugars that ferment in the gut and contribute to GI symptoms
  - **F** – fermentable
  - **O** – oligosaccharides (Fructans and Galacto-Oligosaccharides / GOS)
  - **D** – disaccharides (Lactose)
  - **M** – monosaccharides (excess Fructose)
  - **A** – and
  - **P** – polyols (sorbitol, mannitol, maltitol, xylitol, isomalt)



# The FODMAP Problem

**Symptoms due to:**

1. *Dose response*
2. *Combination of sugars*

Lactose   Fructose   Fructans   GOS   Polyols



# The FODMAP Problem

	FOS / GOS	Fructose / Polyols	Lactose
Osmotic Effect	+	+++	+++
Fermentation	+++	+	++
Result?	Gas and bloating	Diarrhea	Diarrhea, possible gas and bloating

# The FODMAP Problem

## Proposed mechanisms

- Exert osmotic effect

- <10 DP; Increase fluid to large bowel

- *Healthy controls – 4x higher small bowel water volume in 60 minutes post 17.5g mannitol or 40g fructose compared to glucose*

- Increase gas production due to fermentability in gut

- Colonic microflora consume malabsorbed sugars

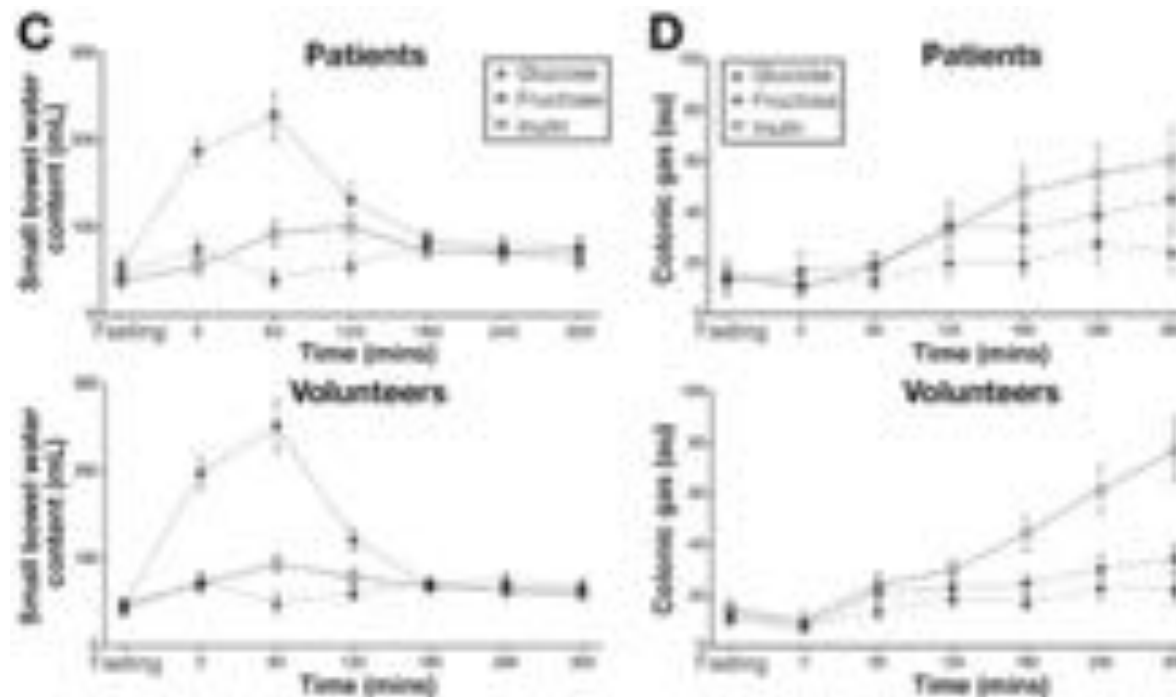
- *40g inulin challenge = 2x greater colonic volume in 4 hours both healthy controls and IBS*

*Marciani, Gastroenterology, 2010; Major, Gastroenterology, 2014; Murray, Am J Gastro, 2014; Madsen, Dig Dis Sci, 2006*



# The FODMAP Problem

*FODMAPs cause symptoms in IBS patients  
because of hypersensitivity NOT gas production*



# The FODMAP Diet

## Who should follow a low FODMAP diet?

- IBS-Diarrhea
- IBS-Mixed
- Brain-Gut-Axis/Functional gut disorders (*diarrhea, abdominal bloating*)
- Celiac disease patients – *clinically in remission with continued symptoms*
- IBD disease patients – *clinically in remission with continued symptoms; ileostomy*
- Small Intestine Bacterial Overgrowth - SIBO(?)

ВНЕШНИЙ ВИД. ПОКРЫ-  
ТИЕ СТЕНЫ, ПОТОЛКА.

10

**SIXTH-GRADER, CHICKADEE AND HERON,  
HERN, SA CAROL, CHOUST MOOT  
EXTRACT WASH-CRICE  
BROUGHT TO THE MARKET**

1. **Содержание:**

The 1000-hour requirement can be met by students in a limited time, approximately 1.5 years, with an efficient course sequence designed to provide training in the distribution phase of the dietetic program and that is sufficiently intensive and rigorous.

The following information is provided for the purpose of providing a general overview of the information contained in this document. It is not intended to be a substitute for the full text of the document.



**OTHER**  
LACTOSE FREE ICE CREAM  
DORRIT FROM ACCEPTABLE  
FRUIT LACTOSE FREE  
YOGURT, GRAFTING  
YOGURT, COCONUT  
YOGURT LACTOSE FREE  
SUGAR (GRAPE, BOTTLED)  
Coke

[illegible]

COARSE, SPREADING, FLAT, BLACK, GREEN-RED WHITE TRAIL  
-VIOLET, IRREGULARLY FLAT

**RECIPIENTS AND ADDRESS:**  
Public Health Center West  
Island Health Unit  
P.O. Box 10000, West  
Island, P.O. Box 10000  
DART CHOCOLATE  
Cocoa Beach, Florida

**Abstract:** The purpose of this study was to determine the effect of a 12-week training program on the physical fitness of 10 sedentary, middle-aged men. The program consisted of three sessions per week, each lasting 45 minutes. The sessions included aerobic exercise, strength training, and flexibility exercises. The results showed that the participants experienced significant improvements in cardiovascular fitness, muscle strength, and flexibility after the 12-week program. The study suggests that a structured exercise program can effectively improve physical fitness in sedentary middle-aged men.

# The FODMAP Diet - Resources

## Kate Scarlata's FODMAP Website:

- <http://blog.katescarlata.com/fodmaps/>

- Checklists high vs low fodmap foods

- Grocery list and meal ideas

- Great weekly blog

- Recipes

- Fodmap brands



# The FODMAP Diet - Resources

## Lactose Intolerance vs Milk Intolerance?

### *Lactose Intolerance / Malabsorption*

Lack enzyme to break down sugar lactose (with or without symptoms)

### *Milk Intolerance*

Inflammation of the intestine caused by A1 beta casein





# Malodorous Flatus



## *Hydrogen sulfide gas creation:*

- Colonic bacteria degrade cysteine and methionine (conversion to homocysteine)
- *Enterococci, Enterobacteria, and Clostridia (Escherichia coli)*
- Pyruvate and  $\alpha$ -ketobutyrate = electron donors to generate more H<sub>2</sub>S
- $\gamma$ -Proteobacteria reduce iron flavoproteins to produce H<sub>2</sub>S

# Malodorous Flatus

*Dietary sources derived from Sulphur containing AAs and special metabolites:*

Legumes (including peanuts and peas)

Beans

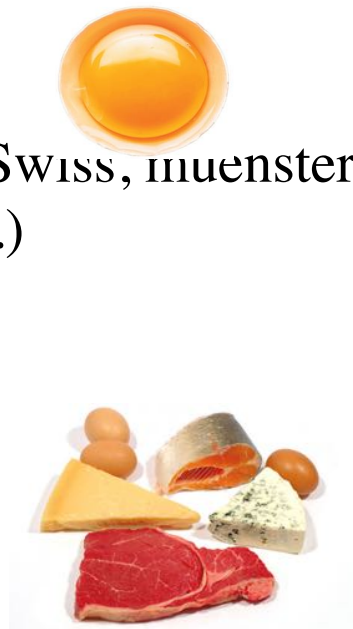
Soybeans

Aged cheese (Swiss, muenster, provolone, etc.)

Eggs (yolk)

Beef

Fish (pink)



Garlic / Onion

Whey

Broccoli

Cauliflower

Brussels sprouts

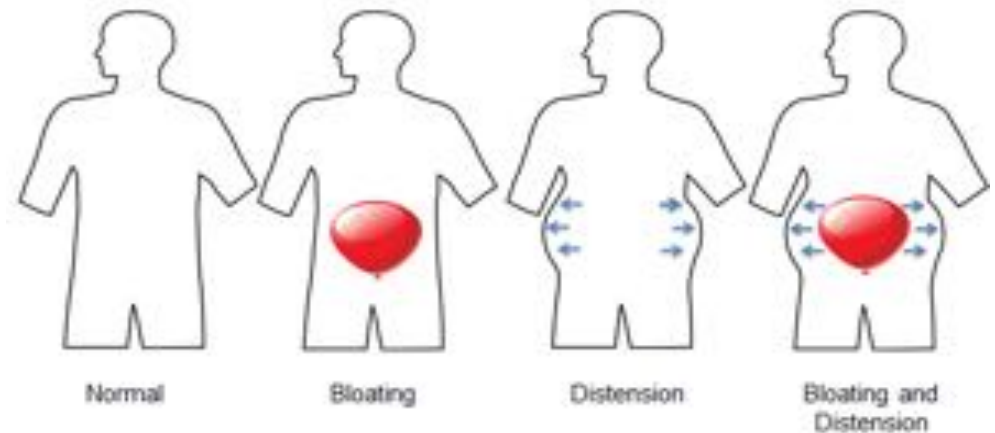
Asparagus

Cabbage



# Next Steps?

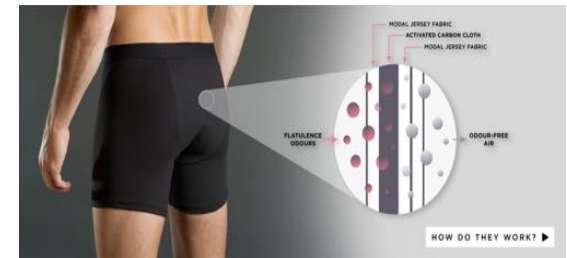
- **What to do?**
  - Medications
  - Procedures / Testing
  - Look for food triggers
  - **Add in anti-gas supplement**



# Simethicone & Charcoal

## Limited Studies

- Simethicone alone
  - *Surfactant to ease passage of gas, increase transit time*
- Activated Charcoal
  - *Significant reduction in bloating and gas (n=99)*
- Simethicone + B. coagulans (1.5 billion CFU)
  - *IBS (n=52) significant decrease in bloating*
- Simethicone, activated charcoal, magnesium
  - *FD (n=276) vs placebo: significant reduction in post-prandial fullness, epigastric pain, burning, abdominal bloating*
- Charcoal underpants



Coffin, Clin Res Hep Gastro, 2011; Kaplan, Arch Fam Med, 1999; Jain, Am J Gastro, 1986

# Peppermint

- Traditional remedy for nausea, indigestion, cold symptoms, headaches, muscle/nerve pain, stomach problems, and IBS
- Active ingredient *L-menthol*
- Smooth muscle calcium channel antagonist – *decrease contractions*
- *Meta-analysis concluded it was superior to placebo in IBS*
- Normalization of orocecal transit time – *slow motility*
- Carminative effects – *prevent flatulence*
- Serotonergic (5HT<sub>3</sub>) antagonism – *antiemetic*





# Peppermint

- *Sustained-release peppermint oil capsules = relief for IBS (Brooks, 2015)*
  - 180 mg l-mentha 3 times daily = statistically significant reduction in abdominal pain/discomfort as well as urgency for IBS-D and M patients
- *Meta-analysis including 4 trials (n = 392) (Ford, 2008)*
  - Fewer patients reporting persistent symptoms – 1-3 months
  - One trial (n = 57) – 25% of patients had IBS-C, 75% had IBS-D
  - Treatment effects last for 4 week after stopping therapy (over 50% of patients)
- *No long term placebo controlled trials to date*

# STW-5

- Preparation combining 9 different herbs

- Meta-analysis – double-blind, placebo-controlled, multi-center trial

- 208 IBS patients – 4 treatment arms: STW 5 (n = 51), STW 5-II (n = 52), bitter candytuft mono-extract (n = 53) or placebo (n = 52)

- Taken three times daily (20 drops) for 4 weeks

*STW5 more effective than placebo for functional dyspepsia*

*Bloating was not studied*

*Relieved the sensations of fullness and tension, which could be considered a surrogate for bloating*





# Take Home Messages

- Not all Fiber is created equal
  - *When in doubt, go for psyllium*
- Low Fodmap – consider a modified version
  - *Functional bloating – think fructans, GOS and lactose*
  - *Consider a digestive enzyme if diet helpful*
- Supplements for bloating
  - *Think peppermint for functional bloating*
  - *Consider activated charcoal for malodorous gas*





# Thank You!!

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