

Microbial Reset Diet (MRD): Principles and Guidelines

This is a therapeutic diet tailored specifically to reduce bacterial, fungal, or parasite overgrowth by depriving these microorganisms of their energy source: poorly absorbed carbohydrates.

This diet is not intended to be a low carbohydrate diet (though it can be, if you have other health conditions that require a low-carb approach), but rather it limits specific types of carbohydrates that are more difficult to digest and therefore more accessible to the microbiota. You may have to add new carbohydrate sources to maintain a moderate carb intake such as Kabocha squash, certain types of white potatoes, certain types of white rice (if tolerated) and parsnips.

A FEW IMPORTANT CONCEPTS AND DEFINITIONS

The small intestine's primary function is the digestion and assimilation of nutrients. While it is normal for some microbes to be present in the small intestine, the amounts should be relatively low (when compared to the large intestine), because microbial overgrowth can interfere with nutrient absorption and other important functions.

Intestinal microbes—whether bacteria, yeast, or parasites—often rely on carbohydrates as their food source. Many microbes in the gut are anaerobic (i.e. they do not require oxygen for growth), and they derive energy by fermentation of carbohydrates. This fermentation produces compounds including hydrogen and methane gas, which in turn can cause bloating, flatulence, pain, and many of the other telltale symptoms of GI disorders.

Therefore, in order to successfully treat microbial overgrowth in the small intestine, we must restrict the food sources of these organisms. Contrary to popular belief, this does not require restriction of all carbohydrates (as in some “anti-candida diets”). For example, simple sugars such as glucose (which is a single molecule) are rapidly absorbed in the upper part of the small intestine, and are thus unlikely to feed the gut microflora. This is why elemental diets— liquid formulas which contain only simple sugars like glucose—are sometimes used in clinical settings to treat recalcitrant or severe SIBO.

Instead of restricting all carbohydrates, we focus on restricting certain carbohydrates that are more likely to feed the intestinal microflora. These include:

- FODMAPs. Fermentable oligosaccharides, disaccharides, monosaccharides and polyols. These include fructans and fructooligosaccharides (FOS, nystose, kestose), galactooligosaccharides (GOS, raffinose, stachyose), fructose (in excess of glucose), lactose, and sugar alcohols (sorbitol, mannitol, xylitol).
- Some (but not all) starches. For example, amylopectin, which is found in high concentrations in certain foods like Jasmine white rice and Russet potatoes, is easily broken down and thus rapidly absorbed. On the other hand, amylose, which is found in Basmati rice, green plantains, and grain products, is much more difficult to break down and thus more likely to feed gut microbes in the small intestine.
- Fiber. Fiber represents the cell walls of fruits, vegetables, nuts, legumes, the hull or bran of grains (except white rice, where the hull has been polished off), and any other carbohydrates that can't be digested or absorbed by humans. These include cellulose, hemicellulose, lignin, pectin, gums, polydextrose, and verbascope.
- Resistant starch. Resistant starch is a type of fiber that is indigestible to us and instead feeds the gut microbiota. Resistant starch can be found white rice and white potatoes that have been cooked, and then cooled. It is best not to eat leftover white rice and potatoes on Phase I or Phase II of the diet (see below). If you do eat them, make sure to fully reheat to break down some of the resistant starch that was formed when they cooled.

FERMENTATION POTENTIAL AND LOW FODMAP

Fermentation potential (FP) is a concept originally presented by Norm Robillard, PhD in his book "Fast Tract Digestion: Heartburn". It is a measure of how likely carbohydrates are to be fermented by intestinal microflora. Carbohydrates that are rapidly absorbed high up in the small intestine are given a low FP, and those that take longer to break down and thus may be fermented by gut microbes are given a higher FP. Foods are assigned a numerical value using a mathematical formula for calculating FP, and then categorized as "low", "medium", or "high" in terms of their propensity to feed intestinal microflora.

The concept behind the "low fermentation potential" and low FODMAP approaches is the same: to reduce the levels of microbial overgrowth in the small intestine (whether bacteria, fungus, or parasites) by depriving them of their food source. However, they employ a different strategy. Low FP is determined primarily by how quickly a carbohydrate is absorbed (as measured by its glycemic index), whereas the low FODMAP diet excludes specific types of carbohydrates that are poorly absorbed.

You will notice that foods with low FP are those that are absorbed rapidly into the bloodstream, such as Jasmine and short-grain white rice, and white potatoes. Favoring these carbohydrates may seem counter-intuitive to you, given their potential effect on blood sugar. However, large review studies as well as examination of traditional hunter-gatherer societies have shown that eating low-glycemic index foods is not associated with weight loss or improvements in insulin sensitivity or glucose control.

That said, individual tolerance to these foods will vary. If you know that eating white rice and white potatoes significantly spikes your blood sugar, you should avoid them on this diet. Please ask your clinician if you have any questions about this.

Finally, it is important to point out that this is a therapeutic diet with a specific purpose (reducing microbial overgrowth in the small intestine), and should NOT be followed long-term. The carbohydrates that are restricted in this plan not only feed microbes in the small intestine that could be causing harm, they also feed beneficial bacteria in the large intestine that are essential to health. In fact, over the long term you should make every effort to reintroduce foods that are moderate to high in both FP and FODMAP content for this reason.

With this in mind, your treatment will proceed in two steps:

- Reduce or eradicate microbial overgrowth in the small intestine using a combination of low FP/ low FODMAP diet, along with antimicrobials, enzymes, hydrochloric acid, and other supportive compounds.
- Restore a healthy gut microbiome using fermentable fibers (moderate-to-high FP and FODMAP foods, as tolerated), fermented foods, probiotics, and prebiotic supplements.

HOW TO USE THIS TABLE AND CUSTOMIZE YOUR DIET

Foods are listed in three columns (Low, Medium, High) depending on their relative FODMAP content. (For example, low FODMAP foods are listed in the green column on the left.)

Foods that are moderate to high in FP are indicated by yellow or red shading, respectively. As you will see, there are some low FODMAP foods that have either moderate or high FP, and there are some high FODMAP foods that have low FP.

Microbial Reset Diet (MRD) Food Tables

SS=SERVING SIZE; UNIT=SERVING SIZE MEASUREMENT UNIT; MUL=MULTIPLE; POL=POLYOLS;
FCT=FRUCTANS; FRU=FRUCTOSE; LAC=LACTOSE

LOW				MEDIUM				HIGH			
VEGETABLES											
FOOD	SS	UNIT	FODMAP	FOOD	SS	UNIT	FODMAP	FOOD	SS	UNIT	FODMAP
Alfalfa sprouts	2.8	OZ	N/A	Cauliflower	2.8	OZ	POL	Artichoke	2.8	OZ	FCT
Bamboo shoots	2.8	OZ	N/A	Celery	2.8	OZ	POL	Asparagus	2.8	OZ	MUL
Bell peppers	2.8	OZ	N/A	Sauerkraut	2.8	OZ	FCT	Beets	2.8	OZ	MUL
Bok choy	2.8	OZ	N/A					Broccoli	2.8	OZ	MUL
Butternut squash	5.3	OZ	N/A					Brussels sprouts	2.8	OZ	MUL
Carrot	2.8	OZ	N/A					Cabbage	2.8	OZ	MUL
Cherry tomato	2.8	OZ	N/A					Fennel	2.8	OZ	MUL
Chives	2.8	OZ	N/A					Garlic	0.3	OZ	FCT
Cucumber	2.8	OZ	N/A					Green beans	2.8	OZ	MUL
Eggplant	2.8	OZ	N/A					Jerusalem artichoke	2.8	OZ	FCT
Endive	2.8	OZ	N/A					Leeks	2.8	OZ	FCT
Ginger	2.8	OZ	N/A					Mushroom	2.8	OZ	MUL
Green peas	2.8	OZ	N/A					Okra	2.8	OZ	FCT
Kale	2.8	OZ	N/A					Onions	2.8	OZ	FCT
Lettuce	2.8	OZ	N/A					Radicchio	2.8	OZ	MUL
Parsnip	2.8	OZ	N/A					Shallot	0.4	OZ	FCT
Pickles (w/o sugar)	2.8	OZ	N/A					Snow peas	2.8	OZ	FCT
Seaweed	2.8	OZ	N/A					Sugar snap peas	2.8	OZ	FRU
Spinach	2.8	OZ	N/A					Tomato sauces & paste	2.8	OZ	FCT
Spring onion	2.8	OZ	N/A								
Swiss chard	2.8	OZ	N/A								
Tomatoes	2.8	OZ	N/A								
Winter squash	5.3	OZ	N/A								
Zucchini	2.8	OZ	N/A								

LOW				MEDIUM				HIGH			
FRUITS											
FOOD	SS	UNIT	FODMAP	FOOD	SS	UNIT	FODMAP	FOOD	SS	UNIT	FODMAP
Banana, ripe	4.2	OZ	N/A	Longon	4.2	OZ	MUL	Apples	4.2	OZ	MUL
Banana, unripe	4.2	OZ	N/A	Lychee	4.2	OZ	POL	Apricots	4.2	OZ	POL
Blueberry	4.2	OZ	N/A	Rambutan	4.2	OZ	POL	Blackberries	4.2	OZ	POL
Cantaloupe	4.2	OZ	N/A					Cherries	4.2	OZ	FRU
Grapefruit	4.2	OZ	N/A					Dried fruit	2.1	OZ	FRU
Honeydew melon	4.2	OZ	N/A					Fruit juice	8	OZ	FRU
Kiwifruit	4.2	OZ	N/A					Grapes	4.2	OZ	FRU
Lemon juice	2.1	OZ	N/A					Mango	4.2	OZ	FRU
Lime juice	2.1	OZ	N/A					Nectarines	4.6	OZ	POL
Mandarin	4.2	OZ	N/A					Peach	4.2	OZ	POL
Orange	4.2	OZ	N/A					Pears	4.2	OZ	MUL
Papaya	4.2	OZ	N/A					Persimmon	4.2	OZ	POL
Passionfruit	4.2	OZ	N/A					Plum	4.2	OZ	POL
Pineapple	4.2	OZ	N/A					Watermelon	4.2	OZ	MUL
Raspberry	4.2	OZ	N/A								
Rhubarb	4.2	OZ	N/A								
Strawberry	4.2	OZ	N/A								

LOW				MEDIUM				HIGH			
STARCHES											
FOOD	SS	UNIT	FODMAP	FOOD	SS	UNIT	FODMAP	FOOD	SS	UNIT	FODMAP
Plantain, green	5.3	OZ	N/A	Sweet potato	5.3	OZ	POL				
Plantain, ripe	5.3	OZ	N/A	Yam	5.3	OZ	POL				
Potato, Desiree ¹	5.3	OZ	N/A								
Potato, Pontiac ¹	5.3	5.3	OZ								
Potato, Sebago	5.3	5.3	OZ								
Potato, Russet ¹	5.3	5.3	OZ								
Potato, Ontario	5.3	OZ	N/A								
Rice, bread ¹ (low amylose)	1.1	OZ	N/A								
Rice, bread ¹ (high amylose)	1.1	OZ	N/A								
Rice, cakes ¹	1	OZ	N/A								
Rice, crackers ¹	1	OZ	N/A								
Rice, noodles ¹	6	OZ	N/A								
Rice, white, sushi ¹	5.3	OZ	N/A								
Rice, white, Jasmine ¹	5.3	OZ	N/A								
Rice, white, Basmati ¹	5.3	OZ	N/A								
Rice, white, long-grain ¹	5.3	OZ	N/A								
Rice, white, instant ¹	5.3	OZ	N/A								
Rutabaga	5.3	OZ	N/A								
Taro	5.3	OZ	N/A								
Yuca (cassava, manioc)	5.3	OZ	N/A								

LOW				MEDIUM				HIGH			
NUTS											
FOOD	SS	UNIT	FODMAP	FOOD	SS	UNIT	FODMAP	FOOD	SS	UNIT	FODMAP
Macadamia ²	1.1	OZ	N/A	Almonds ² (<10)	1.1	OZ	POL	Cashews ²	1.1	OZ	POL
Pecan ²	1.1	OZ	N/A	Almond meal ²	1.9	OZ	POL	Pistachios ²	1.1	OZ	POL
Pine nut ²	1.1	OZ	N/A	Hazelnuts ²	1.1	OZ	POL				
Walnut ²	1.1	OZ	N/A								
Seeds (pumpkin, sesame, etc.) ²	1.1	OZ	N/A								
Macadamia ²	1.1	OZ	N/A								
Pecan ²	1.1	OZ	N/A								
Pine nut ²	1.1	OZ	N/A								
Walnut ²	1.1	OZ	N/A								
Seeds (pumpkin, sesame, etc.) ²	1.1	OZ	N/A								

LOW				MEDIUM				HIGH			
DAIRY & DAIRY ALTERNATIVES											
FOOD	SS	UNIT	FODMAP	FOOD	SS	UNIT	FODMAP	FOOD	SS	UNIT	FODMAP
Almond milk	1/2	CUP	N/A	Almond milk	1	CUP	POL	Ice cream full-fat	1/2	CUP	LAC
Butter	1	TBS	N/A	Kefir (store-bought)	1	CUP	LAC	Buttermilk	1/4	CUP	LAC
Cream, heavy whipping	1/8	CUP	N/A	Yogurt (store-bought)	1	CUP	LAC	Milk	1	CUP	LAC
Ghee	1	TBS	N/A	Soft cheese	2	OZ	LAC				
Hard/aged cheese	2	OZ	N/A	Sour cream	1	OZ	LAC				
Kefir, whole milk (24-hour) ³	1	CUP	N/A								
Yogurt, whole milk (24-hour) ³	1	CUP	N/A								

LOW				MEDIUM				HIGH			
MEAT, SEAFOOD & TOFU											
FOOD	SS	UNIT	FODMAP	FOOD	SS	UNIT	FODMAP	FOOD	SS	UNIT	FODMAP
All meats, seafoods, eggs, and tofu have very low fermentation potentials. Soft, firm, and extra firm tofu do not contain FODMAPs. Silken tofu, tempeh, and other soy protein products are "medium" on the FODMAP scale.											

LOW				MEDIUM				HIGH			
FATS											
FOOD	SS	UNIT	FODMAP	FOOD	SS	UNIT	FODMAP	FOOD	SS	UNIT	FODMAP
All except avocado	N/A	N/A	N/A	Avocado	1/2	FRUIT	POL				

LOW				MEDIUM				HIGH			
SWEETENERS											
FOOD	SS	UNIT	FODMAP	FOOD	SS	UNIT	FODMAP	FOOD	SS	UNIT	FODMAP
Dextrose (glucose) ⁷	2	TSP	N/A					Agave syrup ⁷	2	TSP	FRU
Honey ⁷	2	TSP	N/A					Artificial sweeteners	Var		POL
Maple syrup ⁷	2	TSP	N/A								
Molasses ⁷	2	TSP	N/A								
Palm/coconut sugar ⁷	2	TSP	N/A								
Sucrose ⁷	2	TSP	N/A								

LOW				MEDIUM				HIGH			
BEVERAGES											
FOOD	SS	UNIT	FODMAP	FOOD	SS	UNIT	FODMAP	FOOD	SS	UNIT	FODMAP
Broth (meat only, no bones)	1	CUP	N/A	Broth (made with bones) ⁶	1	CUP	N/A	Beer ⁵	12	OZ	FCT
Coffee ⁵	1	CUP	N/A	Coconut water	1/2	CUP	POL	Fruit juice	1	CUP	FRU
Tea	1	CUP	N/A	Wines, dry ⁵	6.6	OZ	FRU	Sodas	1	CUP	FRU
Coconut water	1/4	CUP	N/A	Kombucha	1	CUP	FRU	Wines, sweet ⁵	6.6	OZ	FRU
Clear spirits ⁵	1.5	OZ	N/A					Coconut water	1	CUP	POL

LOW				MEDIUM				HIGH			
SEASONINGS & OTHER INGREDIENTS											
FOOD	SS	UNIT	FODMAP	FOOD	SS	UNIT	FODMAP	FOOD	SS	UNIT	FODMAP
Cacao, unsweetened	1	OZ	N/A	Chocolate (<70% cacao)	1	OZ	LAC	Breath mints	N/A	N/A	POL
Chocolate, dark (>70% cacao)	1	OZ	N/A	Coconut milk	1/2	CUP	N/A	Carageenan	N/A	N/A	FCT
Coconut, dried, unsweetened	1/4	CUP	N/A	Coconut, dried, unsweetened	1/2	CUP	POL	Chewing gum	N/A	N/A	POL
Coconut milk	1/2	CUP	N/A	Coconut milk	1	CUP	POL	Chicory	N/A	N/A	FCT
Coconut flour	1	OZ	N/A	Coconut flour	>1	OZ	N/A	Cold/cough syrups/liquids	N/A	N/A	MUL
Dried herbs	N/A	N/A	N/A					Fructo-oligosaccharides (FOS)	N/A	N/A	FCT
Fresh herbs	N/A	N/A	N/A					Gums	N/A	N/A	FCT
Garlic-infused oil	N/A	N/A	N/A					Inulin	N/A	N/A	FCT
Ginger	N/A	N/A	N/A					Isomalt	N/A	N/A	FCT
Pepper	N/A	N/A	N/A					Mannitol ⁴	N/A	N/A	POL
Salt	N/A	N/A	N/A					Onion & garlic powder	N/A	N/A	FCT
Spices (no garlic/onion powder)	N/A	N/A	N/A					Prebiotics	N/A	N/A	FCT
Sun-dried tomatoes	N/A	N/A	N/A					Sorbitol ⁴	N/A	N/A	POL
Vinegars	N/A	N/A	N/A					Thickeners	N/A	N/A	FCT
								Toothpaste	N/A	N/A	POL
								Xylitol ⁴	N/A	N/A	POL

1. White rice should only be consumed if you are certain that you tolerate it well. Both potatoes and white rice form resistant starch (which has high FP) when cooled after cooking; therefore both white rice and potatoes should be consumed hot to minimize resistant starch. If you do eat leftover rice and potatoes, make sure to fully re-heat/cook them for a short time before consuming.
2. Nuts can be difficult to digest, even when low in FODMAP and FP. Soaking for 8 hours and dehydrating or roasting at low temperatures prior to consumption can make them more easily digestible.
3. 24-hour, homemade kefir and yogurt contain little to no lactose because most of it has been consumed during the fermentation period.
4. Watch out for sugar alcohols (e.g. mannitol, sorbitol, and xylitol) in liquid supplements, toothpaste, sugar-free gum, breath mints, and similar products.

5. Alcohol and coffee may irritate the gut despite being low in FODMAPs and fermentation potential. They are best avoided during phase one of the protocol
6. Bone broth contains collagen proteins that can be difficult to break down and cause digestive symptoms. A general guideline is if the broth is gelatinous (often made from knuckles, cartilage, bone marrow, chicken feet, trotters, etc.) then it is more likely to cause digestive symptoms. If the broth is liquid in the refrigerator then it is more likely to be well tolerated.
7. Limit sweeteners to one serving per meal, and no more than 3 servings per day.