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

Proceedings, Abstract
Volume 4, Issue 1, 2022, 34
https://doi.org/10.33263/Proceedings41.034

Current Therapeutic Strategies Targeting Tumor Cells and their Microenvironment †

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† 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: Breast cancer is the most common malignancy in women and the leading cause of cancer-related death worldwide. Several treatment modalities are currently available, including surgical resection, chemotherapy, and targeted therapy; however, resistance eventually occurs, and options remain limited. Still, chemotherapy remains an essential component of multidisciplinary treatment for breast cancer, being critical for preventing tumor recurrence and improving long-term survival. In this context, our study aimed to evaluate the efficiency of novel drug delivery systems enriched with 5-fluorouracil (5-FU, an anti-metabolite) or paclitaxel (PTX, a taxan) against breast cancer cell lines. Firstly, tumor cells were put in contact with the scaffolds embedding different anti-cancerous agents, after which analysis of cell viability and proliferation was performed using quantitative and qualitative tests. Specific markers were analyzed at gene and protein levels, using RT-qPCR and immunofluorescence. Moreover, the expression of several microRNA molecules was evaluated using qPCR array before and after treatment. The results showed the positive effect of the drugs on the regulation of various markers involved in cell proliferation, survival, and inflammation (e.g., *p53, caspase-1*, etc.), as well as on the modulation of microRNAs (e.g., miR-130a, miR-17, miR-141, etc.). These results are promising and stand to further the existing knowledge available on the potential therapeutic strategies targeting tumor cells and their microenvironment in breast cancer. Although significant challenges remain, the search continues to develop more efficient treatment modalities, to improve the length and quality of patients' life.

Keywords: breast cancer; chemotherapy; targeted therapy; molecular markers; qPCR array.

Funding

Funding for this research was provided 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.