THERAPEUTIC IMPLICATIONS OF THE WARBURG EFFECT: ROLE OF OXALATES AND ACETATES ON THE DIFFERENTIAL SURVIVAL OF MRC-5 AND A549 CELL LINES

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Abstract: Lung cancer is a one of the most prevalent and deadly cancers in United States. Research has shown that cancer cells exhibit higher glycolytic rates than normal cells. In attempting to exploit this unique cancer-dependent ATP generation phenomenon, we hypothesize that exposure of cancer cells to organic inhibitors of glycolysis would have a negative impact on their survival and will alter their growth and viability due to a vast decrease in their essential glycolytic ATP production with the resultant energetic collapse and that no negative consequences will be seen on normal lung cells. The human lung fibroblast cell line MRC-5 and the human alveolar epithelial cell line A549 were used in this study as models for normal lung and lung cancer in vitro. Using standard methods, both cell lines were maintained and exposed to oxalic acid and zinc acetate reagents at concentration levels ranging from 31.3-2,000 μg/ml in 96 well plates in quadruplets and experiments are repeated at least three times using MTT, and cell counting (T4 Cellometer) assays as well as phase-contrast photo-imaging. Our results indicate that exposure of both cell lines to these organics resulted in concentration dependent cell destruction/cell survival depending on the cell line exposed. Oxalic acid and zinc acetate showed statistically significant (p<0.05) differential negative effects on the A549 line in comparison to its unexposed control as well as to their effects on the MRC-5 cell line, presenting promising indicators for their cancer therapeutic potential.

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