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CLINICAL GUIDE

Prebiotic Guide

Make the connection between beneficial gut species and the prebiotics that nurture them.

+ FRUCTOOLIGOSACCHARIDES
+ INULIN
+ GALACTOOLIGOSACCHARIDES
+ PECTIN
+ ARABINOXYLAN
+ RESISTANT STARCH
+ PROANTHOCYANIDIN

Prebiotics

Prebiotics are substrates selectively utilised by gut microbes, offering health benefits to the host.[1] As clinicians, understanding the role of prebiotics in maintaining gut health is pivotal in managing various conditions and promoting overall well-being.

In clinical practice, dietary intake of prebiotic and plant-based fibres is essential for maintaining microbial balance and promoting the production of short-chain fatty acids (SCFAs), which have been shown to suppress both intestinal and systemic inflammation.

Although there are recommended targets for fibre intake, there isn't a universally agreed upon daily target recommendation for prebiotic intake.

Prebiotics for gut microbiome modulation

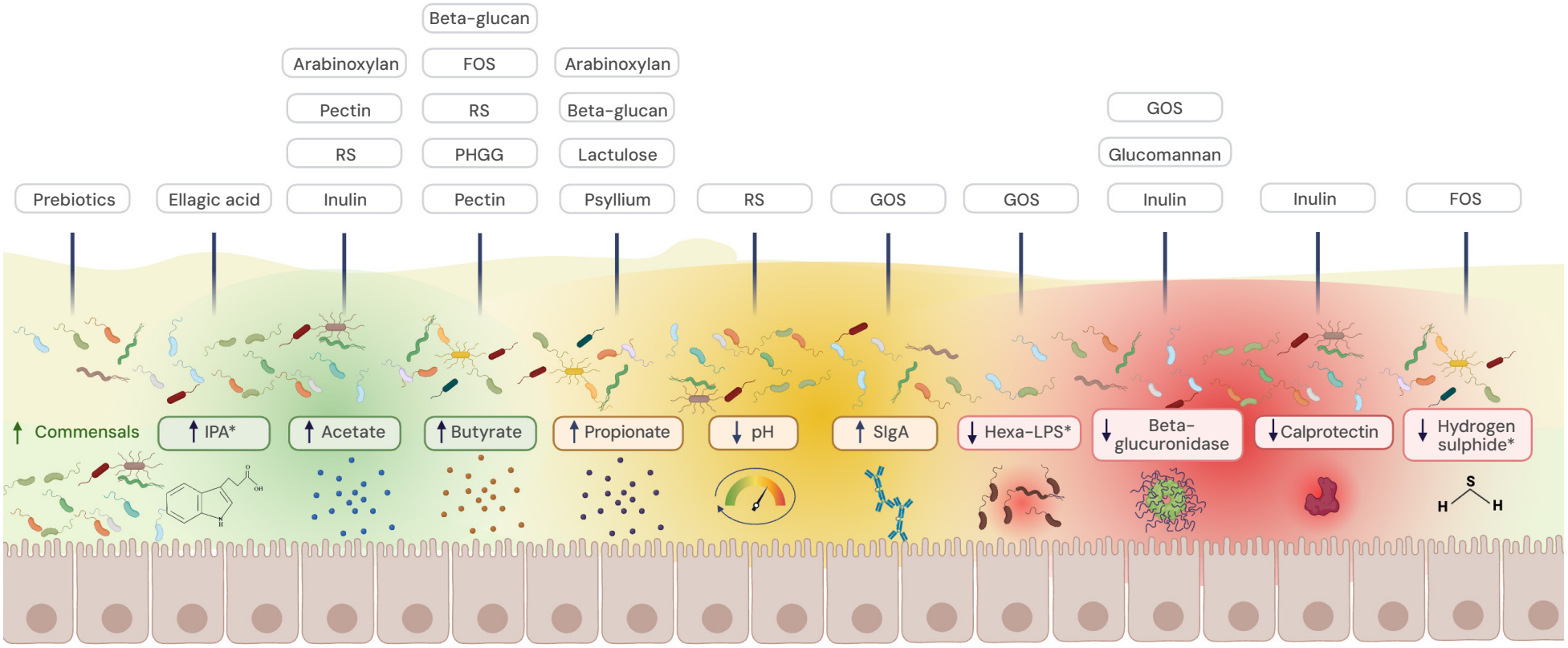
Clinically, prebiotics play a crucial role in modulating the gut microbiome through various mechanisms:

1. **Promotion of beneficial SCFAs:** prebiotics facilitate the production of SCFAs, such as butyrate, acetate, and propionate, which play a pivotal role in maintaining gut health and reducing inflammation.[2-3]
2. **Reduction of detrimental microbial markers:** by supporting beneficial microbes, prebiotics can influence the microbiome, thereby mitigating the production of detrimental microbial markers.[3]
3. **Shifting microbiome composition:** prebiotics may promote the growth of microbial species associated with good health while inhibiting the proliferation of species linked to poor health outcomes.[2-3]

Prebiotics offer clinicians a targeted approach to modulate the gut microbiome, improve gastrointestinal function and influence systemic health.

Testing for valuable insights

Testing the gut microbiome can provide valuable insights into the potential for your patient's gut microbiome to impact their health. Equipped with this information, you can make informed clinical decisions and provide your patients with personalised prebiotic recommendations to better support and manage their health.



FOS - fructooligosaccharides
GOS - galacto-oligosaccharides
PHGG - partially hydrolysed guar gum
RS - resistant starch

IPA - 3-indolepropionic acid
SIgA - secretory IgA
Hexa-LPS - hexa-acylated lipopolysaccharides

*Exclusive to the Microbiome Explorer range

Food Sources of Prebiotics

	INULIN	FOS	GOS	PECTIN	ELLAGIC ACID	RESISTANT STARCH	ARABINOXYLAN	BETA-GLUCAN
VEGETABLES (raw)								
Artichoke, globe, ½ cup	Best	Moderate		High				
Artichoke, Jerusalem, ½ cup	Very best	Very best						
Asparagus, ½ cup	Best	High						
Avocado, ½ cup				High				
Beetroot, ½ cup		Moderate		Moderate				
Bok choy, ½ cup				Moderate				
Broccoli, ½ cup				High				
Broccoli, stalks, ½ cup		Best						
Brussels sprouts, ½ cup		High		High				
Cabbage, ½ cup				Moderate				
Cabbage, red, ½ cup		High						
Cabbage, savoy, ½ cup		Moderate						
Carrot, ½ cup				High				
Cauliflower, ½ cup				Moderate				
Celery, ½ cup				Moderate				
Chicory root powder, 1 tsp	High							
Eggplant, ½ cup				Moderate				
Endive, ½ cup				Best				
Fennel bulb, ½ cup		High						
Garlic, 1 clove	Moderate							
Green beans, ½ cup				Moderate				
Kale, ½ cup				Best				
Kohlrabi, ½ cup				Moderate				

	INULIN	FOS	GOS	PECTIN	ELLAGIC ACID	RESISTANT STARCH	ARABINOXYLAN	BETA-GLUCAN
VEGETABLES cont.								
Leek, ½ cup	Best	High						
Mushrooms, button, ½ cup		High						High
Mushrooms, cup/flat/brown, ½ cup								High
Mushrooms, oyster/shimenji/shiitake, ½ cup								Best
Okra, ½ cup		Moderate		Moderate				
Olives , ½ cup				Moderate				
Onion, red, ¼ cup	High	Best						
Onion, white, ¼ cup	High	High						
Parsnip, ½ cup				Best				
Peas, canned, ½ cup						Moderate		
Peas, green, ½ cup	Moderate			Moderate		High		
Potato, cooked, ½ cup						Moderate		
Potato, cooked then chilled, ½ cup						High		
Potato, cooked, chilled, then reheated, ½ cup						Best		
Sauerkraut, ½ cup				High				
Scallion/spring onion, 1 stalk		Moderate						
Shallot, 1 bulb	Moderate	Moderate						
Snow peas, ½ cup		High						
Swede, ½ cup				High				
Sweet corn, cooked, ½ cup						Moderate		
Sweet potato, ½ cup	Moderate			Moderate				
Swiss chard, ½ cup				Moderate				

	INULIN	FOS	GOS	PECTIN	ELLAGIC ACID	RESISTANT STARCH	ARABINOXYLAN	BETA-GLUCAN
FRUIT								
Apple, 1 cup				High				
Apricot, 1 cup				High				
Banana, green, flour, 1 tbsp						Very best		
Banana, ripe, 1 large	Moderate	High		High		High		
Banana, semi-ripe, 1 large						Very best		
Blackberries, 1 cup				Best	Moderate			
Blueberries, 1 cup				High				
Cherries, 1 cup				Moderate				
Dried fruit, prunes/figs/apricot/dates, 30g				High				
Kakadu plum, freeze dried, 1 tsp					Very best			
Kiwi, 1 cup				Moderate				
Longan, 1 cup		Best						
Mandarins, 1 cup				Best				
Mango, 1 cup				High				
Nectarine, 1 cup				Moderate				
Orange, 1 cup				Best				
Papaya/paw paw, 1 cup				Best				
Peach, 1 cup				High				
Pear, 1 cup				Best				
Plums, red, 1 cup		Moderate		High				
Pomegranate arils, ⅓ cup					Moderate			
Pomegranate juice (from conc.), 1 cup					Moderate			
Raspberries, 1 cup				High	Best			
Red currants, 1 cup		High						
Red dragon fruit, 1 cup	Moderate							
Rhubarb, 1 cup				Moderate				
Rockmelon or honeydew, 1 cup				Moderate				
Strawberries, 1 cup				High	Moderate			
Watermelon, 1 cup		Best						

	INULIN	FOS	GOS	PECTIN	ELLAGIC ACID	RESISTANT STARCH	ARABINOXYLAN	BETA-GLUCAN
GRAINS								
Amaranth, uncooked, ¼ cup			Moderate					
Barley, cooked, ½ cup						Best		
Barley, pearled or wholegrain, uncooked, 1/4 cup							High	Best
Bread, BARLEYmax® fortified, 1 slice								High
Bread, Helga's Prebiotic Barley, 1 slice								Moderate
Bread, pumpernickel, 1 slice							Best	
Bread, rye (made with 100% rye flour), 1 slice							High	
Bread, rye (made with rye and wheat flour), 1 slice							Moderate	
Bread, wheat, wholegrain, wholemeal or multigrain, 1 slice			Moderate				High	Moderate
Bulgur wheat, uncooked, ¼ cup							Best	
Corn cereal, flakes, ½ cup						Moderate		
Corn thins, 3 slices							Moderate	
Mountain Bread, barley, 2 slices								Best
Mountain Bread, rye, 2 slices							High	High
Muesli, ½ cup		Moderate	Moderate			Moderate		High
Multigrain cereal, ½ cup							High	
Oat bran, 1 tbsp							Moderate	Best
Oat flakes cereal, uncooked, ½ cup								High
Oat flour, ½ cup			Moderate					
Oat porridge, cooked, ¾ cup								Best
Oat-based biscuit, 1 biscuit								Moderate
Oat-based cereal bar, 1 bar								High
Oats, quick, uncooked, ½ cup			Moderate					

	INULIN	FOS	GOS	PECTIN	ELLAGIC ACID	RESISTANT STARCH	ARABINOXYLAN	BETA-GLUCAN
GRAINS								
Amaranth, uncooked, ¼ cup			Moderate					
Barley, cooked, ½ cup						Best		
Barley, pearled or wholegrain, uncooked, 1/4 cup							High	Best
Bread, BARLEYmax® fortified, 1 slice								High
Bread, Helga's Prebiotic Barley, 1 slice								Moderate
Bread, pumpernickel, 1 slice							Best	
Bread, rye (made with 100% rye flour), 1 slice							High	
Bread, rye (made with rye and wheat flour), 1 slice							Moderate	
Bread, wheat, wholegrain, wholemeal or multigrain, 1 slice			Moderate				High	Moderate
Bulgur wheat, uncooked, ¼ cup							Best	
Corn cereal, flakes, ½ cup						Moderate		
Corn thins, 3 slices							Moderate	
Mountain Bread, barley, 2 slices								Best
Mountain Bread, rye, 2 slices							High	High
Muesli, ½ cup		Moderate	Moderate			Moderate		High
Multigrain cereal, ½ cup							High	
Oat bran, 1 tbsp							Moderate	Best
Oat flakes cereal, uncooked, ½ cup								High
Oat flour, ½ cup			Moderate					
Oat porridge, cooked, ¾ cup								Best
Oat-based biscuit, 1 biscuit								Moderate
Oat-based cereal bar, 1 bar								High
Oats, quick, uncooked, ½ cup			Moderate					

	INULIN	FOS	GOS	PECTIN	ELLAGIC ACID	RESISTANT STARCH	ARABINOXYLAN	BETA-GLUCAN
GRAINS cont.								
Oats, rolled, uncooked, ½ cup							High	Best
Popcorn, ²/₃ cup							Best	
Rice, brown, uncooked, ¼ cup							High	
Rice, white, long-grain, cooked, ½ cup						Moderate		
Rice, white, long-grain, cooked then chilled, ½ cup						High		
Rice, white, ready to heat, ½ cup						Best		
Rye, wholegrain, uncooked, ¼ cup							Best	
Ryvita, 2 crispbreads		High					High	High
Sorghum cereal, 2 Gluten-free Weetbix							Moderate	High
Sorghum grain, ¼ cup							Moderate	High
Wheat bran cereal, ½ cup		Moderate	High				Best	High
Wheat bran, raw, 1 tbsp		Moderate					Best	Moderate
Wheat germ, 1 tbsp			High					
Wholemeal pasta, uncooked, ¼ cup							High	

	INULIN	FOS	GOS	PECTIN	ELLAGIC ACID	RESISTANT STARCH	ARABINOXYLAN	BETA-GLUCAN
NUTS/SEEDS								
Almonds, 30g				Moderate				
Cashews, activated, 30g			High					
Chestnuts, 30g					Moderate			
Peanuts, 30g				Moderate				
Pecans, 30g				Moderate	High			
Pistachios, 30g			Moderate					
Pistachios, activated, 30g			High					
Sunflower seeds, 30g		High						
Walnuts, 30g					Best			

Prebiotic Supplements

Prebiotic supplements may shift the composition of the gut microbiome to support patient outcomes. When it comes to supplementation it is important to match the prebiotic form, dose and duration recommended for your desired patient outcome. Commonly prescribed prebiotic supplements include:

GI tolerance: High → Low

Prebiotic	Daily dosage range*	Common clinically effective dose	Flavour	Texture	Convenience	References
PHGG	5g – 20g	8g	Neutral	Soluble	Mixes in food/drink	4-5
Oat beta-glucan	3g – 6.6g	3.5g (lipids) 10g (stool form)	Slight oat	Viscous	Thickens, lumpy	6-7
Resistant starch type 2 (green banana flour)	10g – 40g	15g	Slight banana	Viscous	Thickens, separates	8-16
Glucomannan	4.5g	4.5g	Neutral	Viscous	Thickens, jelly-like	17
GOS	3g – 11g	5.5g	Sweet	Soluble	Mixes in food/drink	5,18-25
Inulin	10g – 15g	10g	Sweet	Soluble	Mixes in food/drink	5,21,25-35
FOS	7.5g – 30g	10g	Sweet	Soluble	Mixes in food/drink	5,21,25-35
Lactulose	3g – 25g	10g	Sweet	Liquid	Must be poured	36-38

*Used in research

Framework for Personalised Prebiotic Prescription

Assess	Patient's presentation – signs, symptoms, bowel habits, diet and lifestyle	○
	Patient's health goals and priorities	○
Test	Assess red flags and refer to a medical specialist, if necessary (faecal occult blood, calprotectin, lactoferrin, pancreatic elastase, pathogens)	○
	Assess gut terrain (faecal pH, secretory IgA, zonulin, mucin degradation, oral species)	○
	Assess dysbiosis (diversity & richness, microbial markers, species)	○
Prescribe	Prioritise Microbiome Explorer report insights based on the microbiome markers that need addressing the most (via results range or via health categories)	○
	Select prebiotic food/supplement based on patient symptoms, bowel habits, health history, allergies, intolerances, tolerability, goals, motivations	○
	Use a therapeutic dose guided by research and patient tolerability	○
Monitor	The patient's response to the prebiotic prescription (tolerability, convenience, new symptoms)	○
	Patient symptom improvement	○
	Amendments to the dose	○
	Changes to the prebiotic prescription (add another prebiotic, change the prebiotic or remove the prebiotic)	○
Re-test	Re-test between 3-6 months to understand effectiveness of prebiotic intervention	○

Personalise the prebiotic to the patient, taking into account the clinical picture, goals and preferences, while being guided by the gut microbiome results.

Tolerance and acceptability can be a stumbling block. When in doubt, start conservatively and proceed with caution.

Dose according to the condition, being guided by the research. Always start with the lowest dose and build up from there.

If you're not testing, you're guessing.

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expect *better*

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This guide has been developed for healthcare professionals. The Microbiome Explorer range is only available for purchase through a healthcare professional.

The faecal occult blood, reverse transcriptase polymerase chain reaction (RT-PCR) and enzyme-linked immunosorbent assays (ELISA) used in the Microbiome Explorer™ range are diagnostic and are approved for clinical use. The faeces pH assay used in the Microbiome Explorer™ range is for research use only and not to be used as a basis for diagnosis. The metagenomic assays used in the Microbiome Explorer™ range are to determine the microbiome populations and associated functional pathways in a faecal sample. The application is for research use only and is not to be used as a basis for diagnosis. Learn more about the journey we are on to validate this gold-standard technology for clinical diagnosis and application at microba.com. The Microbiome Explorer™ testing range has been developed for adults 18 years or older and the microbiome results will be compared to a cohort of healthy adults. The clinical and research insights within the report are based on the assessment of the scientific literature in adults over 18 years of age.