

## Editorial Letter

### Probiotics Role in Reducing GIT Cancer-Related Therapy Side Effects

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Received: 30 July 2023; Accepted: 2 August 2023

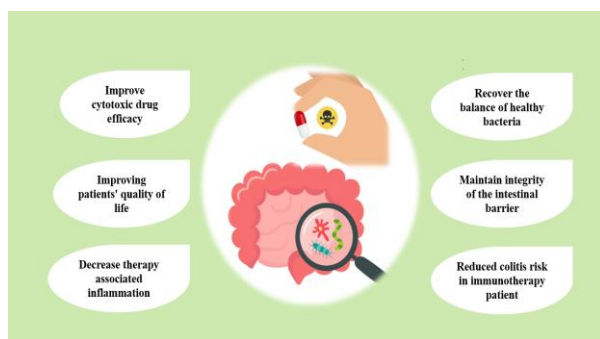
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**Article Citation:** Nori W, Kassim AMK, Pantazi AC. Probiotics role in reducing GIT cancer-related therapy side effects. *Al-Rafidain J Med Sci.* 2023;5:114-115. doi: <https://doi.org/10.54133/ajms.v5i.215>

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#### To the Editor

As appreciators of diligent scientific exploration, we read with interest the comprehensive article by Hassan *et al.* [1] discussing the role of probiotics in gastrointestinal tract (GIT) cancers. But we think it's important to mention that Hassan *et al.* didn't talk about the possible role of probiotics in reducing the side effects of cytotoxic drugs (CTDs), radiotherapy, and immunotherapy in GIT cancers [1] (Figure 1).



**Figure 1:** The main beneficial effects through which probiotic reduces cancer therapy-related side effects to optimize drug efficacy and patient's outcomes.

Disturbance in the harmony of the gut microbiota (GM), known as "dysbiosis," has been linked with many diseases and health issues [2]. Probiotics can help recover the balance of healthy bacteria in the intestine; fostering a healthy GM in cancer patients leads to the following: first, enhance digestion and decrease GIT-

related symptoms caused by cytotoxic drugs [3]. Second, restrict the development of harmful pathogens, such as *Clostridium difficile*, which is antibiotic-resistant bacteria [4]. Third, enhancing intestinal epithelial health improves intestinal absorption, thus improving the cancer patient's nutritional state [1,3]. The integrity of the intestinal barrier is essential for preventing the entry of hazardous substances into the systemic circulation. Cancer therapy can compromise this barrier, resulting in increased intestinal permeability (leaky gut), and may impact the body's ability to ingest and metabolize medications. This can hinder cancer therapy efficacy or increase its toxicity [5]. Understanding this has made people more interested in using probiotics, fecal microbiota transplantation (FMT), and nanotechnologies to change GM to make cytotoxic drugs work better [6]. The latter was used to target cancer-associated bacteria or deliver anticancer therapy in a controlled manner to lessen therapy side effects. Furthermore, a leaky gut has been proposed as a possible factor contributing to metastasis as the tumor-promoting factors move into the bloodstream, facilitating metastasis [5]. Probiotics can strengthen the intestinal barrier by increasing the expression of tight junction proteins and decreasing inflammation and gut leakage [5,6]. The immune system, weakened by cancer therapy, makes patients more susceptible to infections. Probiotics reduce infection risk by boosting immunity via the production of antibodies and activating immune cells [2]. Probiotics' anti-inflammatory and immunomodulatory actions decrease chemotherapy and

radiotherapy-associated inflammation and related discomfort [7]. Recent research points to probiotics' role in improving the mood of patients undergoing cancer treatment. By interacting with the gut-brain axis, probiotics help reduce psychological distress. Improving patients' quality of life (QOL) is well known to increase treatment adherence and has the potential to boost treatment outcomes [8]. Probiotics improve QOL in more than one way, e.g., by mitigating cytotoxic side effects on the GIT, the immune system, and the patient's psychological status, thus improving patients' QOL [5,7,8]. Cancer immunotherapy is a new approach to treating tumors [3]. It can directly bind to cancer cells and trigger body immunity to kill them, or indirectly via target immune checkpoints downregulated by tumor cells—one of the immunotherapy side effects of colitis [9]. The abundance of *Bacteroidaceae*, *Rikenellaceae*, and *Barnesiellaceae* reduced the risk of colitis in patients under immunotherapy. This has prompted multiple researchers to use synthetic biology to redesign GM to evoke particular immune reactions against cancer and other diseases [3,9,10]. Although our understanding of the probiotic underlying mechanism is far from complete, the potential impact on oncology could be revolutionary. In conclusion, probiotics hold promise in reducing the adverse effects of CTDs, radiotherapy, and immunotherapy in GIT malignancies. Further research should aim to identify the most beneficial probiotic strains and understand their optimal dosages and administration routes. Another area of interest is nanotechnology applications in cancer management; efforts should be made to comprehend the mechanism that underlies nanotechnology and evaluate nanoparticles' efficacy, toxicity, and safety profile.

### Conflict of interests

The authors declared no conflict of interest.

### Source of fund

No specific fund received.

### Data sharing statement

N/A

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