

Studying metastasis and immune-related mechanisms of oregano, graviola and cinnamon nanosuspensions against non-small cell lung carcinoma

Abstract Submitter: Yamixa Delgado, Puerto Rico*

Co-Authors: Juan Figueroa, Edwin Figueroa, Giannina Lopez, Daraishka Perez

*San Juan Bautista School of Medicine

Abstract

Background: Lung cancer is the second most common and leading cause of cancer-related deaths worldwide, with 85% of these cases being non-small cell lung carcinoma (NSCLC). Unfortunately, existing therapeutic regimens are ineffective for most NSCLC patients due to chemoresistance and metastasis. Plants are still key in the finding of novel drugs against several diseases, especially in cancer. Conversely, over-the-counter supplements represent the most accessible form of plant-based medication for the general population. A common misconception is that these supplements have no contraindications because they are natural. Objective: This study aims to elucidate the effect on the immune response and metastasis processes of nanosuspensions (NS) derived from oregano, graviola, and cinnamon plants on NSCLC cells alone and in combination with chemotherapeutics (i.e., cisplatin, doxorubicin and paclitaxel). Methods: Utilizing an optimized protocol, we prepared aqueous NS using the plants' own primary and secondary metabolites, enhancing the stability of their phytochemicals. To assess their mechanism of action, we investigated the impact of these phyto-NS on cell cycle, DNA integrity, reactive oxygen species (ROS) production, expression of MAPK/PI3K/EGFR and caspase 3 activation using flow cytometry. To assess the immunomodulatory effects, we investigated the impact of these phyto-NS on the expression of immune and metastasis markers using Real Time qPCR in NSCLC A549 cells. Results: We determined that these phyto-NS killed A549 cells in a dose-dependent manner, leading to DNA damage, ROS production, caspase-3 activation and downregulation of MAPK/PI3K/EGFR proteins. Furthermore, we observed a reduction in the metastasis-related genes (FOXO1, PREX, RAC1), the immune checkpoints (NFkB1, CD80, CD47, IL6, PDL1), and an increase in the immune mediator CXCL11, suggesting a potential immunosensitive tumor microenvironment. However, the combination of these phyto-NS with cisplatin, doxorubicin and paclitaxel drugs resulted in an antagonistic effect in A549 cells. Conclusions: These findings demonstrate the potential of cinnamon-, graviola-, and oregano-based therapies in the fight against lung cancer. However, it is important to note that these plant extracts should not be combined with chemotherapeutics.

Do you have any conflicts of interest?

No, I do not have a conflict of interest.