What is SIBO: Small Intestinal Bacterial Overgrowth

Simply put, Small Intestine Bacterial Overgrowth is a chronic bacterial infection of the small intestine. The infection is often of bacteria that normally live in the gastrointestinal tract but have abnormally overgrown in a location not meant for so many bacteria.
The Problem: IT’s All About Location

- The bacteria interfere with our normal digestion and absorption of food and cause damage to the lining of the small intestine (i.e. leaky gut syndrome).
- This damage impairs the SI’s absorption of food which leads to more food available to feed the bacteria themselves-and bacteria multiply exponentially.
- They hijack their favorite nutrients, which over time leads to deficiencies in critical factors such as iron and B12, causing **anemia, among many other health problems**

http://www.siboinfo.com/overview.html

The Problem Continues…

- They produce gas within our SI. The gas causes abdominal bloating, pain, flatulence, constipation, diarrhea or both (the symptoms of IBS).
- They decrease proper fat absorption by deconjugating bile leading to deficiencies of vitamins A & D, cholesterol and fatty stools.
The Problem Continues

- Because of the damage, larger food particles are not able to be fully digested. These enter into the bloodstream.
- The immune system reacts to these foods leading to food allergies/sensitivities.
- Bacteria themselves can also enter the body/bloodstream.
- Immune system reaction to bacteria and their toxins causes chronic fatigue, body pain and burdens the liver.
- Finally, these bacterial toxins and acids can cause neurological and cognitive symptoms
- [http://www.siboinfo.com/overview.html](http://www.siboinfo.com/overview.html)

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IBS Can Be SIBO: estimates range from 60-84% of IBS patients actually have SIBO

- Food Sensitivities
- Headaches
- Joint Pain
- Fatigue
- Skin symptoms (such as eczema or rashes)
- Respiratory symptoms (such as asthma)
- Mood symptoms (such as depression)
- Brain symptoms (such as Autism)
- Malabsorption Symptoms
- Malnutrition
- Steatorrhea (fatty stools)
- Anemia (Iron or B12)
- Failure to thrive
- GERD

- [http://www.siboinfo.com/overview.html](http://www.siboinfo.com/overview.html)
What Causes SIBO?

1. Food Poisoning Incident
   Many IBS sufferers have a history of a food poisoning prior to developing IBS

2. Impaired Gut Motility—problems with normal movement patterns

3. Damage to the Brush Border of the intestine

Food Poisoning-MOA

- The bacteria/toxic injury to intestinal cells and resulting immune response can lead to autoimmune attack to intestinal cell proteins.
- These particular proteins (Vinculin) are responsible for the normal movement of the digestive tract.
- Ongoing damage from autoimmunity causes loss of this proper movement pattern along with damage to muscles and nerves.
Loss of Correct Movement Patterns brings Correct Function to a Halt

- Some have said that SIBO should be re-named *Small Gut Dyskinesia Syndrome*

A Brief Lesson in the Way the Gut Works
Migrating Motor Complex

- How Food gets from Point A to Point Z

Waves of nerve activity that sweep through the intestines in a regular cycle during fasting.

These motor complexes trigger peristaltic waves, which move substances from the stomach, through the small intestine, past the ileocecal sphincter, and into the colon.

The MMC occurs every 90-120 minutes during the inter-digestive phase (between meals).

It also serves to transport bacteria from the small intestine to the large intestine, and to inhibit the migration of colonic bacteria backward.
Eating and MMC

- **Turned OFF during eating:** Constant grazing will inhibit
- During night: 3-4 waves leading to a clean SI when waking,
- Moves gas out as well

- **MMC 68% SLOWER in SIBO patients**

- TO Optimize the MMC for SIBO –(ADULTS)
  - Eat three meals at least 4-5 hours apart
  - Do a long fast from dinner to breakfast

Inhibitors of the MMC

- Hormones released while eating (CCK)
- Too little stomach acid (achlorhydria)
- Nitric Oxide (bowel inflammation)
- Stress and sympathetic activation
  - Epinephrine
- Damage to or inhibition of the Vagus nerve
- Pathogenic bacteria, H. pylori, viruses, parasites

Sympathetic Vs Parasympathetic Nervous System

- Sympathetic = “Fight or Flight”
- Parasympathetic = rest, heal, digest.
- If one side is activated, the other side will be inhibited
- If a person is “stuck” in Sympathetic activation, digestion will be severely compromised.

Let’s face it—we and our kids are “Stuck”
Loss of Intestinal Enzymes is a major feature of SIBO

- Damage to intestinal lining leads to loss of absorptive capacity.
- Loss of enzyme production—especially those that digest carbohydrates
- Think grains, legumes, fruits, vegetables and nuts

Impaired Digestion of Carbohydrates leads to GAS

- Intestinal enzymes normally break down carbohydrates and fibers (polysaccharides, oligosaccharides, fructans, disaccharides)
- Bacteria LOVE these for fuel.
- If the intestinal enzymes do not break them down for absorption, it leaves more fuel for the bacteria—which means LOTS more gas!!
Pathogenic Bacteria found in SIBO patients:

1. Hydrogen-producing Bacteria: E. Coli, Klebsiella, Proteus, Aeromonas
   - Produces Hydrogen gas; **Diarrhea**

2. Methanogens: Methaneobrevibacteria smithii
   - Converts Hydrogen to Methane;
   - **Constipation** - stops segmental contractions of gut → slows gut movements by 60%.
   - More methane → worse constipation with hard, dry stools

Bacteria in SIBO cont.

3. Hydrogen Sulfide: Proetobacteria-Desulfovibrio piger/species
   - Uses 5 H to produce Hydrogen Sulfide
   - Egg/ Sulphur smelling breath or flatus
   - Tends to **diarrhea**
   - May be associated w/ UC/ **ASD children**

[Link to article](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3093005/)
SIBO: Mechanisms

- SIBO gasses consume vitamin B12, iron, magnesium & other nutrients
  - Destroy flavonoids;
  - Hydrogenate polyunsaturated oils, produce nitrosamines
- Promotes systemic inflammation
- Malabsorption and malnutrition
- Disruption of MMC

Biofilm Formation and MMC

- The slowing of gut motility leads to overgrowth of fungi, yeasts and pathogenic bacteria
- **Biofilms** may develop around organisms (think protective armor)
SIBO damage to Villi of Intestines

- Intestinal lining inflammation and increase in inflammatory mediators
  - Anaerobes: endotoxin formation, direct adherence cause injury
  - Aerobes: enzymes and metabolic products cause injury
- Blunting of villi
- Reduced intestinal absorptive area
- Decreases in disaccharidase and brush-border enzyme activity.
- Development of intestinal permeability
  - http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2852716/

Villi of Intestines
Blunting of Villi

http://www.thefooddoc.com/yahoo_site_admin1/assets/images/celiacendophotophotograph.39181311_large.jpg

SIBO Pathophysiology II

- Bacterial Growth
  - GI Sx's: Bloating, Constipation/Diarrhea, Pain
  - Fermentation of Unabsorbed Carbohydrate
  - Hydrogen, Methane Gas

- SI Bacterial Overgrowth
  - Bacterial Actions
    - Glycosidase & Protease
    - Bile Deconjugation
    - Inflammatory cytokines
      - Steatorrhea
      - Vit A, D, E, Ω 3 deficiency

- Disaccharidases (-) Carb Transporters
  - Blunted Villi, Increased Crypt Depth
  - Intestinal Permeability

- Damage the Brush Border

Dr Allison Siebecker
SIBO: how do you know if you have it?

- More than 60% of people with IBS (Irritable Bowel Syndrome) have SIBO
- Wake up with flat stomach which distends throughout the day.
- Patient reports Gastrointestinal symptoms are temporarily alleviated after taking Antibiotics
- Probiotics & fiber make Gastrointestinal symptoms worse
- Celiac patient that is not better on GF diet
- Candida symptoms- not better after treatment
- Chronic constipation after opiates
- Low Ferritin/ Iron without any other known cause (suspect H. pylori)

Symptoms of SIBO

- Bloating, abdominal gas, belching, flatulence
- Upper gut gas worse after eating
- Start day out with flat abdomen and progressively distends out, looks “pregnant” by end of day
- Gas that can’t be passed
- Diarrhea (Hydrogen) or constipation (Methane) or alternating
Testing for SIBO

- Gold Standard: duodenal and jejunal aspiration: Greater than 10,000 cfu/ml culture is positive (some say 100,000)
- Comprehensive Stool Analysis- (does not diagnose SIBO)
  - Identifies overgrowth of bacteria, yeast
  - Identifies malabsorption, low bile acids, low pancreatic enzymes
  - Identifies quantities of good bacteria and diversity of bacteria
- Urine Organic Acid Test (OAT)
  - Identifies bacterial and fungal metabolites of bugs that don’t show up in the stool cultures

Breath Testing for SIBO

- SIBO breath test-
  - Pt consumes lactulose, a non digestible carbohydrate that only bacteria can ferment or newer tests may use glucose
  - If they are present they will consume it and produce gasses
  - Pt breathes into collection tubes over a 3 hour time period
  - Tubes are then analyzed for gas composition
  - Identifies which general type(s) of bacteria are present
    - Hydrogen
    - Methane
Treatment Options

1. Reduce Bacterial Loads
   - Prescription Antibiotics
   - Antimicrobial Herbs
   - Biofilm Protocol

2. Address the Carbohydrate Maldigestion
   - Restriction of certain carbohydrates

3. Improve Gut Motility
   - Prokinetics
   - Vagal nerve therapies and chiropractic adjustments
   - Heal the gut lining
Rifaximin (Xifaximin)-Cedars-Sinai Protocol Dr. Mark Pimental

- Used to treat both Hydrogen and Methane + SIBO
  - May need to be combined with other antibiotics
- Not systemically absorbed
- Works mostly in the Small bowel
- Can increase Bifido bacteria and enhances Short Chain Fatty Acids
- Approved for Pediatrics
- Typically prescribed for 10 to 14 days, then SIBO breath test retested 5-10 days later
- If bacteria not clear, will have to repeat another course before moving onto the next phase.

Rifaxamin CONS:

- Recurrence of symptoms is common after a few weeks-
  - 50-84% had return of symptoms within 9 months
  - Sometimes need to combine with other antibiotics
- Damage to microbiome-killing the good with the bad- although some studies argue that this does not happen.
- Increases bacterial resistance.
- Does not address underlying carbohydrate maldigestion issues
- [http://jac.oxfordjournals.org/content/early/2010/09/21/jac.dkq345.full](http://jac.oxfordjournals.org/content/early/2010/09/21/jac.dkq345.full)
Antibiotics vs Herbal Antibacterials: A John-Hopkins Study

“Herbal therapies are at least as effective as rifaximin for resolution of SIBO. Herbals also appear to be as effective as triple antibiotic therapy for SIBO rescue therapy for rifaximin non-responders.”

The study used the following herbals:
- Dysbiocide and FC Cidal (Biotics Research Laboratories)
- Candibactin-AR and Candibactin-BR (Metagenics, Inc)


Botanicals: Antimicrobial herbs

- Dysbiocide and FC Cidal (Biotics Research Laboratories)
- Candibactin-AR and Candibactin-BR (Metagenics, Inc)
- Berberine, artemisa, neem, oil of oregano
- Typical course is at least 60-90 days,
- Can retest breath in cooperative subjects
- Must still address the diet and motility
Limit the Fuel Source

There is one constant in SIBO, carbohydrate malabsorption, which feeds the bacterial overgrowth. This issue must be addressed for lasting relief. The best way to accomplish this is with a diet that limits difficult to digest carbohydrates.

When you remove most difficult-to-digest carbohydrates from your diet, you have the almost magical ability to limit the growth of all intestinal bacteria, yeast and other fungi across the board.

Healthy gut bacteria are well adapted (because we evolved with these bacteria) to living in a nutrient-limited gut environment and will prevail over bad bacteria which are less well adapted to this environment.

Diets to Resolve SIBO

Specific Carbohydrate Diet, GAPS, FODMAPS

- grain-free, starchy veggie free, lower fiber
- Based on Animal proteins, nuts, fats, monosaccharides
- Some fruits and vegetables
- Main Avoidances:
  - Disaccharides,
    Oligosaccharides: FOS (fructo), GOS (Galacto), MOS (mannan),
    Polysaccharides: Starch/fiber—soluble and insoluble,
  - Polyols—Sugar alcohols-xylitol, maltitol, erythritol
- Allison Siebecker on SIBOINFO.com
Fermentable Carbohydrates to Avoid

- Fructose — some fruit and fruit juices, honey, processed cereals, baked goods, high-fructose corn syrup, maple syrup, AGAVE-84%
- Lactose — conventional dairy and processed products with dairy and added lactose
- Fructans — wheat, garlic, onion, asparagus, leeks, artichokes, broccoli, cabbage
- Galactans — legumes, cabbage, Brussels sprouts, soy
- Polyols — sorbitol, isomalt, lactitol, maltitol, xylitol and erythritol, commonly found in sugar-free gum, mints and some medications

http://draxe.com/sibo-symptoms/

Elemental Diet

- Consists of pre-digested fats, proteins, and carbohydrates so the nutrients are easily absorbed.
- Vivenox Plus-by Nestle has been the most studied with SIBO
  - 5-6 packets daily for 14-21 days $750-$1120
- SIBOINFO.COM to make your own elemental diet-this can still cost a few hundred dollars.
- 80% ‘cure rate’ after 2 weeks-(better than Rifaximin)
- Must continue to address underlying causes.
SCD: 5 Phases to heal the gut

Intro diet 2-3 days: no raw fruits or veggies, no nuts/seeds/beans; Add in Bone Broth; Typical veggie: Carrots (peeled and cooked); Fruits: grape juice, apple cider; Sweeteners: honey, pure stevia, glucose/dextrose;

- **Phase 1 x 1 week**: Protein powders: Pea, rice, whey, egg; Veggies: carrot, acorn squash, butternut squash, butternut squash, Spinach, zucchini; Fruits: grape & apple cider, pear sauce, apple sauce; Homemade milks only!

- **Phase 2 for 2-4 weeks** w/o arising any sxs w/ good bowel habits: add in nuts; veggies: garlic, asparagus, green beans, mushrooms, pumpkins, artichoke, cucumber; Fruits: peach, pineapple, plum, tomato, apricot

- **Phase 3 for 2-4 weeks**: adding in more veggies; Can add in Quinoa & Flax

- **Phase 4 for 1-3 weeks**: for a few weeks: adding in more foods

- **Phase 5 for 1-3 weeks**: education on good fats, websites on how to go forward w/ diet; Pecan bread; cookbooks

SCD: Post Phase Five

- Symptoms might return if go off the SCD diet if there are issues w/ MMC-
  - IN this case, will have to continue using Prokinetics.

- Gut can heal within 1 month(says who???) but if there is Villi damage, it may take 3-6 months to heal. OR maybe never fully.

- Full healing requires the intestinal cells to produce the right enzymes for full digestion. IF this function does not return, there is a good chance of having a relapse=or having to stay on some version of the diet plus antimicrobials

- Trial multiple enzyme products together
Prokinetics—enhance the motility and contractility of the GI tract
- Low Dose Naltrexone
  - Endorphin receptor blocker
  - Modulates the immune system
- Iberogast-herbal blend
  - 5 HT4 agonist & 5 HT3 antagonist to modulate sensitivity and motility
- Pure GI GO by Pure Compounding Pharmacy
  - Cape Aloe, triphala, Mg citrate
- 5-HTP
  - Stimulates Colonic migrating motor complex through enhancing serotonin and acetylcholine in the intestines
  - Acetyl L-Carnitine, Phosphatidyl Choline

Enhance Motility and Digestion through Proper Nerve Communication
- The Vagus nerve carries Parasympathetic information to the GI tract and the internal organs.
- The Vagus nerve helps manage the complex processes in the digestive tract, including the Migrating Motor Complex
**Stress** (Sympathetic Dominance) Interferes with the Function of the Vagus Nerve

- Most adult IBS sufferers report that stress makes their symptoms much worse.
- Our ASD children live in a chronic state of Sympathetic Dominance—FIGHT OR FLIGHT.
- This leads to poor Vagal function which further impairs motility and digestion.
- Treatment:
  - Vagal Nerve Therapies
  - Chiropractic Adjustments

**Vagal Nerve Therapies**

- Stimulate the back of the throat-humming, gargling
  - Hum “Happy Birthday to Me” in the shower
- Regular exercise such as walking for 30 minutes (helpful for constipation resolution)
- Deep breathing techniques that stimulate the diaphragm—such as 4 square breathing, in for 2 counts out for 8.
Chiropractic Adjustments Directly Correct Autonomic Function

- Remove the interference from nervous system communication
- Bring balance to Sympathetic and Parasympathetic through direct manipulation of the neural elements in the spinal column.

Sympathetic and parasympathetic responses to specific diversified adjustments to chiropractic vertebral subluxations of the cervical and thoracic spine Arlene Welch and Ralph Boone

- Cervical adjustments… result in parasympathetic responses, whereas thoracic adjustments result in sympathetic responses.
- Furthermore, it appears that these responses … demonstrate the relationship of autonomic responses in association to the particular segment(s) adjusted.

Address Iliocecal Valve Function

- Chiropractors routinely address this with manipulation of the appropriate levels of innervation and soft tissue work
  - RLQ soft tissue work
  - Spinal adjustments C5/L1, C3/L3, T12

Address Biofilm to Enhance Effectiveness of Antimicrobial Therapy

- Dr. Anju Usman MD has done a significant amount of work in this area: The following slides are from her lectures on the subject

Clostridia difficile biofilm

True Health Medical Center
Gut Biofilm Approach

- Step 1: Lysis/Detachment – break up the armor (empty stomach)
  - Enzyme blends such as Biofilm Defense
  - Polysaccharidase, Disaccharidase – break down mucus
  - Fibrinolytics
  - Careful with proteases on an empty stomach

- Step 2: Microbial Killing – 15-30 min later (empty stomach)
- Step 3: Clean up – 2hr later or at night
- Step 4: Rebuilding/Nourishing the Gut Lining
  - Dr. Anju Usman

- Disodium EDTA (oral only) or Apple Cider Vinegar- (chelates the metal ions from the biofilm)
- Lactoferrin (especially for Pseudomonas, do not give if dairy allergy)
- Natural Iron Chelators (green tea, rice bran, curcumin
  - Dr. Anju Usman
Step 2: Killing

- Consider natural Antimicrobials first
- Vary agents depending on microbiology, mycology and parasitology testing
- Dysbiosis may seem to worsen initially
- Watch for die off, treat accordingly
- Consider the use of antibiotics or antifungal meds if organisms remain persistent
- Start low and go slow
- It is not always about killing the bugs, it is more important to change the gastrointestinal environment so the bugs don’t grow! Diet is crucial

Dr Anju Usman

Step 3: Clean Up / Binding Agents

- Activated Charcoal, Clays, zeolite
- Alginates, Brown Algae
- Modified Citrus Pectin, -if tolerated
- Burbur drops –easy to use
- Chlorella, Cilantro/Chinese Parsley

- Very important step
- Helps prevent symptoms of die off and detox

Dr Anju Usman
Step 4: Rebuilding/ Nourishing the Gut Lining

- **Probiotics** without prebiotics: start with very low dose:
  - Klaire Labs- Lactoprime, Bacillus coagulans
  - Apex Energetics-Sibotica (maybe)
  - Megasporebiotic
- **Replace Enzymes/Bile Acids/Bitters**
  - Enzymes to break down carbohydrates
  - Bile Acids, choline, taurine
  - Bitters- in water before meals
- **Heal the nerves and mucosa**
  - Acetyl L-Carnitine 1500-3000mg-increases acetylcarnitine
  - Glutamine and butyrate

Stay Connected With a Supportive Team!
Thank You!!

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