**Bacbot Mediated Cancer Nanotheranostics**

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**Abstract**

The futuristic cancer therapeutics are driven towards using bots for delivering targeted payloads and penetrating the inaccessible sites within tumors. Herein, we report the development of “Bacbots” that were based on wild-type living gut bacteria *Lactobacillus rhamnosus*. The living bacteria acted as a template for chemically synthesizing gold nanoclusters (AuNCs) on their surfaces making them fluorescent. These were loaded with Methotrexate. These bacbots were co-cultured with monolayer and 3D spheroids of HeLa and HT29 cell lines. The toxicity of bacbots on these cells were dose-dependent, methotrexate and the inherent anticancer activity of the bacteria acted synergistically on them. The reactive oxygen species (ROS) generation was found to be enhanced after the treatment suggesting this as a possible mechanism of action. Such bacbots can solve the issues like oral administration of bacbots, toxicity due to higher bacterial load as the strain is gut friendly, tolerant to acidic environment and susceptible to antibiotics. Moreover, these can act as stepping stones for developing bots without genetic modifications and unknown adverse effects of attenuation.

**Keywords**- *Lactoacillus rhamnosus*, Bacbots, Methotrexate, Spheroids, AuNCs.



**Scheme1**. Schematic representation of developing bacbots for cancer theranostics.

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