

Specificity of biogenic selenium nanoparticles for prostate cancer chemoprevention with reduced risk of toxicity**Praveen Sonkusre**

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Selenium deficiency is associated with many physiological disorders including the high risk of cancer. The rehabilitation of selenium with different selenium supplements, however, fails due to their low therapeutic index. Therefore, it is advantageous to have a less toxic form of selenium for supplementation with potentially high anticancer activity. In this study, selenium nanoparticles were synthesized biologically by *Bacillus licheniformis* JS2, and a method was developed for extraction and purification of intracellular nanoparticles. Characterization of extracted nanoparticles with various biochemical, microscopic and spectroscopic techniques suggested that these 110 nm sized particles are composed of selenium and capped with a few functional groups that provide steric stability to them. These neutral charged, non-agglomerating selenium nanoparticles at a concentration as low as 2 µg Se/ml were inducing reactive oxygen species (ROS) mediated necroptosis in PC-3 cells by gaining cellular internalization without causing any significant toxicity to human peripheral blood mononuclear cells and RBCs. Real-time qPCR analysis showed increased expression of necroptosis associated tumor necrotic factor (TNF) and interferon regulatory factor 1 (IRF1). An increased expression of the RIP1 protein was also observed at the translational level upon SeNP treatment. Moreover, the cell viability was significantly increased in the presence of necroptosis inhibitor, Necrostatin-1. Furthermore, histopathological analysis showed the subsequent oral administrations of ten times higher concentration of these endotoxin free selenium nanoparticles in C3H/HeJ mice (50 mg Se/kg of body weight), induce significantly lower toxicity compared to the L-selenomethionine (5 mg Se/kg). Data suggest that these biogenic SeNP could be the safest form of selenium supplementation with potentially high anticancer activity.

Biography

Praveen Sonkusre has completed his Ph.D. from CSIR - Institute of Microbial Technology, Sector 39A, Chandigarh, India and currently working in the same institute as Research Associate. He has published 4 research articles in the early stage of his scientific career and is a part of one patent (filed).

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