BIOME GUIDE PROTOCOL

SIBO / IMO Microbiome Protocol

Evidence-based antimicrobial, dietary, and supplement strategies to eradicate overgrowth, restore motility, and prevent recurrence

Covers: Hydrogen-SIBO / Intestinal Methanogen Overgrowth (IMO) / Mixed Type

Based on 16 systematic reviews, meta-analyses, and RCTs | Published March 2026

What This Protocol Addresses

Small intestinal bacterial overgrowth (SIBO) occurs when excessive or abnormal bacteria colonize the small intestine, producing gas, bloating, pain, and altered bowel habits. Research now recognizes at least three distinct subtypes: hydrogen-dominant SIBO (driven by *Escherichia coli* and *Klebsiella* overgrowth), intestinal methanogen overgrowth (IMO, driven by *Methanobrevibacter smithii* archaea that produce methane and slow transit), and hydrogen sulfide overproduction. Each subtype has unique microbial profiles and symptom patterns.

Next-generation sequencing has overturned old assumptions: SIBO is not colonic bacteria migrating upward, but rather overgrowth of two predominant species already present in the small bowel. IBS patients have a 5.7-fold higher risk of SIBO compared to healthy controls. This protocol provides a structured, evidence-based approach to **identify your subtype, eradicate the overgrowth, restore healthy motility, and prevent recurrence**.

Important: SIBO requires proper diagnosis before treatment.

A breath test (hydrogen and methane) or small bowel aspirate is needed to confirm SIBO and determine your subtype. Do not self-treat based on symptoms alone. Some SIBO symptoms overlap with conditions requiring different management (celiac disease, IBD, pancreatic insufficiency). Work with a gastroenterologist or functional medicine practitioner to confirm your diagnosis and rule out serious underlying causes.

Understanding Your Subtype

Feature	Hydrogen-SIBO	IMO (Methane)	Mixed Type
Primary gas	Hydrogen (H2)	Methane (CH4)	Both H2 + CH4
Key organisms	E. coli, Klebsiella (Proteobacteria)	Methanobrevibacter smithii (archaea)	Bacteria + archaea combined
Primary symptom	Diarrhea, urgency, bloating	Constipation, bloating, distension	Alternating diarrhea and constipation
Breath test	H2 rise >=20 ppm within 90 min	CH4 >=10 ppm at any point	Both thresholds met
Treatment	Rifaximin alone OR herbal protocol	Rifaximin + neomycin OR allicin-based	Combined approach (see protocol)

What Causes SIBO

The small intestine has natural defense mechanisms against bacterial overgrowth: gastric acid kills many ingested bacteria, bile has antimicrobial properties, the ileocecal valve prevents backflow from the colon, and the migrating motor complex (MMC) sweeps residual bacteria and food debris downward during fasting periods. When any of these defenses fail, bacteria can accumulate.

Common Risk Factors

Category	Risk Factor	How It Contributes
Motility	Impaired MMC	Reduced "cleansing waves" allow bacterial accumulation; the single most common underlying cause
Motility	Opioid use	Slows intestinal transit, suppresses MMC activity
Motility	Diabetes / hypothyroid	Autonomic neuropathy or metabolic slowing impairs gut motility
Acid/Enzymes	PPI use	Reduced stomach acid removes first-line antimicrobial barrier
Acid/Enzymes	Low bile output	Bile has antimicrobial properties; cholecystectomy or liver disease reduces it
Anatomical	Prior abdominal surgery	Adhesions, blind loops, altered anatomy create stasis zones
Anatomical	Ileocecal valve dysfunction	Allows backflow of colonic bacteria into small intestine
Infection	H. pylori	49% SIBO prevalence in H. pylori+ vs 25% in H. pylori- patients (Wang 2024)
Other	Post-infectious IBS	Food poisoning can damage the MMC via anti-vinculin antibodies

The Migrating Motor Complex (MMC): Your Built-In Cleaning System

The MMC is a cyclical pattern of electrical activity that sweeps through your small intestine approximately every 90-120 minutes during fasting. It acts as a 'housekeeper wave' that clears bacteria, debris, and undigested food from the small bowel. The MMC ONLY activates when you are NOT eating. This is why meal spacing (4-5 hours between meals, no snacking) is a critical part of SIBO prevention. Eating, even a small snack, resets the MMC clock.

Antimicrobial Therapy

Eradicating the bacterial overgrowth is the essential first step. A 2017 meta-analysis of 32 studies (1,331 patients) found that rifaximin achieves a 70.8% overall eradication rate with only 4.6% adverse events. A 2025 network meta-analysis of 30 RCTs (1,552 patients) compared 12 different treatment strategies and found that the optimal approach depends on your clinical context.

Treatment Options by Subtype

Approach	Protocol	Best For	Evidence
Rifaximin	550 mg three times daily for 14 days	Hydrogen-SIBO, uncomplicated	70.8% eradication (Gatta 2017); 59% eradication (Wang 2021)
Rifaximin + Neomycin	Rifaximin 550 mg TID + Neomycin 500 mg BID for 14 days	IMO (methane-dominant)	Rifaximin alone often insufficient for archaea; neomycin targets H2-producers that feed methanogens
Rifaximin + Prokinetic	Rifaximin 550 mg TID + prokinetic agent	SIBO with IBS or FGIDs	SUCRA 89% in Zhang 2025 NMA; best for concurrent FGIDs
Herbal Protocol	Berberine 500 mg TID + Oregano oil + Neem for 4-6 weeks	All subtypes; prefer for mild- moderate SIBO	Chedid 2014: 46% vs 34% rifaximin (equivalent); 57% rescue rate for rifaximin failures
Elemental Diet	Exclusive elemental diet for 14-21 days	All subtypes; non-antibiotic option	Rezaie 2025: 73% breath test normalization, 83% symptom relief; reduces M. smithii

Dose Matters for Rifaximin

Both Gatta 2017 and Wang 2021 meta-analyses found dose-dependent efficacy: higher rifaximin doses produce better eradication rates. The standard dose of 1,650 mg/day (550 mg three times daily) for 14 days is the most commonly studied effective regimen. The medium-to-high dose group (>=1,200 mg/day) showed superior efficacy compared to lower doses (Lu 2026).

Berberine: The Top-Ranked SIBO Treatment

A landmark 2025 network meta-analysis (Zhang et al.) comparing 12 different SIBO treatments across 30 randomized controlled trials placed **berberine at the top of the efficacy rankings** for uncomplicated SIBO eradication. This was measured by SUCRA (Surface Under the Cumulative Ranking curve), the standard method for ranking treatments in network meta-analyses.

Berberine is a plant alkaloid found in goldenseal, barberry, Oregon grape, and Chinese goldthread. It has a unique dual mechanism: direct antimicrobial activity against overgrown bacteria AND prokinetic effects that support healthy gut motility. This combination makes it especially valuable for SIBO, where motility dysfunction is often the root cause.

Zhang 2025 Network Meta-Analysis: Key Rankings

30 RCTs | 1,552 participants | 12 interventions compared

1. Uncomplicated SIBO: Berberine ranked #1 (highest SUCRA)
2. SIBO + functional GI disorders (IBS): Rifaximin + prokinetic ranked #1 (SUCRA 89%)
3. SIBO + chronic liver disease: Prokinetic alone ranked #1 (SUCRA 79.6%)

Parameter	Details
Recommended dose	500 mg two to three times daily with meals
Duration	4-6 weeks for eradication; lower maintenance dose (500 mg once or twice daily) to prevent recurrence
Antimicrobial action	Disrupts bacterial cell membranes; inhibits bacterial FtsZ protein (cell division); active against gram-negative and gram-positive species
Prokinetic action	Promotes intestinal motility via cholinergic pathways; supports MMC function
Additional benefits	Lowers blood glucose, improves insulin sensitivity, reduces inflammation, supports bile flow
Key evidence	Zhang 2025 NMA: highest SUCRA for SIBO eradication across 30 RCTs; Chedid 2014: part of herbal protocol achieving 46% eradication (vs 34% rifaximin)
Safety note	May interact with drugs metabolized by CYP enzymes (statins, cyclosporine). Avoid in pregnancy. Start at lower dose and increase gradually to minimize GI side effects.

Complete Herbal Antimicrobial Protocol

Chedid et al. (2014) demonstrated that a structured herbal antimicrobial protocol was at least as effective as rifaximin for SIBO eradication (46% vs 34% negative breath test, p=0.24). Among 14 patients who had already failed rifaximin, 57% achieved eradication with herbal rescue therapy.

Protocol Option	Components	Dose	Duration
Option A	Dysbiocide + FC Cidal	2 caps of each, twice daily	4-6 weeks
Option B	Candibactin-AR + Candibactin-BR	AR: 1 cap twice daily BR: 2 caps twice daily	4-6 weeks
IMO add-on	Allicin (garlic extract)	450 mg twice daily (enteric coated)	4-6 weeks; especially for methane
Standalone	Berberine (see above)	500 mg two to three times daily	4-6 weeks

Elemental Diet: Non-Antibiotic Option

An elemental diet provides all nutrition in pre-digested, easily absorbed form (amino acids, simple sugars, medium-chain triglycerides, vitamins, and minerals). Because nutrients are absorbed in the proximal small intestine, bacteria further downstream are effectively starved. A 2025 prospective trial from Cedars-Sinai (Rezaie et al.) demonstrated impressive results.

Rezaie et al. 2025: Palatable Elemental Diet Trial

30 subjects with SIBO and/or IMO | 2 weeks exclusive oral elemental diet

73% normalized breath tests (both hydrogen and methane)

83% reported adequate global symptom relief

Methane dropped from 41 to 12 ppm ($p < 0.001$); Hydrogen dropped from 43 to 12 ppm ($p < 0.001$)

Methanobrevibacter smithii abundance decreased significantly ($r = 0.489$, $p = 0.024$)

100% completion rate; no serious adverse events

When to Consider Elemental Diet

Elemental diet is ideal when: (1) you prefer a non-antibiotic approach, (2) you have failed one or more rounds of antibiotics, (3) you have both SIBO and IMO (it works on both subtypes), or (4) antibiotic resistance is a concern. The main barriers are cost, palatability, and the challenge of consuming nothing but elemental formula for 14-21 days. Newer palatable formulations have significantly improved compliance.

Probiotics in SIBO: A Nuanced Approach

Probiotics in SIBO are more complex than in other gut conditions. A 2017 meta-analysis of 18 studies (Zhong et al.) found that probiotics achieved a 62.8% SIBO decontamination rate (RR = 1.61, $p < 0.05$) and significantly reduced abdominal pain. However, the wrong strains at the wrong time can worsen symptoms. High-dose Lactobacillus in active hydrogen-SIBO carries a risk of D-lactic acidosis. Timing, strain selection, and your SIBO subtype all matter.

Caution: Probiotic Timing in SIBO

In active SIBO, adding more bacteria (even beneficial ones) to an already overgrown small intestine can increase gas, bloating, and discomfort. For most patients, it is safer to use probiotics AFTER the eradication phase, or to choose yeast-based probiotics (S. boulardii) that cannot contribute to bacterial overgrowth. If you experience worsening symptoms with any probiotic, stop immediately.

Probiotic	When to Use	Why	Dose
S. boulardii (CNCM I-745)	DURING and after eradication	Yeast-based: cannot worsen bacterial overgrowth; antibiotic-resistant; C. difficile protection	250-500 mg twice daily
Soil-based / Bacillus species	AFTER eradication phase	Spore-forming: survives stomach acid; does not colonize small intestine in the same way	Per product label
L. rhamnosus GG	AFTER eradication; avoid in active H2-SIBO	Well-studied for gut barrier recovery; may help restore normal motility patterns	10-20 billion CFU daily
Multi-strain formula	AFTER eradication; start low dose	Zhong 2017 meta-analysis: 62.8% decontamination rate; best as maintenance strategy	Start at 1/4 recommended dose

For IMO/Methane Specifically

Redondo-Cuevas et al. (2024) found that herbal antimicrobials combined with probiotics showed particular benefit for methane-dominant SIBO (IMO) in a 179-patient RCT. The herbal+probiotic combination may be especially effective because probiotics can help shift the hydrogen:methane balance while antimicrobials target the methanogens directly.

Supporting Supplements

Beyond antimicrobial and probiotic therapy, several supplements support SIBO recovery by addressing root causes, supporting digestion, and promoting gut barrier repair.

Supplement	Dose	Mechanism	Evidence / Notes
Berberine	500 mg 2-3x/day	Antimicrobial + prokinetic dual action	#1 SUCRA ranking (Zhang 2025 NMA of 30 RCTs)
Digestive Enzymes	Full-spectrum with each meal	Supports complete digestion; reduces fermentable substrate reaching distal small bowel	Especially important if low pancreatic output, bile issues, or post-cholecystectomy
Betaine HCl	650 mg with protein-rich meals	Restores stomach acid barrier; PPIs are a SIBO risk factor	Only if low stomach acid confirmed; avoid with gastritis, ulcers, or NSAID use
L-Glutamine	5 g twice daily	Fuels enterocytes; supports intestinal barrier repair; reduces permeability	Particularly useful after eradication for gut lining recovery
Ginger extract (Iberogast)	1 mL three times daily or ginger caps 500-1000 mg	Natural prokinetic; accelerates gastric emptying; supports MMC function	Alternative to prescription prokinetics for recurrence prevention
Vitamin D3	2,000-4,000 IU daily	Immune regulation; tight junction support; antimicrobial peptide production	Many SIBO patients are deficient due to malabsorption; test and optimize levels

Addressing Nutrient Deficiencies

SIBO can cause malabsorption of fat-soluble vitamins (A, D, E, K), vitamin B12, iron, and essential fatty acids. If you have had SIBO for an extended period, ask your doctor to test these levels. Correcting deficiencies is an important part of recovery that is often overlooked. Iron and B12 deficiency are especially common in hydrogen-SIBO with diarrhea.

Protocol Phase 1: Eradicate and Calm

Weeks 1-6

Phase 1 focuses on eradicating the bacterial or archaeal overgrowth while managing symptoms and supporting digestion. Choose your antimicrobial approach based on your SIBO subtype and clinical context, then layer in the supportive strategies below.

Component	Details	Timing
Antimicrobial (choose one)	Rifaximin 550 mg TID (14 days) OR Herbal protocol (4-6 weeks) OR Elemental diet (14-21 days)	Start immediately after diagnosis
For IMO: add	Neomycin 500 mg BID (with rifaximin) OR Allicin 450 mg BID (with herbals)	Same duration as primary antimicrobial
S. boulardii	250-500 mg twice daily	Safe during antibiotics; continue throughout
Low-fermentation diet	Reduce FODMAPs, simple sugars, and starches during treatment	Throughout Phase 1; STRICT during antimicrobial period
Meal spacing	4-5 hours between meals; no snacking; allow MMC "cleansing waves"	Begin immediately; continue indefinitely
Digestive support	Digestive enzymes with meals; Betaine HCl if low acid confirmed	With every meal
L-Glutamine	5 g twice daily for gut barrier repair	Begin in week 2-3; continue into Phase 2

Phase 1 Priority: Die-Off Management

When bacteria are killed off rapidly, they release endotoxins (lipopolysaccharides) that can temporarily worsen symptoms: increased bloating, fatigue, headaches, brain fog. This is called a Herxheimer reaction or 'die-off.' Strategies to manage it:

1. Start antimicrobials at half dose for 2-3 days, then increase to full dose
2. Stay well hydrated (aim for 2-3 liters of water daily)
3. Activated charcoal (500 mg) taken 2 hours away from meals and medications can help bind toxins
4. Gentle movement (walking, yoga) supports lymphatic clearance
5. If symptoms are severe, slow down the antimicrobial ramp-up rather than stopping completely

Protocol Phase 2: Restore and Prevent

Weeks 7-16+

Phase 2 is arguably the most important phase because SIBO recurrence is extremely common without ongoing prevention. Up to 40-50% of patients relapse within 9 months when the underlying motility dysfunction or other root causes are not addressed. Phase 2 focuses on restoring healthy motility, rebuilding the microbiome, expanding the diet, and addressing root causes.

Component	Details	Timing
Prokinetic therapy	Prescription: Low-dose erythromycin (50 mg at bedtime) OR prucalopride (1-2 mg daily) Natural: Ginger/Iberogast or 5-HTP	Begin within 1 week of completing antimicrobials; continue 3-6+ months
Berberine maintenance	500 mg once or twice daily (reduced from eradication dose)	If used as primary therapy; continue 3-6 months
Probiotic reintroduction	Soil-based organisms first (Bacillus spp.); add L. rhamnosus GG after 2-4 weeks; start at quarter dose, increase gradually	Begin 1-2 weeks after completing antimicrobials
Diet expansion	Gradual FODMAP reintroduction over 6-8 weeks; increase fiber diversity slowly; emphasize tryptophan and polyphenol- rich foods for motility support	Systematic reintro starting week 7-8
Meal spacing	Maintain 4-5 hours between meals; overnight fast of 12+ hours; MMC-supportive eating pattern	Continue indefinitely as lifestyle habit
Root cause work	H. pylori eradication if positive; PPI de-escalation if possible; thyroid optimization; adhesion work	Begin evaluations in Phase 2; ongoing
Repeat breath test	Re-test at 3 months post-treatment to confirm eradication and guide next steps	Around week 12-16

Prokinetics: The Key to Preventing Relapse

Zhang et al. (2025) found that prokinetic therapy alone was the most effective intervention for SIBO in patients with chronic liver disease (SUCRA 79.6%), and that rifaximin combined with a prokinetic was best for SIBO with functional GI disorders (SUCRA 89%). This underscores that restoring motility is not just supportive care but a primary treatment strategy. Low-dose erythromycin (50 mg at bedtime) is the most evidence-based prescription prokinetic for MMC stimulation. Natural alternatives include ginger extract, Iberogast, artichoke leaf, and 5-HTP.

SIBO Dietary Guide

Diet plays a dual role in SIBO: reducing fermentable substrates during treatment, and supporting healthy motility and microbiome diversity during recovery. The goal is NOT permanent restriction. Overly restrictive diets held for too long can reduce beneficial bacteria (especially Bifidobacterium), worsen nutrient deficiencies, and create disordered eating patterns.

During Treatment (Phase 1)

Favor	Reduce / Avoid
Well-cooked, easily digestible proteins (chicken, fish, eggs, bone broth)	High-FODMAP foods: onion, garlic, wheat, beans, lentils, apples, pears
Low-FODMAP vegetables: zucchini, carrots, spinach, green beans, bell peppers	Large amounts of raw vegetables (harder to digest, more fermentable)
White rice, sourdough bread (lower fermentation potential)	Whole grains in large amounts (oats, brown rice, quinoa)
Healthy fats: olive oil, avocado oil, coconut oil, small portions of avocado	Sugar alcohols: sorbitol, mannitol, xylitol (found in sugar-free products)
Ginger tea, peppermint tea (natural prokinetic/antispasmodic)	Alcohol, carbonated drinks, excessive caffeine
Lactose-free dairy or hard cheeses (if tolerated)	Soft cheeses, milk, ice cream, yogurt with added sugars

During Recovery (Phase 2)

Gradually reintroduce restricted foods one at a time over 6-8 weeks. If a food causes significant symptoms, wait 2-4 weeks and try again at a smaller portion. Prioritize diversity. The goal is to support a wide range of beneficial bacteria while maintaining meal spacing for MMC function.

Priority Foods	Why	How to Introduce
Tryptophan-rich	Serotonin precursor; accelerates intestinal transit and gastric emptying	Turkey, chicken, eggs, pumpkin seeds, tofu; include daily
Polyphenol-rich	Antimicrobial properties; support beneficial bacteria; reduce inflammation	Berries, dark chocolate, green tea, turmeric; add gradually
Soluble fiber	Feeds beneficial bacteria; supports SCFA production; gentler than insoluble fiber	Cooked carrots, sweet potato, bananas; start small, increase over weeks
Fermented foods (small amounts)	Natural source of beneficial bacteria; supports microbiome diversity	Start with small amounts of sauerkraut or kefir; monitor symptoms carefully

The #1 Dietary Rule for SIBO Prevention: Meal Spacing

Space meals 4-5 hours apart with NO snacking between meals. The migrating motor complex only activates during fasting. Every time you eat, even a small bite, the MMC resets its 90-120 minute cycle. An overnight fast of 12+ hours gives the MMC its longest uninterrupted cleaning window. This single habit is the most important dietary change for long-term SIBO prevention.

Tracking Your Progress

SIBO tracking is uniquely objective compared to many gut conditions: the breath test provides quantifiable gas measurements that directly reflect bacterial overgrowth. Combined with symptom tracking, this allows you to measure real progress.

Metric	How to Track	Target / Timeline
Breath test (primary)	Lactulose or glucose hydrogen- methane breath test	Repeat at 3 months post-treatment; goal: H2 rise <20 ppm, CH4 <10 ppm
Symptom severity	Daily symptom diary: bloating, pain, bowel habits (1-10 scale)	50%+ improvement by end of Phase 1; continued improvement in Phase 2
Stool form	Bristol Stool Chart (types 1-7)	Goal: consistent type 3-4; IMO patients track constipation improvement specifically
Nutrient levels	Blood tests: B12, iron, ferritin, vitamin D, fat-soluble vitamins	Test at baseline and 3-6 months; correct any deficiencies identified
Weight / BMI	Weekly weigh-in if underweight or weight loss was a concern	Stabilization or healthy weight gain indicates improved absorption
Food tolerance	Food reintroduction diary during Phase 2 FODMAP reintroduction	Track which foods trigger symptoms vs which are tolerated

If SIBO Recurs

Recurrence Management Strategy

If your 3-month breath test shows persistent overgrowth or symptoms return:

1. Re-evaluate root causes: Is the MMC still impaired? Unaddressed H. pylori? Ongoing PPI use?
2. Try a DIFFERENT antimicrobial approach (if rifaximin failed, try herbals; if herbals failed, try elemental diet)
3. Ensure prokinetic therapy is adequate and consistent
4. Consider cyclical antimicrobial therapy: 2 weeks on, 2 weeks off, for 2-3 cycles
5. Investigate anti-vinculin and anti-CdtB antibodies (markers of post-infectious IBS/SIBO)
6. Consider referral to a GI motility specialist if recurrence is frequent

The H. pylori Connection

A 2024 study (Wang et al.) found that H. pylori infection is significantly associated with both SIBO and IMO. Among 102 patients, SIBO prevalence was nearly double in H. pylori-positive patients (49.1% vs 24.5%, p = 0.019), and IMO prevalence was three times higher (24.5% vs 8.2%, p = 0.027). Importantly, successful H. pylori eradication also resolved SIBO in 66.7% and IMO in 76.9% of cases, with significant symptom improvement.

This has practical implications: if you have SIBO that keeps recurring, testing for and treating H. pylori may resolve the underlying driver. H. pylori affects stomach acid production and gut motility, both of which are key defenses against bacterial overgrowth.

Measure	H. pylori Positive	H. pylori Negative	P Value
SIBO prevalence	49.1%	24.5%	p = 0.019
IMO prevalence	24.5%	8.2%	p = 0.027
SIBO resolution after H. pylori Tx	66.7% response	N/A	
IMO resolution after H. pylori Tx	76.9% response	N/A	
Symptom scores (GSRS) after Tx	2.0 to 0.0 (median)	N/A	p < 0.001

Action Step

If you have recurrent SIBO, ask your doctor about testing for H. pylori (urea breath test or stool antigen test). If positive, standard triple or quadruple therapy can eradicate H. pylori, and this alone may resolve your SIBO/IMO.

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Important Disclaimer

This protocol is provided for educational purposes only. It is not a substitute for professional medical advice, diagnosis, or treatment. Always seek the advice of your physician or other qualified health provider with any questions you may have regarding a medical condition.

SIBO and IMO require proper diagnosis through breath testing or small bowel aspirate before treatment. Some treatments discussed (rifaximin, neomycin, erythromycin, prucalopride) are prescription medications that must be prescribed and monitored by a licensed healthcare provider. Herbal antimicrobials and supplements can interact with medications and may not be appropriate for everyone.

Do not stop or modify any prescribed medication based on information in this protocol. If you are pregnant, nursing, or have liver or kidney disease, consult your doctor before starting any supplement regimen. The information presented here reflects the best available evidence as of the date of publication but may not reflect the most current research.

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