KRESSER INSTITUTE
FOR FUNCTIONAL AND EVOLUTIONARY MEDICINE

Gut: SIBO – Part 1

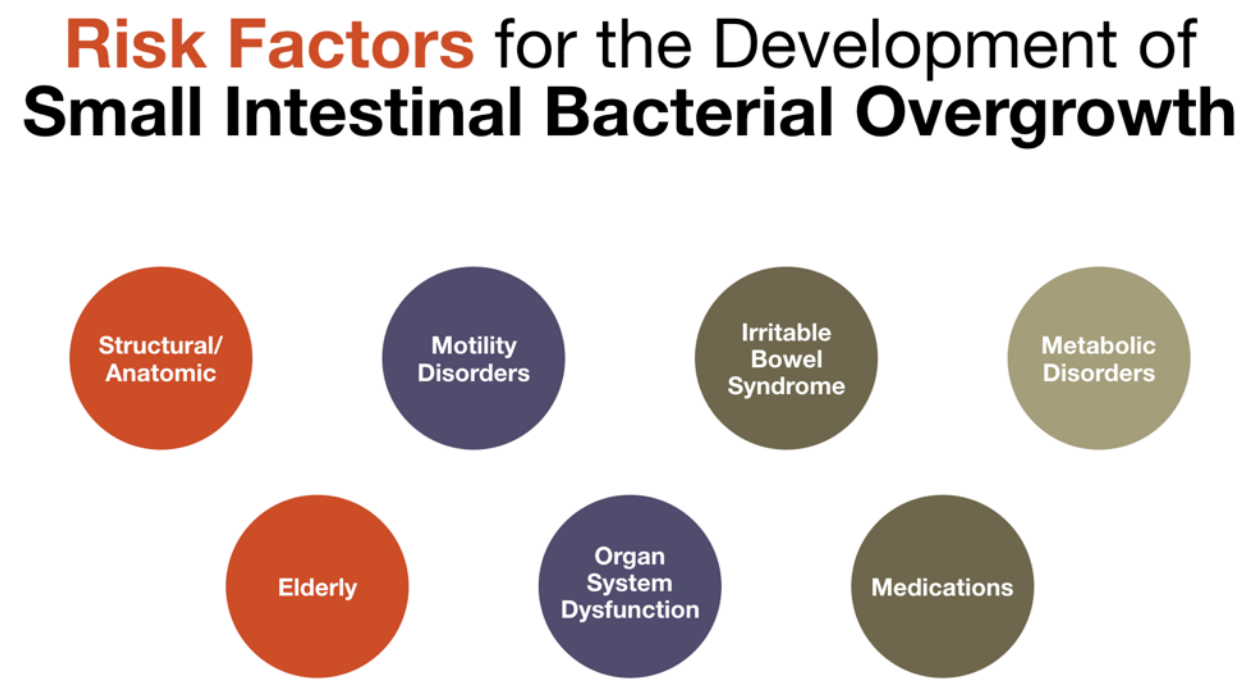
Hey, everybody, in this presentation we're going to talk about the diagnosis of small intestinal bacterial overgrowth, or SIBO. There are a lot of different ways to define SIBO. Part of the challenge of dealing with it is that there isn't even really a consensus on how to define it. But on the simplest level, it indicates the presence of excessive bacteria in the small intestine. One more specific definition has been bacteria exceeding 105 to 106 organisms per milliliter. Normally, there should be less than 103 organisms per milliliter found in the upper small intestine, and the majority would be gram-positive, but this specific definition of SIBO relies on endoscopy, which is one of the two test methods used to detect SIBO, but it's the least frequently used. In fact, I'm hard-pressed to think of any clinician, particularly any functional medicine clinician, that is using endoscopy to diagnose SIBO, so it's not really that helpful of a definition for our practical perspective.

In addition to the absolute number of bacteria in the small intestine, the type of flora also plays a role in the signs and symptoms of SIBO. The predominant bacteria metabolize bile salts to unconjugated or insoluble compounds, and that can cause fat malabsorption or bile acid diarrhea, and microorganisms that preferentially metabolize carbohydrates to short-chain fatty acids in gas can cause bloating without diarrhea, whereas gram-negative bacteria that are overgrown in the small intestine like Klebsiella can produce toxins that damage the mucosa and interfere with nutrient absorption. So this explains why people with SIBO can have such a wide range of symptoms. It really depends on which type of bacteria is overgrown in the small intestine.

Prevalence of SIBO is difficult to determine given the lack of consensus on how to even define it, and the fact that there's no gold standard test or even accepted interpretation of those tests, and there are also no studies about evaluating SIBO in healthy volunteers. The data that we have on healthy volunteers with SIBO comes from the control group of trials, and if you look at those control groups, you see a prevalence of SIBO in healthy people that ranges from 6 to 20 percent, depending on what test method is used, whether they're using endoscopy to define SIBO, or glucose breath test, or lactulose breath test. And I always wonder what "healthy people" actually means in these control groups and studies, but if we take that at face value, and we say that the control group in these studies had no digestive symptoms and no significant diseases, then 6 to 20 percent of them have SIBO in these studies. The rates of SIBO in asymptomatic young or even middle-aged people seem to be on the lower end of the scale, whereas the rates of SIBO in asymptomatic elderly patients tend to be on the higher end of the scale.

And again, the definition of healthy here I think makes a difference, and also the understanding of what symptoms could be related to SIBO makes a difference, so if you have a "healthy control" in one of these studies who has no gut symptoms but they have skin problems or brain fog or things like that, that may not be typically attributed to SIBO, they're still labeled as a healthy control, and they're still labeled as a "healthy person" that happens to have SIBO, rather than a person with SIBO that is experiencing a direct result of that pathology, so these numbers are a little bit misleading I think, but the key takeaway here is that some patients can have what is defined as

SIBO and not necessarily be symptomatic at all, and I've certainly seen that in my practice. We'll talk more about that as we go in the various relevant sections.



The pathogenesis of SIBO and how it develops is not entirely clear, and it's still somewhat controversial. The basic idea is that it develops when the normal homeostatic mechanisms that control small intestinal bacterial populations are disrupted, and there are at least seven risk factors that have been identified as potential predisposing triggers for that disruption. So one would be structural or anatomic issues, and this can be present, for example, after surgery, if there was damage to nerves that enervate the small intestine, or patients with cystic fibrosis or other conditions that cause structural or anatomic abnormalities. We have motility disorders, so dysfunction of the migrating motor complex, which we'll be talking about more later. We've got conditions like irritable bowel syndrome, which is really a non-specific condition, a diagnosis of exclusion as we call it—my guess is that's more related to disrupted gut microbiome that becomes a predisposing factor for SIBO; metabolic disorders like diabetes and low stomach acid; being of elderly age, as we just talked about; or even organ system dysfunction and medications.

In a functional medicine practice, I think there are really three primary processes that contribute to SIBO, and number one would be gastric acid secretion, so low stomach acid in particular. Number two would be small intestine dysmotility, so this again involves disruption of the migrating motor complex and that peristaltic wave in the gut, which has a cleansing action and prevents the overgrowth of bacteria, and then disrupted gut microbiome, and by this I'm more referring to dysbiosis in the colon that then leads to overgrowth of bacteria in the small intestine. Once it is present, SIBO has been shown to cause inflammation in the small intestine, blunting of the small intestinal villi, which are responsible for the digestion and absorption of food, thinning of the small intestine mucosa and crypts, and it can also further reduce stomach acid production and further slow motility, which causes a vicious cycle and exacerbates the SIBO, so low stomach acid and slow motility can cause SIBO, but then SIBO can cause low stomach acid and slow motility, which makes it much more likely that SIBO will recur or be recalcitrant and difficult to get rid of. So let's look a little more closely at each of these three key processes.

Stomach acid suppresses the growth of ingested bacteria, which would limit bacterial counts in the upper small intestine, and that is why hypochlorhydria, or low stomach acid, is a primary risk factor for SIBO. It can develop when H. pylori is present, or with chronic stress, or as a consequence of aging. SIBO can lead to a false positive for H. pylori, in fact, using breath testing, given the presence of urease-positive bacterial strains in the upper part of the small intestine. So, you may know that the breath test for H. pylori measures level of urea in the breath, and so what I just said was that in SIBO, you can have an overgrowth of certain types of bacteria in the upper part of the small intestine that also produce urea, and that can lead to a false positive for H. pylori in the breath test, and that's one of the reasons I prefer fecal antigen testing for H. pylori as kind of the first-line testing. There are also drugs that inhibit acid secretion, like histamine type 2 receptor

blockers, or PPIs, both of which are used to treat heartburn and GERD, so if a patient has heartburn, they take these acid-suppressing drugs for a significant period of time, it reduces stomach acid in some cases almost to zero, and it predisposes them to developing SIBO. It's another reason why I'm very uncomfortable with patients using these drugs for a long period of time, and they were never designed or even approved to be used for those long periods of time.

The next primary trigger here is impaired intestinal motility or motility disorders in general. During periods of fasting, the migrating motor complex, or MMC, develops approximately every 90 to 120 minutes, and what it does is it sweeps residual debris through the gastrointestinal tract, so abnormalities in the migrating motor complex may predispose to the development of SIBO. Also, gastroparesis, which is a chronic problem of delayed gastric emptying, or the emptying of the stomach contents into the small intestine, can develop as a secondary complication of diabetes, and this explains the connection between diabetes and metabolic disorders and SIBO, and then there are neurological and myopathic diseases such as intestinal pseudo-obstruction and scleroderma or polymyositis, respectively, that are associated with SIBO.

The third factor is disrupted gut microbiome, and there's less research on this proving a direct connection, but there are several lines of evidence that I believe support an association. One is that it's well-established that antibiotic use can lead to disrupted gut microbiome and in turn SIBO. Celiac disease leads to a disrupted gut microbiome and there's a strong connection between celiac and SIBO. Disrupted gut microbiome has been shown to cause dysfunction of the ileocecal valve, and we know that dysfunction of the ileocecal valve can lead to translocation of bacteria that should stay in the large intestine into the small intestine, which is one of the main ways that SIBO develops.