Does the Microbiome Matter?

Microbiome in Practice: Assessing OTC Options

There’s still much to learn, but clinicians already have tools to manipulate the microbiome.

BY PAUL WINNINGTON, EDITORIAL DIRECTOR

More than ever in my practice today, patients are inquiring about gut health,” observes New York City dermatologist Bobby Buka, MD. “There’s been a real trend toward the whole food and naturopath movements versus more traditional skin care regimens. I’ve noticed a move away from our traditional antibiotic/hormonal approach to acne and rosacea in favor of nutritional changes in an attempt to mitigate systemic inflammation.”

Gary Goldenberg, MD notes a similar level of interest among his Manhattan patients. “Gut microbiome is a very important component of skincare, especially when it comes to treating inflammatory conditions such as acne, rosacea, eczema, and psoriasis. The evidence that gut microbiome plays an important role in controlling inflammation is increasing. Patients ask about this topic and nutrition all the time. This is true in most of my patients, from millennials to baby boomers.”

Following on the tail of other trends like gluten-free diets, conversations about pre/probiotics are “common when precribing antibiotics for acne, and when talking about anti-aging,” according to Mona Gohara, MD, a dermatologist in Connecticut.

But not all dermatologists are seeing similar trends. Nashville’s Michael H. Gold, MD says his patients ask about skincare, “but not usually about probiotics. Probiotics may become more important over time, but right now, in my practice, they are not that important.”

“We actually do not see a lot of patients initiating conversations about prebiotics, probiotics, or postbiotics,” agrees Charlotte, NC dermatologist Todd Schlesigner, MD. “These are things we now have evidence can be helpful for certain skin conditions, such as eczema. Our theory is that there needs to be more education about the skin microbiome and the potential benefits of using these products. The dermatology community and patients may also benefit from additional research into the topic.”

Ava Shamban, MD says that in her Beverly Hills practice, patients don’t bring up pre/probiotics “yet,” but she does.

CAN PRE/PROBIOTICS HELP?

The accumulating evidence suggests that management of the microbiome, including through the use of pre/probiotics, holds promise to aid the management of skin disease. However, many questions remain.

“If you asked me to manage acne vulgaris using just diet for optimal intestinal health, it would be difficult to achieve the skin impact most patients are looking for. However, if by changing a patient’s nutritional profile, I can take her off antibiotics a month earlier or use lower dosages, then absolutely. I can be lighter with my prescription pad and achieve comparable results,” Dr. Buka says. “Gut health is an area of medicine patients are asking more about and one I’m more enthusiastic about than in years past.”

To conceptualize a role for the microbiome in skin disease, Dr. Buka describes the cycle of inflammation in psoriasis. Increased white blood cells in the skin pump pro-inflammatory cytokines into the blood stream where they may promote atherosclerotic plaques or inflammatory bowel disease, both conditions found in higher incidence among patients with psoriasis. “There’s this two-way street when it comes to inflammation in the skin and enteric system of the gut,” he says. “If we take that same paradigm and apply it to gut health and acne, I can confidently say, based on the data available, that inflammation initiated in the gut...”

Evidence suggests that the microbiome affects health, with dysbiosis of the gut or skin microbiota linked to cutaneous disease. It’s less clear how dermatologists can help patients modulate the microbiome to support skin health, but early strategies are emerging. Leading dermatologists agree that it is important to keep up with the science.

the bottomline
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begets more inflammation in the skin via well-described cytokine pathways. We’re finding the human body, perhaps not surprisingly, has a number of interconnections between organ systems. The inflammatory profile of my gut will affect skin, cardiovascular, even brain health.” The theory, then, is that, “I can decrease inflammation by applying items directly to the skin or I can decrease inflammation by shutting down inflammatory mediators in other organs so that they don’t spread to further skin inflammation,” he explains.

One potential way to reduce systemic inflammation is to target the gut. An unbalanced diet—especially one low in fiber and high in processed foods—has been shown to promote growth of unfavorable bacteria like *E. coli*, Dr. Buka notes. A proliferation of such bacteria will signal an inflammatory response with potential implications for multiple organ systems, including the skin. Conversely, a “whole food” diet supports normal

More than Just Yogurt Masks: A Researcher’s Take on the Role of Probiotics in Skincare

Yang Yu, MD, clinical Instructor on faculty in the Division of Dermatology at the University of California-Los Angeles in the Division of Dermatology, is admittedly fascinated with the skin’s microbiome and has been ever since she first learned of role that Cutibacterium acnes can play in acne. She took this initial fascination a step further when she began to research the role that oral and topical probiotics may play in treating of certain skin disorders. Dr. Yu talked to *Practical Dermatology* about her research and the growing awareness about the skin microbiome and its link to health.

What do we know today about the microbiome and skin health?

**Yang Yu, MD:** The skin microbiome is collectively composed of bacteria, fungi, viruses, and microscopic arthropods that colonize our skin. Coexisting in a complex and balanced ecosystem, these diverse commensal communities contribute to healthy skin by aiding in the prevention and resolution of disease.

Commensal microbes can impede the colonization of opportunistic and pathogenic species or actively compete against them by secreting antimicrobial factors. Commensals can also modulate the immune system and promote immune tolerance, which can reduce the severity of inflammatory skin diseases. Thus, a diverse skin microbiome is crucial to the function of the epidermal barrier and to skin health.

What questions still need to be answered about this relationship?

**Dr. Yu:** The exact role of the resident microbiome in the pathogenesis of many skin diseases is still unknown. For example, how does the microbiome from psoriatic skin differ from the skin of a healthy individual? Is one particular bacterial species or phylum more responsible for disease promotion than another? How and why is this important?

We know, at least, that microorganisms are able to modulate the innate and adaptive immune responses, so a better understanding of the host-commensal interactions will allow us to further characterize the microbiome’s role in various skin diseases.

How are the gut and skin intertwined?

**Dr. Yu:** Hippocrates claimed that, “all diseases begin in the gut.” Indeed, the gut can have major regulatory effects on the skin. The gut microbiome impacts intestinal barrier function and permeability, thereby influencing overall systemic inflammation, oxidative stress, glycemic control, and tissue lipid content.

Recent data have demonstrated that disturbances to the normal microflora of the gut have been associated with cutaneous manifestations and play a role in certain inflammatory skin conditions.

This brings us to the topic of probiotics, a topic that is becoming very relevant to dermatologists. Probiotics consist of live microorganisms, which when administered in adequate amounts confer a health benefit on the host. By restoring a healthy balance of gut microbes, oral probiotics can reduce systemic inflammation and indirectly impact the skin in a positive way. In contrast, topical probiotics can directly manipulate the skin microbiome to impact skin health.

What oral and topical probiotics are effective for inflammatory skin diseases?

**Dr. Yu:** Overall, the total number of clinical trials investigating the utility of probiotics in dermatology is still limited, but the available results appear favorable. Most evidence in support of probiotics comes from our research in atopic dermatitis. Oral probiotics containing species from the *Lactobacillus* genus, the *Bifidobacterium* genus, or mixtures of both, have been shown to improve the skin of atopic dermatitis patients and may even be protective against development of the disease. There are fewer studies in acne patients,
flora. “The bacteria that’s responsible for maintaining that health has a fighting chance against pathogenic inflammatory bacteria,” he says. Probiotics—live active cultures—and prebiotics serve a similar role, he says. Fermented foods (think Sauerkraut or Kimchi) can also be beneficial.

“I recommend probiotics to most patients, especially with inflammatory conditions, as a part of their skincare routine. I recommend a multistrain product with the highest number of bacterial colonies,” Dr. Goldenberg says. In fact, Dr. Goldenberg’s practice has developed and branded a formulation for patients looking to support skin health. “Our office offers Goldenberg Dermatology brand multistrain probiotic with 52.5 billion cultures. Patients also inquire about topical probiotic products. I often recommend MotherDirt brand products,” he adds.

Similarly, Dr. Buka developed a 60-day super food, prebiotic

but they also demonstrate that daily consumption of a mixture of *Lactobacillus* and *Bifidobacterium* species was as effective a treatment as minocycline. In patients with seborrheic dermatitis, intake of *Lactobacillus paracasei* has been shown to be beneficial. Similarly, oral probiotics containing species of *Lactobacillus* improved wound healing in chronic diabetic ulcers and burn victims. In regard to skin cancer, oral intake of lipoteichoic acid from *Lactobacillus rhamnosus* was associated with less UV damage and a reduced risk of skin cancer in mice.

In discussing topical probiotics, I want to emphasize that we should be focusing on ones that contain commensal skin flora, instead of those formulations consisting of gut flora or bacteria found in the environment. In my opinion, applying gut flora to the skin fundamentally does not make sense, since the skin is not their natural ecological niche. Topical probiotics containing skin commensals would better establish colonization, minimize off target effects, and be more viable, thereby enhancing effectiveness and longevity of treatment. This has already been demonstrated in a few studies. Topical application of commensal, coagulase-negative *Staphylococcus* or *Roseomonas* mucosa to the skin of atopic dermatitis patients has been associated with clinical improvement in disease.

The results thus far are exciting, and I am eager for more clinical studies to test the effectiveness and long-term safety of probiotics.

**Can we say which bacteria is good and bad as far as the skin is concerned?**

Dr. Yu: Yes and no. It can be specific for different disease states, and there is still so much we do not fully understand. However, we have already taken the first steps to answer this question. For example, we have a good idea of what constitutes a normal skin microbiome in different regions of our body and how the microbiome undergoes change at different stages of our lives. The next step is to determine what differences exist in the microbial communities on patients with different skin diseases. Unfortunately, this has only been extensively studied for a few diseases.

We do know that *Staphylococcus aureus* is a notorious pathogen in atopic dermatitis. It is found in abundance on these patients and associated with flares and more severe disease. In acne, *Cutibacterium acnes*, has been implicated in pathogenesis. Interestingly, though, it is only specific phylotypes of this bacteria that are commonly associated with acne, while other types are exclusively associated with healthy skin. Thus, while in some cases it may seem easy to label a bacteria as “bad,” in other cases, particular strains of the same bacteria may be “good.” The complex microbial community as a whole must also be considered, since decreases in diversity can negatively impact skin health.

**Are there any cosmeceuticals that can help improve skin microbiome?**

Dr. Yu: In today’s society, the media has certainly popularized the idea of topical probiotics. While I do not have any specific brand recommendations, I do encourage everyone to read the fine print of what is actually contained within the formulations of the products that they intend to purchase. There are cosmeceuticals that advertise themselves as topical probiotics, but they do not actually contain live bacteria. There are other topical products that contain a myriad of live bacteria, but all of them originate in the gut. Some cosmeceuticals also contain only prebiotics, which are non-digestible carbohydrates that stimulate the growth of probiotic bacteria. After confirming the product ingredients, I also recommend taking a look to see if there is any clinical data supporting the claims made by the manufacturers.

**Are patients aware of the microbiome and its relationship to skin health?**

Dr. Yu: Yes! Patients are trying at-home “yogurt masks” and buying probiotic sprays online. New cosmeceuticals containing probiotics and prebiotics are in the news, social media, and advertisements every day. I hope this attention leads to more scientific studies that will enable us to better grasp their effects and to develop optimal probiotic treatments and preventative regimens. The microbiome serves as a target for new therapies and expands the spectrum of available therapeutic options for dermatologists! I am delighted that it has been put in the spotlight.
supplement called PASTILLES. Among other ingredients, the formulation contains fish oil for omega fatty acids, vitamin D, biotin, ashwagandha, spirulina, and turmeric. “The idea,” Dr. Buka says, “is to prime the gut for a low inflammatory state.”

When it comes to oral supplements, Dr. Gohara believes they can benefit overall health, but she defers to GI specialists on specific recommendations. “The benefits of oral probiotics have been well elucidated in the gut, so I defer to them,” she explains.

Dr. Gold sees the most promise in oral supplements for hair loss. “The hair growth supplements that are part of what we dispense—Nutrafol and Viviscal—both have real science behind them and can, in most, make a difference with re-growing hair,” he observes. “Other supplements, for skin aging may, in some, be very useful and we are always looking at the science and what may be best for our patients.”

In terms of topicals, the science offers no specific guidance. “I have been to many lectures about this at meetings and have read about pre/probiotics extensively. The only definitive data is the data linking a healthy microbiome to healthy skin. Dysbiosis can result in exacerbation of inflammatory skin conditions,” Dr. Gohara says. As such, she advises patients to use what she calls “microbiome gentle” products.

“For example,” she continues, “I recommend gentle cleansers instead of harsh soaps. Dove body wash actually has a microbiome gentle designation on the back of the bottle!”

Dr. Shamban recommends a bacteriophage-containing product called Ellis Day. In the topical realm, Dr. Buka recommends Vinter’s Daughter Active Treatment Essence and Beauty Chef’s Probiotic Skin Refiner as anti-inflammatories.

Dr. Schlesinger does not recommend any specific products that feature probiotics. “Some Avène products contain a bacterial extract that could reduce itching and inflammation, and we do carry those. Unfortunately, the evidence is not there to support specific recommendations and there is a lot we do not know.”

For Dr. Gold, more traditional topical regimens remain standard. “I recommend products that we know will have an effect in preparing the skin for a procedure—especially skin lightening creams and also retinoids of some kind before and after, I really like growth factors and still think they play an important role. We also hear more and more about pollution and its effects on the skin, so we also bring into the equation products with antioxidants and other defenses against pollution.”

In addition to compounds that may be considered pre/probiotic, Dr. Buka notes that other products applied directly to the skin may affect the local milieu of bacteria. “At the skin’s surface, these topicals may help to shift flora to more supportive, less inflammatory bacterial profiles.”

Joshua Zeichner, MD recommends botanical-based products for many of his patients, including the Kamedis line for eczema. “Besides traditional moisturizing ingredients like ceramides, emollients like shea butter, and humectants, this product contains a unique combination of botanicals to calm inflammation in the skin,” he explains. “Newer data suggests that these botanicals also support growth of healthy bacteria on the skin, while suppressing more harmful strains. In a clinical trial comparing the active cream to its vehicle without the Chinese herbs, the active cream performed statistically better in treating eczema, demonstrating the benefit of the herb combination.” Botanical extracts in the Kamedis AC-Clear line for acne have been shown to inhibit growth of C. acnes and support growth of S. epidermidis.

La Roche-Posay has led research on the effects of its skincare lines on the microbiome. “Thermal spring water from La Roche Posay, France is rich in minerals like selenium and strontium,” Dr. Zeichner says. “Selenium in particular has been shown to provide prebiotic benefits, increasing diversity of microbes on the skin.”

MORE TO LEARN

Despite research, misinformation remains. “The greatest misconception in my opinion is that taking these supplements or applying them to your skin will aid in the quest for anti-aging,” Dr. Gohara says. “Although there may be a link, it hasn’t been fully teased out. In terms of future directions, it will be important for us to see how these products can be incorporated into the therapeutic regimen for inflammatory skin disease.”

Most dermatologists seemed to agree that pre/probiotics may best be viewed as contributing to overall skin health with possible effects on inflammation from acne or eczema.

“One of the greatest misconceptions is that all bacteria are bad. We now have good information to suggest that the microbiome plays a significant role in both the gut and the skin. There are certain organisms known to reside in the skin and possibly be involved in certain disorders such as C. acnes in acne and Demodex mites in rosacea,” Dr. Schlesinger says. “We need to understand more about what bacteria are present in skin, how to manipulate the skin microbiome in a safe and effective way, and how the skin microbiome changes in response to the environment, diet, skin product application, or other factors.”

“We still have very safe prescriptive options for our patients who suffer from acne vulgaris. My professors taught me how to use them, their professors before them—there’s nothing broken there. But we should acknowledge that...
pharmaceuticals may not be the only way to get there. We’re all after a common goal of skin wellness for our patients and there are probably a few ways to accomplish that,” Dr. Buka asserts, “and one of those paths leads right through the gut. At the Dermatology Specialists, we seek to find a balance between what a patient is comfortable taking on the prescription side, but also finding synergies with gut health for optimal results. The tension between Western and Eastern approaches to medicine is antiquated—it doesn’t have to be either/or, and we’re finding incredible benefit if we take the opportunity to incorporate both.”

Gilly Munivalli, MD says there is a need for more research and notes a particular interest in acne. He says the most common questions in his practice come from women with acne who are in their 20s and 30s. Dr. Shamban wants to see evidence that a skin cream can contain live cultures.

Dermatologists have a responsibility to follow the research and stay educated, Dr. Munivalli says. “I really think more convincing mainstream research is necessary to guide us.”

“Until the research is there to allow dermatologists to make recommendations, I think we should continue to pursue knowledge so we can make the best suggestions based in science for the health of our patients, friends, and family,” Dr. Schlesinger adds.

“We have to become more knowledgeable in this topic, and not just dismiss it. This is important to patients and more and more evidence suggests that the microbiome is an important component of skincare,” Dr. Goldenberg says.

In general, Dr. Gold maintains, “Skincare research needs to be done outside of the ‘company’ and also away from ‘contracted labs.’ Studies need to be done by dermatologists who perform quality clinical research and treat these trials as if they were true FDA trials. We are still learning about the microbiome and the appropriate studies needed here—but again, they need to be done and done correctly.”