


Leveraging the power of microbiota for enhanced surgical recovery: new perspectives on probiotics and pre-biotics supplementation

Aprovechando el poder de la microbiota para una recuperación quirúrgica acelerada: nuevas perspectivas sobre la suplementación con probióticos y prebióticos

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To the Editor,

Research on the gut microbiome has been gaining momentum for a long time. The term "probiotics" was first used in 1992 to describe "a preparation of or a product containing viable, defined microorganisms in sufficient numbers, which alter the microflora (by implantation or colonization) in a compartment of the host and by that exert beneficial health effects in this host". Pre-biotics, defined as "non-digestible food ingredients (fiber) that beneficially affect the host by selectively stimulating the growth and/or activity of one or a limited number of bacteria in the colon", have recently attracted a lot of attention. The fiber is converted into short-chain fatty acids by these bacteria, which have positive benefits both locally and systemically^{1,2}. Probiotics and pre-biotic fiber are two examples of dietary supplements that may rapidly alter the gut flora. Actually, the microbiome can undergo a dramatic shift in just 24 h in response to a dietary fiber increase or decrease.

Prebiotics and probiotics exhibit anti-inflammatory properties, among other effects. The inflammatory response elicited by surgical procedures necessitates an investigation into the potential role of pre-biotics and probiotics in modulating immune responses

during the perioperative period, as well as their impact on surgical outcomes³.

The immune system constitutes a complex network of pathways regulated by binary signaling molecules. An inadequate or excessive concentration of any of these molecules can result in considerable downstream effects. The existing evidence linking specific inflammatory mediator concentrations to surgical outcomes is limited; nonetheless, the necessity to reduce excessive inflammation is unequivocal. Increased levels of inflammatory cytokines correlate with post-operative delirium, heightened muscle catabolism, and prolonged hospital and ICU stays. Cytokines play a crucial role in increasing the permeability of the blood-brain barrier, affecting the hippocampus and potentially resulting in delirium and cognitive decline⁴. Inflammation compromises the integrity of the mucosal barrier. This issue is pertinent to surgical procedures as a compromised mucosal barrier can exacerbate systemic inflammation through the entry of bacterial metabolites, fragments, and possibly intact bacteria into systemic circulation. Studies demonstrate that pre-biotics and probiotics enhance the mucosal barrier through multiple mechanisms⁵.

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If the objective is to mitigate inflammation, one may inquire about methods to regulate the immune response. The regular application of pre-biotics and probiotics may alter our inflammatory condition and could have ramifications during the perioperative phase. A recent study involved 52 colorectal cancer patients who received either a placebo or a probiotic supplement comprising lactobacillus and bifidobacterium for 6 months post-surgery. Participants in the probiotic group exhibited a substantial decrease in pro-inflammatory cytokines tumor necrosis factor- α , interleukin-6 (IL)-6, IL-10, IL-12, IL-17A, IL-17C, and IL-22. In this study, Zaharuddin et al. highlight that IL-10 and IL-12 have dual activity as both anti-inflammatory and pro-inflammatory cytokines; nevertheless, the research did not identify a significant rise in exclusively pro-inflammatory cytokines with probiotic administration⁶. Recognizing the importance of tailored nutritional strategies, the integration of personalized pro-biotic and pre-biotic regimens into perioperative protocols represents a forward-thinking approach that could redefine standard surgical care.

In conclusion, leveraging probiotics and pre-biotics during the perioperative period offers promising potential to enhance recovery outcomes by modulating immune responses, strengthening the mucosal barrier, and reducing post-operative inflammation. The anti-inflammatory and barrier-supportive effects of these supplements can mitigate complications, such as post-operative delirium, muscle catabolism, and prolonged hospitalization. Further research is warranted to solidify the clinical guidelines and optimize the supplementation strategies for specific surgical populations, ultimately improving patient care and recovery pathways.

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Conflicts of interest

The authors declare no conflicts of interest.

Ethical considerations

Protection of humans and animals. The authors declare that no experiments involving humans or animals were conducted for this research.

Confidentiality, informed consent, and ethical approval. The study does not involve patient personal data nor requires ethical approval. The SAGER guidelines do not apply.

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