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Analysis of Pathways in Triple-negative Breast Cancer Cells treated with the Combination of Electrochemotherapy and Cisplatin †

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Abstract: More than 2 million new cases and over 600,000 breast cancer deaths were reported in 2018 worldwide. Out of these, 15 to 20% are Triple Negative Breast Cancer (TNBC), which lack all the three most commonly administered receptors, namely ER, PR, and Her2 amplification. Hence, TNBC is difficult to treat; and it has the highest five-year recurrence rate among breast cancer types. Currently, TNBC patients are treated with platinum-based chemotherapeutics, such as Cisplatin. With the aggressive and metastatic nature of TNBC cells, it demands immediate, alternate treatments.
Electrochemotherapy is a proven drug delivery practice in molecular medicine. The combination of electrical pulses (EP) with Cisplatin (Cisp) is studied using Label-free quantitative proteomics to better understand action pathways. Cisplatin alone and Cisplatin combined with Electroporation on MDA-MB-231, human TNBC cells were used for this purpose. The results indicate that EP + Cisp significantly upregulated Mitochondrial ribosomes and significantly downregulated ribosomes and ubiquitin-mediated proteolysis. A total of 12 proteins were found downregulated among both ribosomes and ubiquitin-mediated proteolysis and a total of 29 proteins were upregulated among Ribosomes. Mitochondrial ribosome upregulation indicates the DNA damage was done by Cisplatin, and proteasome inhibitors are proven to function as novel anticancer compounds.

Keywords: cisplatin; triple negative breast cancer; electrochemo theraphy.

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Conflicts of Interest

The authors declare no conflict of interest.