The Effect of Metabolite Glucose 6-Phosphate on Apoptosis of Breast Cancer Cells

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Cancer cells evade apoptosis, a cellular suicide process that plays a pivotal role in cancer, thus enabling excessive cell proliferation. Metabolic reprogramming is a hallmark of cancers, which creates a unique tumor microenvironment characterized by the limited availability of nutrients. Therefore, metabolic dependencies of cancer cells have provided new therapeutic strategies to exploit altered metabolism in cancer treatment. Glucose 6-phosphate (G6P) is an essential metabolite, a metabolic hub connecting glycolysis, the pentose phosphate pathway, glycogen synthesis, and de novo lipogenesis; however, its role in apoptosis of cancer cells remains unknown. Here we show that treating human breast cancer MCF7 cells with G6P can induce apoptosis and cause cancer cell death. Increased concentrations of G6P and longer treatment lead to more cell death and apoptotic cells. Furthermore, expression of gene TRIOSEPHOSPHATE ISOMERASE 1 (TPI1) in glycolysis decreased when breast cancer MCF7 cells were treated with 40 mM and 60 mM of G6P for either 48 or 72 hours. This research can be further evaluated in future studies, providing potential for a novel cancer treatment by metabolic reprogramming in humans.

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