

## Metal nanoparticles synthesized by probiotics are promising agents with anti-cancer effects

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**Aim and Background:** Probiotics are live microorganisms that maintain or improve the natural balance of gut microflora. The health benefits of probiotics include boosting the immune system, improving heart and brain function, and breakdown and absorption of medications. Cancer is serious life-threatening disease in almost all societies, and in the present review, we focused on the role of probiotics in synthesis of metal nanoparticles with anti-cancer activity.

**Methods:** Recent review articles included key words probiotic, cancer therapy and nanoparticle were extracted from databases Google scholar, Web of Science and PubMed.

**Results and discussion:** Use of chemical agents is a routine strategy for cancer treatment. However, high toxic effects of drugs on normal tissues restricts efficiency of chemotherapy. Accordingly, development of alternative therapies with limited side effects is of importance. Probiotics induce anti-cancer effects through various mechanisms, such as production of compounds with anti-carcinogenic properties, modification of gut microbial components, inhibition of cancer cell growth and immunomodulation. In addition, metabolites of probiotics, including short-chain fatty acids, enzymes/proteins, amino acids, polysaccharides and vitamins, could reduce and stabilize various nanoparticles. In this regard, Au, Zn and Se nanoparticles synthesized by Lactobacillus strains have shown anti-proliferative and apoptosis-inducing effects on human and murine colon carcinoma cells. Similarly, growth and survival of liver, breast and lung cancer cells was inhibited by Pt and Ag nanoparticles produced by Saccharomyces, Streptomyces and Lactobacillus strains.

**Conclusion:** In conclusion, recent reports introduced probiotics as potential sources for synthesis of stable and effective metal nanoparticles with anti-cancer activity.

**Keywords:** Metal nanoparticles, Probiotics, Anti-cancer effects.