

# Current State-of-the-art Cutting-edge Technologies for Nanonutraceuticals in Cancer

Dear Editor,

The rapid transformation of nanoscale sciences and nutraceuticals over the years has been accountable for the evolving importance and readiness of nanomedicine in recent times. Nutraceuticals refer to substances that could have a physiological advantage and can boost the host's immunity against long-standing diseases like cancer. From the current literature, it is observed that the consumption of these nutraceutical substances can have a potential benefit for people suffering from chronic diseases like cancer.<sup>[1]</sup> Nutraceuticals also include antioxidants whose intake in increased proportions may reduce the risk of cancer disorders. Nutraceuticals can be an adjunct to traditional therapies. Complementing micronutrients has the potential to turn down cancer cell growth, impeding the proliferation of cells and apoptosis (programmed cell death). Most chemotherapeutic products currently are imprecise against cancer cells, a target of choice for the therapy. Hence, these imprecise therapeutic agents can further threaten healthy cells, causing various adverse effects. Because of the inaccurate targeting of the chemotherapeutic substances, high doses cannot be given at a shot as they may threaten healthy cells. Furthermore, minimal drug doses can lead to resistance by cancer cells toward that chemotherapeutic agent, thus making them hard to kill. One best way to tackle this issue is to intensify the “drug targeting and delivery” through the mechanisms of nanonutraceuticals. The application of nanotechnology in natural substances and pharmaceuticals, collectively as nutraceuticals, can amplify cancer management.<sup>[2]</sup>

Cutting-edge “Nano-formulations and Nano-suspensions” have been observed to potentiate and improve drug delivery, henceforth reducing the chemotherapeutic resistance of the drug and aiding in countering the undesirable effects of the drug. The application of nano nutraceuticals has transformed cancer management from diagnosis to treatment by utilizing contrast agents for

imaging based on nanotechnology, which could target the cancer cell more precisely, thereby potentiating tumor identification and management.<sup>[3]</sup> Nutraceutical remittance by applying nanotechnology can have several advantages in cancer management, including protecting healthy cells from oxidative damage through antioxidant activity.

Recent developments in nanotechnology have laid the foundation to produce nutraceuticals targeted against cancer packed in ‘biodegradable polymeric nano substances. These loaded nutraceuticals have exhibited cutting-edge results, demonstrating the highest anticancer potential with superior solubility and bioavailability. Curcumin is a widely researched nutraceutical appreciated for having exceptional anticancer effects following its integration with nanotechnology.<sup>[4]</sup> Nanonutraceuticals have emerged as a potential carrier for various pharmaceutical formulations for cancer therapy. Nanonutraceuticals must be adequately evaluated to appraise their properties’ longevity and shelf life, majorly at the Nano level, to assure their safety and potency. Follow-through studies from time to time aimed at assessing the possible undesirable side effects are essential for the sustainability of Nano nutraceutical formulations.<sup>[5]</sup>

### AUTHORS’ CONTRIBUTION

Simhachalam Kutikuppala contributed in concept, manuscript writing, editing, and processing for publication. Kalyani contributed manuscript writing and editing. Sri Harsha Boppana performed manuscript writing and editing. Mohapatra contributed manuscript review, editing and supervision.

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### Conflicts of interest

There are no conflicts of interest.

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## REFERENCES

- Salama L, Pastor ER, Stone T, Mousa SA. Emerging nanopharmaceuticals and nanonutraceuticals in cancer management. *Biomedicines* 2020;8:347.
- Illahi AF, Muhammad F, Akhtar B. Nanoformulations of nutraceuticals for cancer treatment. *Crit Rev Eukaryot Gene Expr* 2019;29:449-60.
- Pellico J, Ellis CM, Davis JJ. Nanoparticle-based paramagnetic contrast agents for magnetic resonance imaging. *Contrast Media Mol Imaging* 2019;2019:1-13.
- Divella R, Daniele A, Savino E, Paradiso A. Anticancer effects of nutraceuticals in the mediterranean diet: An epigenetic diet model. *Cancer Genomics Proteomics* 2020;17:335-50.
- Deshantri AK, Varela Moreira A, Ecker V, Mandhane SN, Schiffelers RM, Buchner M, *et al.* Nanomedicines for the treatment of hematological malignancies. *J Control Release* 2018;287:194-215.

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