

State of the Globe: Probiotics: The “Good Bacteria” May Help Healthy People but Can These Be Recommended Formally?

Probably sensing the significance of probiotics, the International Scientific Association for Probiotics and Prebiotics convened an expert panel meeting in October 2013 to discuss the developments in the field of probiotics.^[1] Although a beginning had been made at the turn of this century when efforts were made to define probiotics and subsequently guidelines were published for regulators, scientists and industry by the Food and Agriculture Organization (FAO) of the United Nations and the World Health Organization (FAO/WHO), the meeting of 2013 marked an important landmark in this area. The FAO/WHO defined a probiotic as “live microorganisms which when administered in adequate amounts confer a health benefit on the host.”^[1] Extending on this definition, the ministries of health from Canada, Italy, and the European Union issued standards for bacterial species and their respective levels to qualify as probiotics. Health Canada identified *Bifidobacterium* (*adolescentis*, *animalis*, *bifidum*, *breve*, and *longum*) and *Lactobacillus* (*acidophilus*, *casei*, *fermentum*, *gasseri*, *johnsonii*, *paracasei*, *plantarum*, *rhamnosus*, and *salivarius*) bacterial species when delivered in food at a level of 1×10^9 colony-forming units per serving, as probiotics.^[1] Essentially, it is these bacteria that represent a core group of well-studied species likely to impart some general benefits and qualify as probiotics as per the FAO/WHO definition. On lines similar to this, other countries such as Italy, for example, have also regulated the use and administration of beneficial bacteria as food supplements or food ingredients to help manage the intestinal microbiota. The idea of “supporting a healthy immune system” through probiotics rests on benefits ranging from preventing allergic disease to downregulation of inflammation to the enhancement of anti-infection activities. In addition, the idea that probiotics support the health of the reproductive tract, oral cavity, lungs, skin, and gut–brain axis is promising as well.

The science of probiotics has advanced, primarily fuelled by the industry as also through the recognition of the growth of progress in understanding the role of the human microbiota in health across the world and therefore a need to define effective strategies to shape a healthier human microbiota. The story of probiotics has been on high since their use has only increased over time. However, as is always there with the success stories, there has been recognition of a flipside as well. A systematic review of case reports and case series about infectious complications after probiotic treatments found that both *Lactobacillus* spp. and *Pediococcus* spp. were involved as causative agents, among other probiotic organisms of common use.^[2] A research study published in the current issue of *Journal of Global Infectious Diseases* takes it further by raising some

valid questions with larger public health implications regarding the use of probiotics.^[3]

The focus of this study, although limited to *Lactobacillus* group, might serve as a starting point on multidisciplinary research related to using probiotics as *Lactobacillus*, a group of paraphyletic Gram-positive, nonspore forming, mostly nonrespiratory, but aerotolerant, lactic acid bacteria of more than 237 species and 29 subspecies are not only known to be a part of the normal human microbiota, colonizing the mouth, gastrointestinal tract, and the female genitourinary tract, but also have been used for centuries for food and feed fermentation. Their use in probiotics is based on the fact that these are rarely associated with pathology in immunocompetent people. However, in the presence of risk factors and some underlying conditions, they can cause infections such as endocarditis, bacteremia, neonatal meningitis, dental caries, and intra-abdominal abscesses including liver abscess, pancreatic necrosis infection, pulmonary infections, pyelonephritis, meningitis, postpartum endometritis, and chorioamnionitis.^[4,5]

WHAT DOES THIS MEAN FOR HEALTHCARE PROFESSIONALS?

First, there is a need to create awareness that, for immunocompromised individuals, or those affected by particular medical conditions, *Lactobacillus* can represent a hazard and must be used more cautiously as health-promoting microorganisms than it is currently done. In a world dominated by noncommunicable diseases such as diabetes mellitus, heart disease, and cancers, the fear is more real than imaginary. Add to these patients on chemotherapy, transplant surgeries, HIV infection, and steroid use, and we have a real danger on our hands. Second, there is an urgent need to come out with national guidelines on the use of probiotics based on the recommendations of clinical and scientific experts on probiotics (with specialties in gastroenterology, pediatrics, family medicine, microbiology, microbial genetics, immunology, and food science). The guidelines should have implications for the use of probiotics in food, agriculture, and pharmaceutical industry. Third, there is a need for the development of a research framework focusing on defining the beneficial commensal microbes, as certain individual constituents of the human microbiota might represent novel candidates for new probiotics. The framework should also identify as to whether the depletion of some critical commensal might have health consequences later in life due to misuse and abuse, for example, of antibiotics. Even though a cause–effect relationship between low microbial richness of the

human body and disease has not been established, but even if hypothetical, replacement of the missing commensal microbes with individual strains or defined strain mixes could help in the prevention and treatment of a large number of such disorders affected by their depletion.

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Conflicts of interest

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