



Digestive Enzymes for FODMAPs

A TARGETED APPROACH

Hello and welcome



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Disclosures

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Today we'll cover

IBS & FODMAP INTOLERANCES

DIETARY APPROACHES FOR FODMAPS

DIGESTIVE ENZYMES SCIENCE

CLINICAL APPLICATION OF ENZYMES

Irritable Bowel Syndrome (IBS) is a Functional GI Disorder

Various mechanisms at play:

- changes in how food moves through the digestive tract
- increased sensitivity to digestion processes (aka visceral hypersensitivity)
- altered immune function and increased inflammation
- altered gut microbiota composition (dysbiosis)





F Fermentable

O Oligosaccharides

D Disaccharides

M Monosaccharides

A And

P Polyols

- Short-chain carbohydrates that are indigestible or poorly absorbed by the gut
- Trigger gut symptoms like abdominal pain, constipation, excessive gas, bloating, and diarrhea when they reach the colon
- Symptom onset is generally 4-8 hours after FODMAP intake



FODMAPs may be troublesome beyond IBS

- Inflammatory GI conditions
- Small intestinal bacterial overgrowth (SIBO)
- Polycystic ovary syndrome (PCOS)
- Endometriosis
- Gastroesophageal reflux disease (GERD)
- Various types of colitis
- Gastric surgeries
- Athletes
- Sub-clinical intolerances

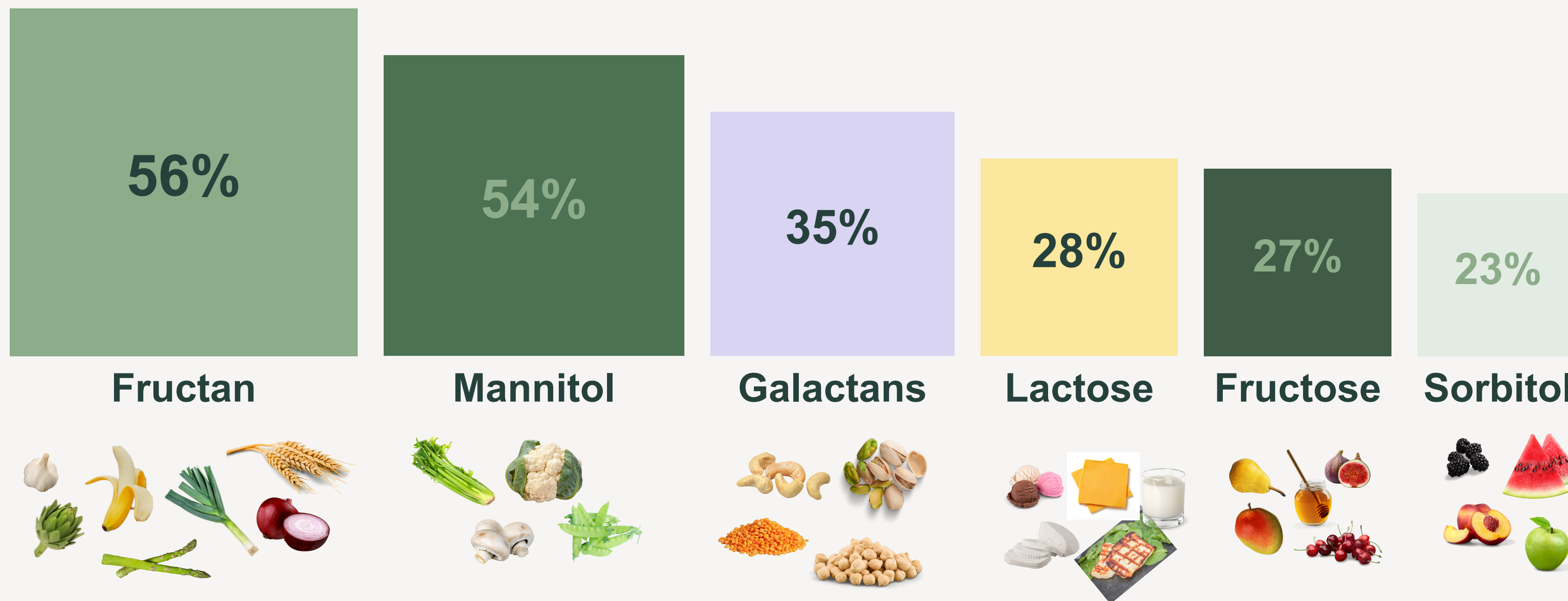
FODMAPs

and particularly fructan are found in many nutritious and delicious foods and recipes...

...and are notoriously hard to avoid



The most common FODMAP triggers



The low FODMAP diet (LFD)



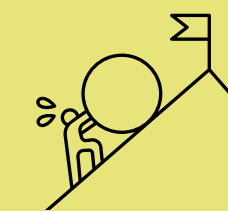
MONASH
University

A FODMAP diet is a 3 step diet used to help manage the symptoms of IBS.



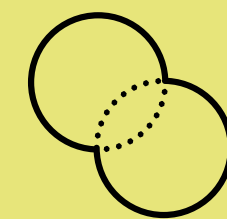
ELIMINATION

Eliminating / greatly minimizing high FODMAP foods, to assess for symptom relief



REINTRODUCTION / CHALLENGE

Systematically reintroducing foods containing FODMAPs to learn triggers & tolerance



PERSONALIZATION

Integrating the trigger foods and personalizing their intake

The simplified FODMAP diet

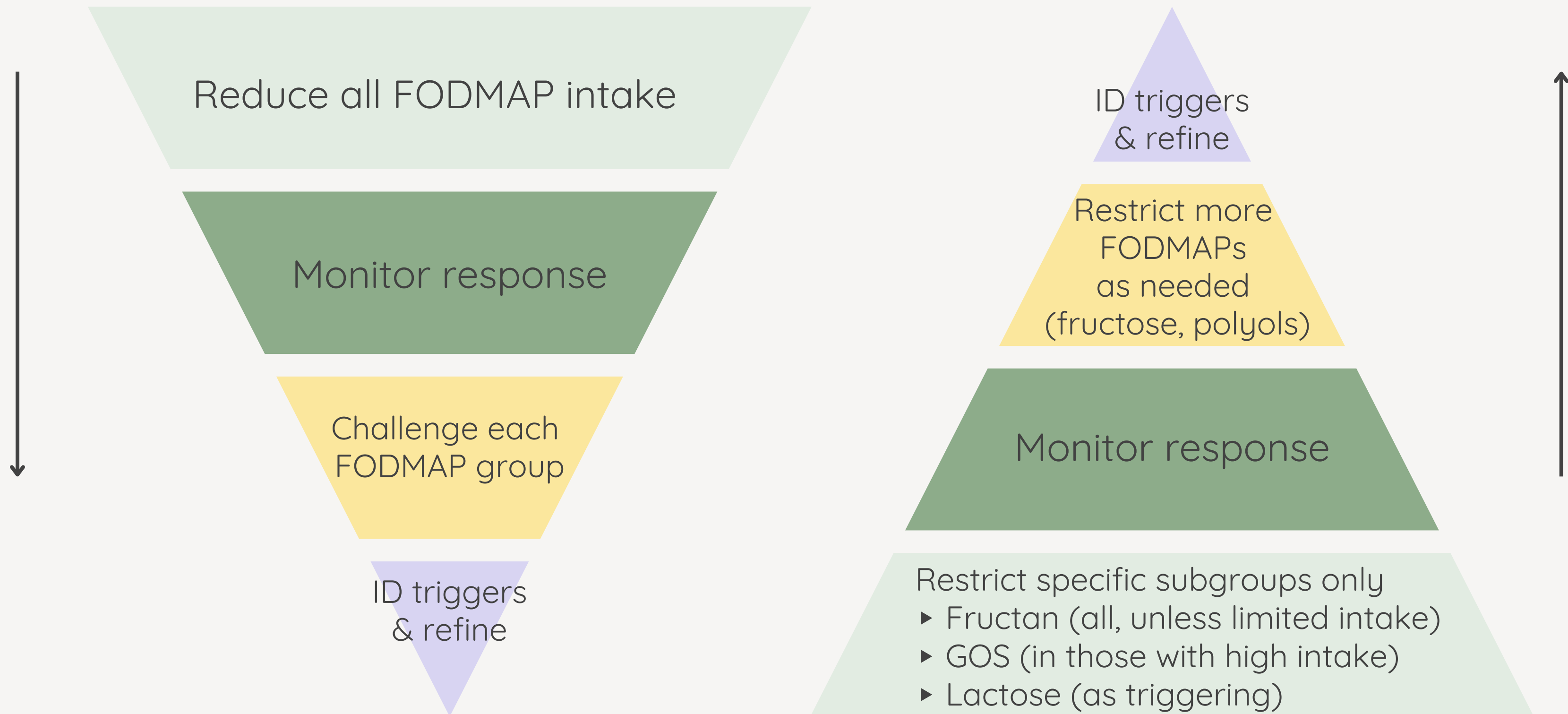
DAIRY	<ul style="list-style-type: none">▶ Milk▶ Yogurt	VEGETABLES	<ul style="list-style-type: none">▶ Garlic▶ Onion, leek bulbs▶ Cauliflower▶ Mushrooms
GRAINS	<ul style="list-style-type: none">▶ Wheat▶ Rye		FRUIT
MEAT ALTERNATIVES	<ul style="list-style-type: none">▶ Legumes		

Halmos & Gibson, 2019

The Simplified FODMAP diet should only be implemented under the guidance of a Registered Dietitian.



TOP DOWN VS. BOTTOM UP





Excessive diet restriction has risks

MICROBIOTA CHANGES

NUTRIENT & ENERGY DEFICIENCIES

SOCIAL ISOLATION AND ANXIETY

FOOD FEARS

INCREASED FOOD COSTS

SUPPLEMENT VS. DIET INTERVENTIONS

Advantages

Good adherence (convenience, simplicity and ease of administration)

Little interference on daily life

Low dietary impact (limited impact on usual diet, foods, and nutrients)

Ease of understanding (limited education from clinician required)

High precision (exact dose and composition can be advised and consumed)

Disadvantages

Medicalization (and recall required for adherence)

Cost and availability

Supplements
powders, capsules, etc.

Advantages

Low medicalization
(perceived as natural and self-managed)

Personalizable & broadly applicable

Disadvantages

Variable adherence

High impact on daily life

Cost and availability

High dietary impact

Requires understanding and education

Low precision due to differences in clinician delivery and patient adherence

Diet Interventions
Change in quantity or type of foods

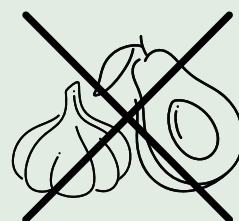
Proposed 5-phase FODMAP framework

This updated approach includes a new Phase 0 to identify ideal candidates for FODMAP approaches based on predicted response and Phase 4 to implement adjunct diet and non-diet therapies



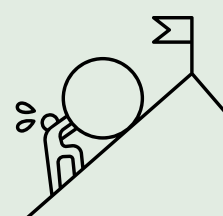
PHASE 0

Identify dietary candidates using predictors of response



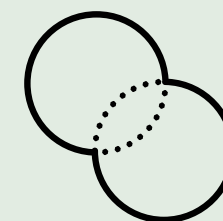
PHASE 1

Reduce total FODMAP intake to assess symptom benefit



PHASE 2

Challenge to assess tolerance to each FODMAP group and learn tolerated portions



PHASE 3

Develop sustainable, nutritionally adequate diet for long-term maintenance



PHASE 4

Implement adjunct diet and non-diet therapies to enhance tolerance to identified triggers

Adapting the FODMAP diet in IBS —

Ideal candidates and key considerations

	Ideal IBS candidates	Key considerations
Traditional three-phase FODMAP approach	<p>Patients who</p> <ul style="list-style-type: none">• Have more severe symptoms• Lack of identifiable patterns for symptom generation with food 38• Have sufficient motivation and resources to conduct the diet in full	<ul style="list-style-type: none">• Current evidence best supports this approach• Dietitian-delivered education superior to booklet-delivered education 39• More restrictive dietary adjustments required at outset as compared to FODMAP-gentle approach, but may be better able to identify specific food triggers and hence improve long-term success of the diet 40
FODMAP-gentle approach	<p>Patients who are</p> <ul style="list-style-type: none">• Eating large concentrations of FODMAPs• Mildly symptomatic• Children• Elderly• Nutritionally compromised• Following other dietary restrictions• At poor capacity to understand and/or apply the diet• Preferred to follow this approach	<ul style="list-style-type: none">• Dietetic assessment of habitual diet will guide the choice of diet application• Robust trial evidence for the FODMAP-gentle diet is lacking• Traditional IBS dietary advice shares features of a FODMAP-gentle diet, with some evidence of efficacy for symptom management
Low-FODMAP Mediterranean diet	<ul style="list-style-type: none">• Psychological symptoms (anxiety/depression)• Cardiovascular risk factors• Patients with poor-quality diets	<ul style="list-style-type: none">• Time to prepare meals• Adequate financial resources• Access to Mediterranean foods

Additional contraindications for full LFD

- History of or current disordered eating
- At risk for disordered eating
- Picky eaters
- No IBS diagnosis



DIGESTIVE ENZYME SCIENCE



GOS

fructan

fructan

fructan

polyol

fructan

GOS

GOS

GOS

fructan

GOS

fructan

fructose

fructan

fructan

What are digestive enzymes?

Enzymes are highly specialized proteins (chains of amino acids) folded in particular ways. Digestive enzymes can act on troublesome foods, including FODMAPs, to break them down.

ENZYMES CAN TARGET MANY TYPES OF CARBOHYDRATES

SUBSTRATE	ACTIVE ENZYME
* Fructan (inulin, FOS, levan)	Fructan hydrolase
* Fructose	Glucose/xylose isomerase
* Galactooligo-saccharides (GOS)	Alpha-galactosidase
* Inulin	Inulinase (Endo or Exo)
* Lactose	Lactase
* Polyols (mannitol, sorbitol)	Under development
Pectin	Pectinase
Sucrose	Sucrase
Starch	Amylase & glucoamylase
Insoluble fiber	Hemicellulase



* FODMAPs



Enzymes for FODMAPs

Targeted use of digestive enzymes with FODMAP-containing foods helps break down their FODMAP content before they can trigger symptoms.

Digestive enzymes act as specialized molecular scissors to break down FODMAP molecules, making them easier to digest.

ENZYMES FOR VARIOUS FODMAP FAMILIES:

- Lactase
- Alpha-galactosidase
- Fructan hydrolase
- Glucose/xylose isomerase*



The body does not produce enzymes that target FODMAPs, with the exception of lactase

*converts (rather than breaks down) fructose to glucose or glucose to fructose, depending on relative concentrations

Clinical guidelines on enzymes

Guidelines in peer-reviewed journals and by Monash University on how to implement the low FODMAP diet recommend the use of digestive enzymes to enable:

1

Management of symptoms, eg. bloating, gas, diarrhea, constipation

2

Dietary flexibility and reduced anxiety around social or uncontrolled food environments

3

Long-term sustainability and expanded food options to meet nutrition needs



Safety and efficacy of enzymes

Research shows that patients with FODMAP sensitivities benefit from using enzymes with otherwise triggering foods:

- 1 **Supplemental lactase reduces bloating, abdominal pain and gas in both adults and children**
- 2 **In those with IBS, alpha-galactosidase prevents bloating and gas and reduces global distress following galactan-rich meals**
- 3 **Multi-enzyme blends show promise in controlling overall symptoms, and for individual symptoms like bloating, gas and abdominal pain**



Candidate profiles

A variety of patients can benefit from use of digestive enzymes

	Ideal IBS candidates	Key considerations
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Digestive enzymes can be a first-line intervention in those:


Already on a highly restrictive diet

With disordered eating or at risk

Lacking access to low FODMAP foods

With poor compliance to diet recommendations

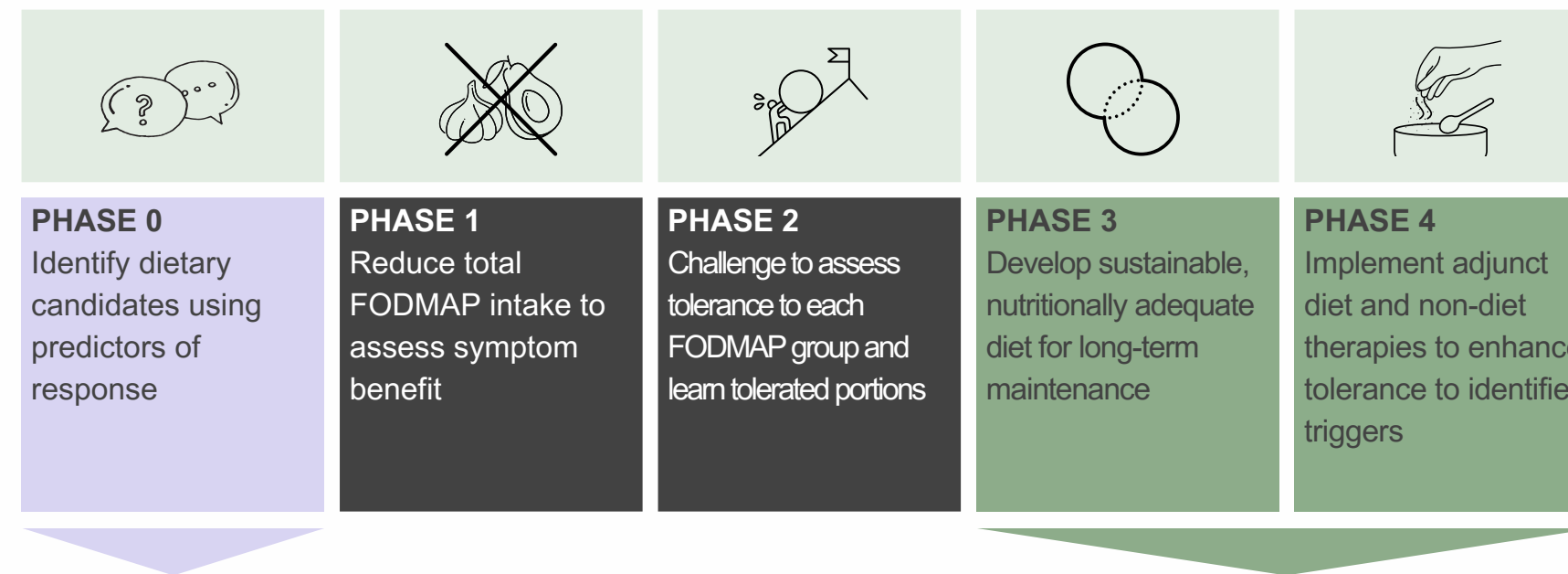
Who are elderly or at risk for malnutrition



Digestive enzymes help liberalize the diet of anyone with sensitivities to the FODMAP that the enzyme targets

Ways to use digestive enzymes

Enzymes may be used with or without dietary change based on a patient's indications and awareness of FODMAP triggers



WITHOUT DIETARY CHANGES

When knowingly eating food that contains FODMAP triggers (eg. garlic, dairy, beans)

Regardless of meal makeup when FODMAP content is unknown & assess response

WITH DIETARY CHANGES

With known FODMAP triggers during the personalization phase

Following personalization phase to further liberalize the diet

Intolerances guide enzyme selection

Patients with multiple FODMAP intolerances benefit from combination products

LACTOSE

Lactase

Milk, ice cream, frozen yogurt, gelato, soft cheeses (ricotta, cottage, paneer, etc), yogurt, kefir, pudding, custard, condensed milk

FRUCTAN

Fructan hydrolase

Onions, garlic, scallion, shallot, leek, wheat, barley, rye, spelt, inulin, FOS, artichoke, grapefruit, Brussels sprouts, dried fruit, beets, Savoy cabbage

GALACTANS

Alpha galactosidase

Beans, beets, lentils, chickpeas, falafel, hummus, soymilk, soybeans, soft tofu, peas, cashews, pistachios, kale, taro, tomatillo, almond meal

FRUCTOSE

Xylose/glucose isomerase

Apples, pear, fig, mango, watermelon, fruit juice/smoothies, honey, agave nectar, high fructose corn syrup, candies and sweets, sugar snaps

A note on polyols

Tips to support tolerance

POLYOLS

Under development

Cauliflower, celery, mushroom, stone fruit, apple, pear, sugar free gum



1

Limit portion sizes according to tolerance



2

Enjoy in the context of larger, balanced meals

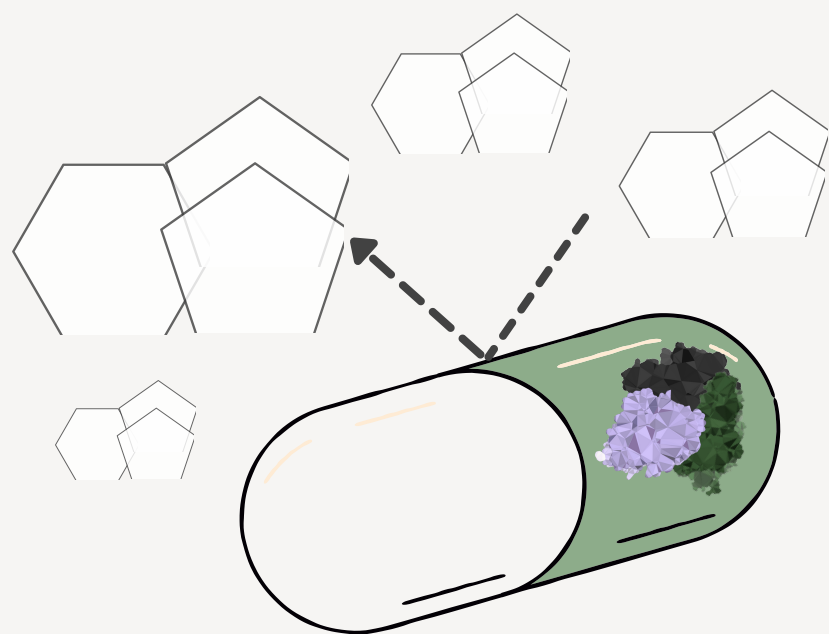


3

Use with digestive enzymes for other FODMAPs to limit stacking

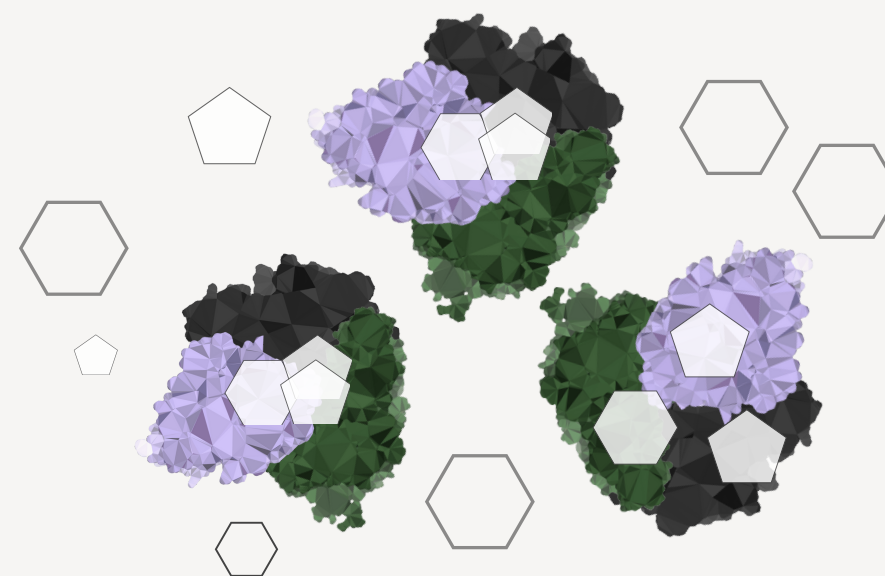
Powders vs. Capsules

A powder facilitates optimal contact between enzymes and FODMAPs for maximum FODMAP break down



ENZYMES IN CAPSULES:

- isolated from FODMAP substances
- deactivate in the stomach
- are digested themselves



ENZYMES IN POWDER FORM:

- get to FODMAPs faster & break them down
- integrate easily with FODMAPs
- distribute freely in food in the gut

What to look for in an enzyme

How to choose an effective digestive enzyme for patients

TARGETED FORMULA

Designed for known or suspected triggers. Beware of generic “enzyme blends” that do not contain evidence-based enzymes or not at therapeutic levels

MODE OF ADMINISTRATION

A powder form maximizes an enzymes' effect, while capsules reduce their ability to homogenize with and break FODMAPs down

NO OTHER GUT TRIGGERS

Avoid supplements formulated with mannitol, sorbitol, lactose, carrageenan, artificial sweeteners and other gut irritants

BACKED BY RESEARCH

Be cautious when non-peer reviewed or ‘marketing’ studies are cited. Also be wary of claims solely on background bioactives research



Benefits of regular use

1

Support better digestion of trigger foods by reducing overall FODMAP load and stacking

2

Reduce food fears and anxiety to facilitate greater confidence with food and social eating

3

Increase flexibility to have a more varied, nutrient-rich and diverse diet

Specific nutritional benefits



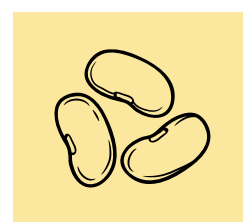
NUTRITIONAL DIVERSITY

Avoid nutrient deficiencies and promote health (eg. calcium-rich dairy to support bone health)



PLANT-BASED FIBER FOODS

Increase fiber variety and tolerated volume to support microbiome health



PROTEIN BEYOND MEAT

Increase high-FODMAP protein foods like tofu, peas, legumes, nuts, soy and dairy



Getting patients started

1

APPLY TO KNOWN OR SUSPECTED FODMAP TRIGGERS

2

ADD TO FIRST BITE OR DURING START OF MEAL

3

EXPECT BENEFIT 4-8 HOURS AFTER HIGH FODMAP FOOD

4

USE AS FREQUENTLY AS NEEDED





Troubleshooting

FIBER

increase gradually, diversify types, consider fiber manipulation (eg. hummus vs. chickpeas)

HYDRATION

encourage hydration throughout the day, especially as fiber intake increases

PORTION SIZES

listen to satiety cues, eat slowly and mindfully, chew well

OTHER TRIGGERS

monitor fatty and spicy foods, alcohol, caffeine, carbonation and artificial sugars

Supporting behavior change

3X

EDUCATE ON LINK BETWEEN GI DIET AND FOOD ANXIETY

History of a restrictive diet, such as low FODMAP or gluten-free, is associated with 3x more risk for disordered eating behaviors



DISCUSS SIGNS OF EXCESSIVE RESTRICTION

Avoidance of food due to fear of symptoms or difficulty socializing due to restrictions can point toward the need for expansion



EXPLORE RELATIONSHIP WITH FOOD

How would you describe your relationship with food? Do you feel anxious around food? Do you skip meals due to fear of GI issues?





Communication tips & common questions

Does this mean I can eat anything I want now?

How do I know what has FODMAPs in it?

Can I cook with digestive enzymes?

Will I become dependent on enzymes?

How much do enzymes cost?



Communication tips & common questions

Does this mean I can eat anything I want now?

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Will I become dependent on enzymes?

How much do enzymes cost?

Common multi-FODMAP meals

AMERICAN	MEDITERRANEAN	SPANISH	MEXICAN	JAPANESE	ITALIAN
Meatloaf with onion gravy	Falafel in pita with tzatziki	Chorizo with onion & pepper on wheat bun	Quesadilla with flour tortilla & poblano	Udon with silken tofu	Artichoke pizza
Cheeseburger with onions	Couscous with chickpeas & currants	Paella with peas, artichoke & asparagus	Nachos with cheese & scallions	Pumpkin curry with scallions	Penne alla vodka
Parfait with cranberry granola	Pomegranate fattoush	Gazpacho with croutons	Bean & cheese burrito	Okonomiyaki (scallion pancake)	Vegetable lasagna
Smoothie with banana, spinach & regular milk	Halloumi kebabs with onion & zucchini	Pan con tomate	Tacos with jicama slaw on flour tortilla	Sukiyaki with savoy cabbage	Pistachio gelato

There is no cure for Functional GI Disorders



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Thank you!

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