

## An interview with Dr. Jocelyn Strand, ND, Director of Clinical Education and Research at Biocidin Botanicals

Interview by Sheldon Baker

*Jocelyn Strand, ND, is the senior director of clinical education and research at Biocidin Botanicals®. She brings both a devotion to botanicals and a passion for science to her role. Dr. Strand monitors and participates in research, trains clinicians, and is a respected and engaging speaker. She is an avid participant in microbiome research and lectures extensively with the vision of increasing awareness about the power of natural medicine. Before joining Biocidin Botanicals® in 2019, Dr. Strand was in private practice for over a decade at Lake Superior Natural Medicine in Duluth, MN, specializing in GI system disorders, Lyme, and autoimmune conditions.*

*Sheldon Baker is an InnoVision contributing editor. His freelance editorial content can also be found in several lifestyle publications, and as CEO of Baker Dillon Group LLC, he has created numerous brand marketing communications and public relations campaigns for health and wellness organizations. Contact him at [Sheldon@NutraInk.com](mailto:Sheldon@NutraInk.com).*

**Integrative Medicine: A Clinician's Journal (IMCJ):** Much of your work at Biocidin Botanicals revolves around microbiome health.

**Jocelyn Strand, ND:** I oversee educational and clinical content creation, supporting practitioners with information about the microbiome and how it affects different body systems.

I also oversee research in the form of case studies. We cast a wide net with case studies or case reports, working with individual practitioners to do interventions, modify the microbiome, and monitor test results and clinical outcomes for patients. I'll take that information where we get traction and move it into more pilot research.

At present, we have clinical research being conducted outside of our organization. We've wrapped up one study on rosacea and another on small intestinal bacterial overgrowth (SIBO). Both looked at the use of botanicals as an intervention for these conditions. We're looking at three forms of SIBO, including hydrogen-dominant, methane-dominant, and hydrogen sulfide-dominant.

**IMCJ:** Do you do university studies?

**Dr. Strand:** Yes. We're excited to be collaborating with Johns Hopkins University. We're very close to starting new research

with them. We really run the gamut in terms of research, with multiple studies being conducted simultaneously.

**IMCJ:** You gave up private practice several years ago, but do you still see a few patients?

**Dr. Strand:** I closed my private practice to work full-time with Biocidin Botanicals. I see a few patients on the side, but I get my patient fix through our case reports.

**IMCJ:** What is the influence of the microbiome on metabolic and cardiovascular health?

**Dr. Strand:** This is an area that is so interesting to me. What I love about it is that the deeper I dive into the published research, the more individual pathways reveal themselves, both in terms of how the microbiome affects metabolic health and how it's a major and modifiable risk factor for cardiovascular disease.

If we start with metabolic health, I think of two primary pathways. One is dysbiosis, particularly the overgrowth of gram-negative bacteria, which has been demonstrated in research to affect metabolism. But any kind of pathogenic microorganism or loss of balance in the microbiome will result in the production of metabolites and pathogens that will damage the lining of the gut. Once the gut lining is damaged, we have a breakdown of the epithelium in that area and intestinal permeability.

On a microbial level, the consequence of an impaired intestinal lining is the translocation of microbes from the lumen or lining of the gut into the bloodstream. We think of not just bacteria moving but also of all those metabolites from the gut, which are typically eliminated in the stool.

When the lining of the gastrointestinal tract breaks down, we lose that protective mechanism, and we start to see the movement of PAMPS, or pathogen-associated molecular patterns, from the gastrointestinal tract into the bloodstream, where they act more systemically. But the result, in a nutshell, is chronically upregulated, smoldering inflammation. And it doesn't take much to increase some of those PAMPS. Lipopolysaccharides, in particular, can cause what we know as metabolic endotoxemia. This is also a major modifiable risk factor for both metabolic and cardiovascular health.

**IMCJ:** Are there other pathways that can cause problems?

**Dr. Strand:** One pathway I've recently read about that has an immediate effect is called GLP. These are receptors in the lining of the gastrointestinal tract that can make us more sensitive to insulin, which is good. We want to be sensitive to insulin because that benefits our metabolic health. These GLP receptors work optimally when we have a healthy microbiome.

**IMCJ:** From a patient or practitioner's standpoint, what are the symptoms someone could look for? What would you look for in the gastrointestinal tract?

**Dr. Strand:** Basic GI symptoms like dyspepsia or burping after meals. Even something as simple as that can indicate suboptimal digestion or an imbalanced microbiome. There are so many lifestyle and environmental factors that contribute to creating and maintaining a healthy microbiome, and these factors can just as easily throw off that balance.

Overall, the symptoms that may indicate digestive or metabolic issues are pretty insidious. These can include fatigue and irritability, which might sound vague, but I have often heard this from patients in clinical practice. The symptoms could be anything, but we know the primary or root cause often has to do with the gut.

Systemic health is directly impacted by the gut. It all starts there, where 85 percent of our immune system resides. The gut-immune axis is what mediates inflammation in the body. So, if the gut becomes dysregulated, we'll start to have an upregulation of immune activity accompanied by inflammation. We don't necessarily have to have gastrointestinal symptomology to indicate dysbiosis or other systemic effects.

Patients with small intestinal bacterial overgrowth and pathogens like *H. pylori* or *Klebsiella*, for example, are more prone to chronic inflammation. They often will have things like gas and bloating, constipation, diarrhea, or IBS-type symptoms. They may also have irritable or inflammatory bowel diseases, and that can increase their risk for other systemic conditions that are mediated through the same pathways as chronically elevated inflammation.

So, anytime someone has any kind of gastrointestinal symptom, we want to identify the microbiome as an underlying cause, address it locally, and set a foundation for systemic health.

**IMCJ:** So gastrointestinal symptoms can be fixed.

**Dr. Strand:** It can be fixed, and often it can be fixed quite rapidly. Sometimes, it takes time. It depends on how long the person's been sick and the state of their immune system. It also depends on their diet, sleep, and stress levels. These lifestyle factors contribute to microbial community and diversity. These factors are definitely modifiable and can, when combined with other interventions, help recondition and restore balance in the gut.

When I think of why this is more of an issue now than it was in the past, I believe there are many reasons. Gastrointestinal function has always been a concern, but it's becoming even more of a concern. Forty percent of adults in the US now have a functional gastrointestinal disorder. That is remarkable. Every practitioner sees patients with some type of functional gastrointestinal disorder, whether it's dyspepsia, gas, bloating, or another GI-related symptom.

There are several reasons why this is happening. First is our food. The standard American diet is not healthy for most people. We're not getting enough fiber and eating too many refined carbohydrates and saturated fats. These food choices predispose us to have an overgrowth of bacteria and yeast in the body, which can create dysbiosis and negatively affect the gastrointestinal tract. The use of antibiotics is a significant risk factor as well.

That first inoculation with a healthy microbiome comes from the vaginal flora in the vaginal tract during birth. Breastfeeding is another way for a mother to share her microbiome with her baby. So, by design, the birthing process and infant nurturing are there to help us initiate, establish, and maintain a healthy microbiome.

**IMCJ:** Women have an advantage here.

**Dr. Strand:** I guess nature has designed it so that we establish a healthy microbiome and maintain it right from delivery, and even before delivery, as the oral microbiome of women during pregnancy plays a role in fetal microbiome development.

I get excited about all this. There's a transient period in which pregnant women have permeability in their oral tissue. And what they have found is at this same time the baby's fetal tissue gets inoculated with the mother's oral microbiota, which initiates immune development for the fetus. Those microbes are gone by the time the baby is born. But it's that marvelous design by nature. All of these things happen in a way that supports microbial health illustrating the importance of microbial health from birth, or even before birth.

**IMCJ:** Having a healthy microbiome during pregnancy is important.

**Dr. Strand:** Yes, this can positively correlate with a woman having a healthy, normal delivery. That's the important part. But it becomes a significant part of having a healthy microbiome later in life because the microbiome shifts and changes throughout the first few years.

**IMCJ:** What recommendations do you suggest to maintain a healthy microbiome?

**Dr. Strand:** One thing we can all do is eat a high-fiber diet. Fiber contains what are called prebiotics, and that is food for the beneficial microorganisms. Those beneficial

microorganisms take the fiber and generate helpful metabolites like short-chain fatty acids. This includes butyrate, propionate, and acetate, which have the systemic effect of reducing inflammation. Fiber helps support a balance in beneficial microorganisms that comes from having the appropriate abundance and diversity of flora. With dysbiosis, there is often an increase in pro-inflammatory metabolites due to a lack of dietary fibers and, therefore, a reduction in short-chain fatty acids.

So many different microorganisms exist and coexist in the gastrointestinal tract. When we start to see thriving beneficial flora, there is also a shift toward reducing systemic inflammation. They also feed the gastrointestinal tract's lining so that it's robust and healthy.

I think fiber got pigeonholed as something that helps people have regular bowel movements. But it has so much more to offer. It's much more important in terms of phytonutrients and their related downstream effects.

What's essential in the diet is not a rapid intervention. We're talking about a lifestyle choice that, over time, will set the stage for long-term health and well-being. It's really foundational. There are shorter-term interventions that can also help to establish good health. But a healthy diet is critical as it supports both short-term and long-term health.

**IMCJ:** What about stress?

**Dr. Strand:** We know as soon as people start to experience stress, it affects the microbiome and causes dysbiosis. The flip side is also true, which is that if we have dysbiosis, it affects our ability to manage stress. It affects our neurotransmitter production and our ability to handle stress when a difficult situation comes up. It becomes a feed-forward cycle, where if we have dysbiosis and can't manage stress, it causes further dysbiosis. Then, we have a smoldering problem at the microbial level.

**IMCJ:** You mentioned antibiotics causing problems. But the toxicity of drugs alone overall can cause an issue.

**Dr. Strand:** Yes. And antibiotics are also found in our food supply. For example, cows and pigs are fed grains laced with antibiotics to prevent disease. It's done as a public and agricultural health measure to keep the livestock from becoming ill with bacterial infections. So, we're all getting antibiotics in our food supply in low-grade amounts. But it can start to shift that balance towards microbial dysbiosis. There are many other drugs that will also result in dysbiosis through multiple mechanisms of action.

**IMCJ:** What's a good example?

**Dr. Strand:** An example would be acid-blocking drugs that reduce the body's ability to kill bacteria. We have stomach acid for a reason. So that when we swallow a foodborne pathogen, the stomach acid neutralizes or kills it. If we take

something like an acid-blocking drug, which is very commonly prescribed, then we're looking at the possibility of these pathogens making it through from the stomach into the gut and the small intestine. There, we don't have the same defense mechanisms, and it can start to grow.

Another issue with acid-blocking drugs is we don't release bile and pancreatic enzymes because we don't have good stomach acid. That's what initiates bile and pancreatic enzyme flow. Now we're looking at another point where our body would have a natural defense mechanism that's impaired just by that one medication.

Thinking about it in that way it becomes important to restore natural function to the stomach and to the gastrointestinal tract. Often, drugs like antibiotics are essential. Blocking drugs are essential. But if they're not being used properly, that becomes a problem over time.

**IMCJ:** I would imagine those acid blockers are being prescribed due to a poor diet.

**Dr. Strand:** Often, that's the case, and this is something that can be corrected if you modify a person's diet and stress levels. *Candida*, which is yeast overgrowth in the gastrointestinal tract, can be an underlying cause of reflux or heartburn.

This is something I've been talking to my patients about for many years. When we have the early onset of heartburn or reflux, oftentimes, we need more stomach acid. At that point, when the stomach acid level drops, the lower esophageal sphincter gets lazy and opens up, and we'll get a reflux of our stomach contents.

We feel like we have too much acid, but we don't have enough at that point. That's hypochlorhydria, and it's significantly more common than the opposite state of hyperchlorhydria, which is having too much stomach acid. If you can intervene with therapeutics that will support healthy stomach acid, then you're setting up the patient to restore natural function, better nutrient absorption, and better microbial balance. Down the road, everything will heal better.

Of course, I'm biased because, as a naturopathic doctor, I really lean into restoring the function of the body. Our body is so brilliant and wise. We should just give it what it needs and get out of the way so it can do its work.

**IMCJ:** I would imagine too many trips to fast-food restaurants don't help.

**Dr. Strand:** This is very true and actually funny to me. At one point, I realized that I could no longer use fast-food restaurants as landmarks when driving because I don't know where they are. They're just not on my radar. If people tell me something is near McDonald's, I would not know what they were talking about. But I might know the location of a Starbucks.

**IMCJ:** How about the importance of gut metabolites in the development of cardiovascular disease?

**Dr. Strand:** It can work either against healthy physiology or in favor of healthy physiology. When we have a robust microbiome, we have the short-chain fatty acids that help reduce inflammation systemically in and out of the blood vessels, which is our cardiovascular system.

A reduction in inflammation in the blood vessels will keep them pliable and will also keep the endothelium healthy and functioning correctly. But let's focus on gram-negative bacteria which have something called lipopolysaccharides or LPS in their cell walls and can also be found in biofilms. As the bacteria grow and reproduce, they are producing these metabolites. Endotoxemia is defined as elevations in LPS in the bloodstream. It's called endotoxemia because it's extremely toxic and is cleared by the liver. When the gastrointestinal tract gets damaged, even in a healthy gut, there will be some movement of LPS into the blood flow around the gastrointestinal tract. It goes directly to the liver, like everything else in that blood flow, and is cleared. It's cleared as a priority because it's so toxic.

But there's a point at which we can become overburdened. The gut loses its ability to clear all of the LPS. The LPS is like a receptor when that happens. Those receptors are all over the body and they are designed to clear pathogens. They are there to do their job, which is to clear out any kind of pathogens or damaging molecular pattern associated with a pathogen. And their downstream effect is to stimulate something called NF kappa B, resulting in the release of pro-inflammatory cytokines.

Our very wise body wants to clear the endotoxin that's supposed to be localized in the gastrointestinal tract in the liver. But when the liver gets overburdened, LPS gets into our systemic blood flow, causing stimulation of inflammation through the entire body. It only takes two-to-three times the normal level of lipopolysaccharides in the bloodstream to have what's called metabolic endotoxemia. That is a risk factor for all cardiovascular diseases and all modifiable cardiovascular diseases. A very direct therapeutic target for us is to be able to bring that LPS load down by modifying what's growing in the gastrointestinal tract.

**IMCJ:** We now have a probiotic for the mouth. How well-known is it regarding oral microbiome?

**Dr. Strand:** Yes. I'd like to first set the stage by saying it's a really great segue into oral health because of the oral microbiome. The microbiome includes bacteria, both gram-negative and gram-positive bacteria, yeast, fungal elements, and viruses. The microbiome in the gut is the most robust and diverse microbiome in our body by far in terms of sheer quantity. It is where most of our microbiome resides, but the second in line is our oral microbiome. We have 10 to the ninth micro-organisms in a milliliter of saliva, and we swallow a liter of saliva every day. This

illustrates the quantity of microorganisms we have in the mouth and the important role they play in systemic health. For example, if we get dysbiosis in the mouth, the same thing happens in the mouth that happens in the gut, where we get inflammation in the tissue. Then the tissue breaks down, and it has direct access to the bloodstream.

This is even more important to our health than dysbiosis in the gut, and for a while I was puzzled by that. Why in the mouth? Because there are so many cardiovascular, autoimmune, and neurodegenerative diseases that are related to oral dysbiosis.

And I thought if there's so many bacteria in the gut, and it's our main reservoir, why? Why is the mouth so important? One reason is there is no first-pass clearance by the liver when it's going straight from the mouth into the bloodstream. Those metabolites have access to the entire body before they get cleared by the liver. The other thing is that they are more potent coming from the mouth. We have what's called a mucin layer, or mucosa, that is basically mucus lining the gastrointestinal tract that we don't have in oral tissue to the same degree. It's easier for it to get damaged. Anybody who has bleeding gums when they brush or floss their teeth has translocation of whatever is in that periodontal pocket. Bleeding is a direct pathway to the bloodstream. And that is caused by dysbiosis, which is amazing to think about.

I think the easiest way to describe oral dysbiosis is to compare plaque to "fuzzy" or "sweater" teeth. Plaque is a biofilm produced primarily by yeast, *Candida albicans*, and *Streptococcus mutans*, which are gram-positive bacteria in the mouth.

If you have fuzzy teeth, you have microbial growth in your mouth. All of us have it. When you eat lower carbs or a healthier diet, such as paleo and keto, teeth don't get as fuzzy. That's because we're not feeding those bugs the food they need to thrive. *Candida* really loves refined carbohydrates. If you eat sugar and your teeth feel fuzzy, that's why. But the problem in the mouth is that those biofilms get wedged between the teeth and the gingival tissue. Our immune system is doing its work, coming in and firing away at the biofilms, but they are not effective. Our neutrophils are not effective against the biofilms, and instead, what you get is chronic, localized inflammation in the area of a periodontal pocket, as well as bone loss and degradation of the tissue. When you have direct access to the bloodstream with all of those microorganisms and their metabolites flowing directly into the bloodstream, there is a concern for cardiovascular disease.

Medical research tells us there are almost always oral microorganisms in coronary and artery plaques. It's the body's attempt to isolate and remove from the coronary artery what's coming from the mouth and contributing to those cardiovascular plaques.

We must have a healthy balance of microorganisms in the mouth, not just for oral health but for systemic health as well. It sets the stage for healthy microbial balance throughout the entire body. Probiotic research shows that microorganisms



will help to restore balance and then reduce the risk of chronic systemic illnesses, including cardiovascular disease.

**IMCJ:** Interesting how it has such an impact on other bodily functions.

**Dr. Strand:** It is fascinating. And the mouth is located proximally right by the brain. It makes sense that what's happening there will impact neuroinflammation. Think of things like Parkinson's, MS, and Alzheimer's disease. And of course, mood and sleep. All of that is impacted by what's growing in the mouth, which will also impact the sinus cavities and the lungs. It even extends through the ears.

**IMCJ:** Oral probiotics are a relatively new category.

**Dr. Strand:** Yes. What's interesting is that if you type microbiome into *Pubmed*, there are over 100 000 articles just on the microbiome. But if you type in oral microbiome, there's far less. It's a relatively new field. Research is just starting to explode in that area to identify a normal microbiome, and to recognize intervention with probiotics as well as detect the connection between what's growing in the mouth and systemic health.

**IMCJ:** Might oral microbiome be improved by using your new Dentalflora product?

**Dr. Strand:** Yes. We have several phases in the approach that we take to the oral microbiome, and one key piece of data on periodontal disease is inflammation in the gum. Gingivitis and periodontitis are the most common inflammatory illnesses on the planet. In people over the age of 35, 50 percent of the population will have some degree of periodontal disease, whether it's just inflammation in the gums or bone and teeth loss, as well as significant periodontal issues. This is an area where we can really affect change.

When we talk about the microbiome, whether it's in the gut or the mouth, we look at what's called a weed and seed approach. It's a multi-pronged strategy to reduce the pathogenic load by addressing the pathogens that are growing in the mouth or the gut. But we're talking mouths right now.

The "weeding" takes place with the use of our oral care products powered by our signature Biocidin botanical blend that help to restore balance in the oral microbiome.

We have research, not on the oral microbiome, but on stool samples showing that when using the botanicals in Biocidin, probiotic abundance went up.

We're in the process of researching the oral microbiome and the effects of these botanicals on the beneficial microorganisms in the mouth. We could go down a rabbit hole of oral microorganisms, but the big bad guy we talk about most is *Porphyromonas gingivalis*, a gram-negative bacteria. That means it's creating LPS as a metabolite that will cause and contribute to systemic inflammation. With

Biocidin oral health products on board, we start to see the removal of unwanted microorganisms and the restoration of balance.

Where probiotics come in is after we weed out those bad guys, then we repopulate, or seed, with beneficial organisms. The probiotic helps to reseed the beneficial microorganisms that will change that milieu and support the production of things like short-chain fatty acids that will out-compete the pathogens in the mouth.

The way I think about it is if you have an apartment building and it's vacant, then you have a problem. Anyone can move in, and they might not be the tenants you want. But if you have an apartment building that's full of a robust, healthy community, they're looking out for each other. They're doing their neighborhood watch. They're keeping the place clean, and you're more likely to have a tenant population that takes care of itself and is healthy. That's what the combination of weeding and seeding offers. This ability to put in the tenants that we want will help us with our overall health.

**IMCJ:** Great analogy. Biocidin Botanicals has played a significant role in developing the product category and in research.

**Dr. Strand:** Biocidin Botanicals has been in business since 1989. I started with the company in 2014, assisting Rachel Fresco, our founder, at industry events. I began in my current role in 2019. What Rachel did early on was the pioneering work of developing therapeutics in the supplement space that support and modify the microbiome in a healthy way to restore microbial balance. We started with a focus on the gut microbiome. We have continued to be at the forefront of research and development as we have expanded into products for the oral microbiome.

We're currently initiating research with Dr. Ariana Ebrahimian. She is a respected functional dentist who serves on our Scientific Advisory Board. We collaborated with her in developing Dentalflora, our oral probiotic.

She is doing a split sample looking at both PCR and whole genome sequencing testing of the oral microbiome, with an intervention that allows for evaluation of their clinical presentation. Do they have inflammation? Do they have a periodontal pocket? What are their periodontal pocket probing depths? Do they have a coating on their tongue? We're looking at the clinical picture, as well as doing the testing of the microbiome.

The participants' intervention includes Dentalcidin®, our oral microbiome toothpaste containing Biocidin, and Dentalcidin LS, an oral rinse powered by the Biocidin liposomal formulation that has deeper activity into the periodontal pocket area. We will then do follow-up testing and clinical evaluation to determine resulting diversity, pathogens, probiotic abundance, and more. We hope to complete the study within the next 12 months.