Proceedings International
Platinum Open Access Journal (ISSN 2668-6384)

Proceedings, Abstract
Volume 4, Issue 1, 2022, 49
https://doi.org/10.33263/Proceedings41.049

Nanocellulose-based Scaffolds Embedding 5-FU Designed to Support Post-mastectomy Breast Tissue Engineering †

Liliana-Roxana Balahura [1,*], Sorina Dinescu [1], Alexandra Cernencu [2], Adriana Lungu [2], Marieta Costache [1,2]

[1] Department of Biochemistry and Molecular Biology, Faculty of Biology, University of Bucharest, Bucharest, Romania
[2] Advanced Polymer Materials Group, University Politehnica of Bucharest, Bucharest, Romania
* Correspondence: roxana.balahura@bio.unibuc.ro (L.R.B.);
† Presented at 1st OncoHub Conference – Connecting Scientists for Next Generation Cancer Management (13-15 October 2021, virtual)

Received: 25.10.2021; Accepted: 5.02.2022; Published: 14.02.2022

Abstract: Non-invasive therapeutic strategies are recommended in the early stages of breast cancer, but surgical treatment is often necessary due to the aggressiveness of the disease. In this context, this study aims to validate new biomaterials enriched with 5-fluorouracil (5FU), designed for post-mastectomy adipose tissue engineering. 3D scaffolds based on nanocellulose and pectin (CNP) enriched with 1% and 5% 5FU have been proposed for post-mastectomy breast reconstruction. To perform this study, normal breast and tumor cells were seeded into the 3D scaffolds. Cell viability was determined after two and seven days of culture. The level of reactive oxygen species (ROS) generated was measured in order to identify the capacity of 5FU to induce oxidative stress. Gene and protein expression of p53 and caspase-1 were determined by Real-Time PCR and immunofluorescence techniques. The inflammatory profile was assessed by detecting the level of caspase-1 directly from culture media. The results of viability assays indicated a strong cytotoxic effect of 5FU on tumor cells. Exposure of tumor cells to 5FU resulted in an increased ROS production. At the same time, the presence of 5FU determined increased p53 and caspase-1 expressions at both gene and protein levels. The highest level of caspase-1 released in the culture media was detected in 3D systems composed of biomaterials enriched with 5FU and tumor cells. This study demonstrates the cytotoxic effect of 5FU on breast tumor cells, as well as the increased expression of p53 and activation of caspase-1.

Keywords: 5-fluorouracil; nanocellulose; 3D scaffolds; breast cancer; caspase-1.

Funding

This work was supported by PN¬III¬P1¬1.2¬PCCDI¬2017¬0782/ REGMED.

Acknowledgments

This research has no acknowledgment.

Conflicts of Interest

The authors declare no conflict of interest.