

## Accepted Manuscript

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PII: S0928-4931(17)32690-5  
DOI: doi:[10.1016/j.msec.2018.04.085](https://doi.org/10.1016/j.msec.2018.04.085)  
Reference: MSC 8542  
To appear in: *Materials Science & Engineering C*  
Received date: 10 July 2017  
Revised date: 16 April 2018  
Accepted date: 28 April 2018

Please cite this article as: Indu Hira, Amit Kumar, Reena Kumari, Adesh K. Saini, Reena V. Saini , Pectin-guar gum-zinc oxide nanocomposite enhances human lymphocytes cytotoxicity towards lung and breast carcinomas. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Msc(2017), doi:[10.1016/j.msec.2018.04.085](https://doi.org/10.1016/j.msec.2018.04.085)

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**Pectin-guar gum-zinc oxide nanocomposite enhances human lymphocytes cytotoxicity towards lung and breast carcinomas.**

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**Abstract**

Pectin-guar gum-zinc oxide (PEC-GG-ZnO) nanocomposite was prepared by precipitation technique. The composite was characterized by using FT-IR, XRD, HRTEM, SAED, EDS, and SEM. TEM images showed the hexagonal shape of nanocomposite with the size range of 50-70 nm. Further, PEC-GG-ZnO was used as an immunomodulator for the first time to improve the cancer cells killing capabilities of human peripheral-blood lymphocytes (PBL). The lymphocyte proliferation assay proved the immunostimulatory property of the PEC-GG-ZnO which increased with the increase in concentration (25 µg/ml to 200 µg/ml). ELISA detection confirmed a significant increase in the release of IFN-γ, IL-2 and TNF-α cytokines and flow cytometry analysis revealed enhanced expression of CD3, CD8, and CD56 after treating PBL with PEC-GG-ZnO as compared to PEC and GG treatment. Moreover, we also found that nanocomposite pretreated human PBL displayed enhanced cytotoxicity towards lung (A549) and breast carcinoma (MCF-7) cells as compared to untreated PBL. The microcytotoxicity assay also demonstrated that with increase in effector: target ratios from 2.5:1 to 20:1, there was an increase in the cancer cell death. Taken together, the current data corroborates the immunostimulatory activities of PEC-GG-ZnO, a novel nanocomposite, hence it can serve as a promising cancer therapeutic agent.

Keywords: Immunotherapy, Nanocomposite, Anticancer, Pectin, Guar gum

**1. Introduction**

Immune system is an extremely sophisticated defense mechanism inside vertebrates to protect them from invading agents. Cancer - immune system interactions activate innate and adaptive immune effector mechanisms to recognize and control tumor. Cancerous cells are detected by cytotoxic T lymphocytes which lead to the destruction of

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