

The Effects of Metformin And PCL-sorafenib Nanoparticles Co-treatment on MCF-7 Cell Culture Model of Breast Cancer

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Abstract : Background: Despite breakthrough therapeutics in breast cancer, it is one of the main causes of mortality among women worldwide. Thus, drug therapies for treating breast cancer have recently been developed by scientists. Metformin and Sorafenib are well-known therapeutic in breast cancer. In the present study, we combined Sorafenib and PCL-sorafenib with metformin to improve drug absorption and promote therapeutic efficiency. Methods: The MCF-7 cells were treated with Metformin, Sorafenib, or PCL-sorafenib. The growth inhibitory effect of these drugs and cell viability were assessed using MTT and flow cytometry assays, respectively. The expression of targeted genes involved in cell proliferation, signaling, and the cell cycle was measured by Real-time PCR. Results: The results showed that MCF-7 cells treated with Metformin/Sorafenib and PCL-sorafenib/Metformin co-treatment contributed to 50% viability compared to untreated group. Moreover, PI and Annexin V staining tests showed that the cells viability for Metformin/Sorafenib and PCL-sorafenib/Metformin was 38% and 17%, respectively. Furthermore, Sorafenib/Metformin and PCL-sorafenib/Metformin leads to p53 gene expression increase by which they can increase ROS, thereby decreasing GPX4 gene expression. In addition, they affected the expression of BCL2, and BAX genes and altered the cell cycle. Conclusion: Together, the combination of PCL-sorafenib/Metformin and Sorafenib/Metformin increased Sorafenib absorption at lower doses and also leads to apoptosis and oxidative stress increases in MCF-7 cells.

Keywords : breast cancer, metformin, nanotechnology, sorafenib

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