

The Particulars of Probiotics

Q. *The nutritionist who works with our spa recently suggested that I recommend probiotics to my clients. What are they, and how do they differ from antibiotics?*

A. Defined by a group of experts convened by the Food and Agriculture Organization (FAO) of the United Nations, probiotics are beneficial live bacteria or yeast that, when administered in adequate amounts, produce positive health effects for the host in which they live. The term "probiotic" is taken from the Greek words *pro*, meaning "for," and *bios*, meaning "life."

Among Americans who have used antibiotics for years to kill health-threatening microorganisms known as pathogens, the idea of good microorganisms is a difficult concept to understand. However, there are many more beneficial microbes in the environment and in the human body than harmful ones. By using friendly microbes to control the population of hostile ones—especially after times of intense stress, infection, antibiotic therapy or even a night of heavy alcohol consumption—probiotic practitioners believe that they can maintain or revive health in a variety of situations.

Their thinking is based on the fact that the average human is the landlord to large colonies of bacteria, known as flora. More than 400 species can be found in the intestinal tract, mouth, skin and, for females, the vaginal tract. The population of flora is so vast that some experts estimate there are more bacterial cells than human cells in and on the human body. Similar to other animal relationships, bacteria and humans have come to rely on one another for their existence. This symbiotic association depends on good flora to, among other things, inhibit pathogens and yeast; aid in the synthesis of vitamins, such as niacin, folic acid and pyridoxine; improve the uptake of minerals—especially calcium; prevent or reduce some forms of cancer; and stimulate the immune system. This last action most likely occurs when colonies of friendly flora increase cells—including macrophages and lymphocytes—in the immune system, while triggering the



production of disease- and inflammation-fighting biochemicals, including antibodies, cytokines, immunoglobulins and interferon. These biochemical factors represent several large groups of chemicals that are manufactured by the body to fight bacteria, parasites, viruses and cancer cells.

Probiotics have a long-standing tradition of use in Europe, the Middle East and Asia. A variety of probiotic-rich foods—including yogurt, cheese, sour cream, kefir, sauerkraut and kimchee—has been used for centuries to reduce symptoms of diarrhea, constipation and vaginitis; to improve the digestion of lactose-containing dairy products in lactose-intolerant people; and, when yogurt or kefir is applied to the skin, to control acne. During the past decade, research has broadened, and double-blind clinical studies into the effects of probiotics on a variety of conditions have commenced—especially in Europe. Among the most promising is the effect of probiotic bacteria on *Helicobacter pylori*, a gut bacterium that has been linked to stomach ulcers and rosacea.¹ Also of interest are several studies conducted by Finnish researchers examining whether certain probiotic bacteria can help to reduce or eliminate the development of allergies and atopic eczema in children.²

Probiotics are used in the United States, but in a more limited way than in other parts of the world. Unpasteurized yogurt that contains live

bacteria cultures represents the largest probiotic product category sold in the United States.

Nutritionists and some physicians recommend that yogurt be consumed either during or at the end of a round of broad-spectrum antibiotics because these types of drugs often eliminate all bacteria, resulting in a loss of friendly flora in the gut and vaginal tracts that can lead to stomach problems and vaginal yeast growth. Certain spermicides and contraceptive creams also can kill beneficial vaginal bacteria, leading to yeast infections soon after their use.

The cultures used to transform milk into yogurt should be listed on containers of unpasteurized yogurt. *Lactobacillus acidophilus* and *bifidobacterium* are the two most common, but *Streptococcus thermophilus*, *Lactobacillus bulgaricus*, *Lactobacillus reuteri*, *Lactobacillus case*, *Lactobacillus rhamnosus GG* and *Lactobacillus plantarum* also are used by probiotic practitioners. If your client doesn't like yogurt and you want to ensure that they receive the most effective dose of bacteria, look for capsules of *Lactobacillus acidophilus*, *Lactobacillus GG*, *Lactobacillus johnsoni* or *Lactobacillus reuteri*. Of the entire group, these have undergone the most study and are obtained easily in capsule form. *Lactobacillus acidophilus* is the most readily available, and also is used to reduce bad breath, prevent fungal growth and control acne.

All of the above bacteria are members of the lactic acid bacteria (LAB) family, named due to its ability to change lactose sugar into lactic acid via fermentation. Lactose in milk, cabbage, Chinese radishes, cornstarch, potatoes, molasses and similar foods ferments easily under the influence of LAB, which has been used for centuries to lengthen food's edible life span by lowering its pH level and reducing consuming nutrients that could be used to support the growth of spoilage microbes.

Sometimes nonliving lactose-rich substances called prebiotics purposely are introduced into the same product as LAB to stimulate bacterial activity. When this is done, the product is known as a synbiotic or symbiotic, depending on with whom you're speaking. Inulin—an oligosaccharide utilized by such plants as chicory, garlic, wild yam, jicama, burdock and dandelions to store energy—is the most commonly used prebiotic.

PROBIOTICS are beneficial live bacteria or yeast that produce positive health effects for the host in which they live.



RESOURCES

If you would like to learn more about these concepts, consult the following Web sites.

- www.wikipedia.com (Start by searching for the word(s) "probiotic," "prebiotic," "symbiotic," "inulin," "lactic acid bacteria" and "lactobacillus acidophilus.")
- www.usprobiotics.org
- www.nationaldairycouncil.org (Search using the word "probiotics." The entry on the probiotic search return, "Probiotics: Considerations for Human Health," is especially interesting.)
- www.food-info.net/uk/ff/probiotics.htm
- www.gutflora.org

REFERENCES

- 1 JM Hamilton-Miller, *The role of probiotics in the treatment and prevention of Helicobacter pylori infection*, *Int J Antimicrob Agents* (22) 360-366 (2003)
- 2 M Kalliomäki, S Rautava et al, *Probiotics during pregnancy and breastfeeding might confer immunomodulatory protection against atopic disease in the infant*, *J Allergy Clin Immunol* 109(1) 119-21(2002)

Q. Do you know whether any studies exist that support the use of probiotics on the skin?

A. Throughout the past several years, researchers in Europe and Asia—where probiotics are more accepted by medical practitioners and consumers—have been exploring the use of probiotics to control acne, signs of aging, immune functions and other aspects of skin care. The results of their studies are slowly making their way to U.S. audiences.

One of the first to be introduced was Bioecolia (alpha glucan oligosaccharide), a prebiotic oligosaccharide obtained from natural sucrose and maltose sugars. According to Solabia, the French developers of the ingredient, the oligosaccharide is

an easily digested food source for skin's beneficial microflora, but is not a good food source for hostile bacteria. In the presence of both friendly and hostile microbes, the good are fed and thrive while the hostile starve. *Staphylococcus aureus* and *Propionibacterium acnes*—problematic bacteria associated with rosacea and acne—are especially susceptible.

Originally designed as a natural cosmetic preservative, Bioecolia has gained greater popularity for its effects in balancing the ecosystems of the skin and scalp during times of stress, exposure to airborne pollutants or imbalances that are thought to occur through the aggressive use of hand sanitizers or highly alkaline, acidic or antimicrobial soaps on the face, hands and scalp. Regardless of whether or not these events lead to a decrease of friendly flora is still under debate, but several companies in Europe have had great success with acne, dandruff and baby products containing Bioecolia. Several U.S. brands also feature the ingredient.

Bioecolia is best formulated in creams, lotions and gels that remain on the skin or scalp, as opposed to facial cleansers, body washes and shampoos that are rinsed. Solabia also claims that its ingredient is an ideal addition to deodorants because it inhibits the growth of underarm bacteria.

More recently, a German ingredient developer, Chemisches Laboratorium Dr. Kurt Richter GmbH (CLR), introduced ProBioBalance CLR (water, lactose, milk protein, bifida ferment lysate). Described as "probiotic bifidobacteria cultures solubilized in a bioactive milk-based nutrient," the company recommends the material for use in high-performance skin care. This is apparently for good reason. In vitro and in vivo studies on the ingredient's effect on the skin by the CLR group are quite impressive, reflecting much of the cellular and immune system benefits for which probiotics generally are known. In vitro, keratinocyte vitality—the primary cell in the epidermis that forms the skin's barrier, the stratum corneum, and orchestrates much of its immune defense—was protected even after the nutrients used

RESEARCHERS have been exploring the use of probiotics to control acne, signs of aging and other aspects of skin care.

to maintain cell life were removed. Control cells did not fare as well, showing signs of undernourishment and inactivity. In two other in vitro studies, protein-destructive enzymes known to cause elasticity loss and wrinkling, as well as immune suppressive biochemicals that lower the skin's immune activity after ultraviolet (UV) exposure, both were reduced in skin that was pre-treated with ProBioBalance CLR, then exposed to UV radiation. Similar to the first study, untreated cells did not fare nearly as positively.

The material also was tested on 20 volunteers on whom prolonged redness due to irritation was developed for purposes of the study. Each member of the test group was exposed to a placebo and the same vehicle plus 5% ProBioBalance CLR, and a section of skin was left untreated. Throughout the nine-day test, skin treated with the vehicle-plus-probiotic consistently displayed less redness than the two control areas, with redness evident in the two controls but completely eliminated in the skin treated with ProBioBalance CLR at the end of the study. CLR recommends this ingredient to control signs of aging and stress, although cosmetic companies are exploring its use for a variety of skin concerns.

LABs also are being investigated for their use as natural cosmetic preservatives. One of the most promising is AC Leucidal from Active Concepts (leuconostoc/radish root ferment filtrate). Using modern biotechnology, the company has isolated a peptide from pure *Leuconostoc kimchi* culture and combined it with radish root to yield one to two years of preservative activity effective against *E. coli*, salmonella, shigella, candida and other microbes. Products containing AC Leucidal already may be on the market, even though it was introduced to cosmetic manufacturers in late 2005.

As cosmetic scientists learn more about utilizing the effects of prebiotics and probiotics in their products, look for more novel and effective applications of these concepts. In the meantime, an occasional application of yogurt to control acne might appeal to your more nature-loving clients. X