



Acta Gastroenterológica Latinoamericana
ISSN: 0300-9033
ISSN: 2429-1119
actasage@gmail.com
Sociedad Argentina de Gastroenterología
Argentina

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Acta Gastroenterológica Latinoamericana, vol. 51, núm. 3, 2021

Sociedad Argentina de Gastroenterología, Argentina

Disponible en: <https://www.redalyc.org/articulo.oa?id=199368908006>

DOI: <https://doi.org/10.52787/oqig2049>

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Updates on Mechanisms and Future Potential of the Intestinal Microbiome in Gastroenterology

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Acta Gastroenterológica
Latinoamericana, vol. 51, núm. 3, 2021

Sociedad Argentina de Gastroenterología,
Argentina

Recepción: 02 Julio 2021
Aprobación: 26 Julio 2021
Publicación: 27 Septiembre 2021

DOI: <https://doi.org/10.52787/oqlg2049>

Redalyc: <https://www.redalyc.org/articulo.oa?id=199368908006>

The intestinal microbiome has emerged as a vital organ, capable of performing complex metabolic, immune, and neuroendocrine functions that impact its mammalian (human) host. We have evolved to establish a mutualistic relationship with our gut microbiome, which remains largely beneficial to the host throughout the life span. However, many factors can perturb this peaceful equilibrium, and this has led to the prevailing concept that the gut microbiome can participate as driver of inflammation and gut dysfunction, contributing to gastrointestinal disease. On the other hand, this hypothesis has opened new diagnostic and therapeutic opportunities in gastroenterology.

One clear well known mechanism that benefits the hosts, are the microbial cues, particularly in early life, that lead to maturation of the immune system,¹ instructing how to differentiate between potentially harmful agents, and innocuous antigens, such as those from the diet. In the past decades we have witnessed an accelerated development of new generation techniques to study and characterize the intestinal microbiome, both compositionally and functionally. Overall, the technical capacity to explore the microbiome has advanced so rapidly, that it has somewhat outpaced our capacity for translating this enormous body of new knowledge into clear practical applications in medicine. It is thus fair to say that more questions than answers remain, but that is the essence of science. Can we identify which microbes are more adapted to maintenance of homeostasis or to pathogenic pathways? Should we focus on understanding the conditions that trigger transformation from a commensal to opportunistic pathogen? Are we capable of applying the knowledge learned to prevent or treat disease? How and what to treat when fundamental questions such as what constitutes a healthy microbiome,² have not been answered?

In this, and the next issue, of Revista ACTA Gastroenterológica Latinoamericana, we will feature a series of articles addressing the key role of the intestinal microbiome in the pathogenesis, as well as potential diagnosis and therapy of defined gastrointestinal conditions.

The prevalence of food sensitivities, which imply an immune underlying pathogenesis and could be allergic or autoimmune, such as celiac disease, and food intolerance have significantly increased in the past years.³ The increase is so rapid, that environmental factors related to the microbiome, have been proposed. In the current issue of *Revista ACTA Gastroenterológica Latinoamericana*, Caminero describes the microbial mechanisms underlying the development of food intolerance and sensitivities, which could be targeted with novel biotherapeutics to better treat these conditions. In this same issue Valdovinos provides an insightful review on the clinical application of probiotics in one of the most common conditions in gastroenterology, the irritable bowel syndrome. The area remains controversial, and more robust clinical trials are needed to identify specific probiotics that will benefit the clinically heterogeneous IBS. In the following edition of *Revista ACTA Gastroenterológica Latinoamericana*, De Palma & Bercik address the role of the intestinal microbiome in IBS, from a mechanistic perspective, increasing our understanding of microbial pathways leading to symptom generation. Rueda & Pinto-Sanchez, argue on the clinical evidence for the use of probiotics in celiac disease, from basic studies to recent meta-analyses. Finally, Santiago-Badenas & Verdu discuss the hypothesis and current evidence for the development of pre-clinical microbial biomarkers in ulcerative colitis.

The intestinal microbiome, without doubt, is a new chapter in medicine. However, the speed at which the technology to characterize the microbiome (compositionally and functionally) continues to advance, outpaces our capacity to implement the insights gained into clinical practice. The challenge for the future will be to successfully apply the knowledge accumulated into new diagnostics, and biotherapeutics, taking into account specific microbiome-host interactions in a personalized manner.

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Notes

Cite this article as: Verdu EF. Updates on mechanisms and future potential of the intestinal microbiome in gastroenterology. *Acta Gastroenterol Latinoam*. 2021;51(3):257-8. <https://doi.org/10.52787/oqlg2049>