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CRISPR technology for cancer therapy

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Cancer is said to be the second leading cause of global deaths. Even though there are many treatments available for cancer, it is uncertain that cancers are always cured when the treatment ends. Therefore, early detection of cancer with efficient treatments is important to cure the disease and prevent its recurrence. Recent cancer treatments can target rapidly proliferating cancer cells by disrupting their special metabolic processes. However, lack of specificity against cancer cells may result in adverse side effects for such treatments. Therefore, a new therapeutic strategy that selectively targets cancer cells is an attractive treatment option for cancer. “Aerobic Glycolysis” is the major process of cancer cells to achieve their higher energy demands. There are several critical enzymes that catalyze key steps in glycolysis and therefore, targeting one of these enzymes would be an effective approach to suppress cancer progression. Our research focuses on knocking out the regulatory domain of PFK-1 enzyme, which catalyzes one of the main steps in glycolysis. The ultimate objective would be to downregulate the activity of PFK-1 activity and slow down the proliferation of cancer cells. To achieve this objective, we have used the recent genome editing technology, CRISPR/Cas9 to modify PFK-1 gene that will result in a truncated PFK-1 lacking its regulatory domain. Down-regulation of PFK-1 activity may be a safer therapeutic approach to treat cancer over complete inhibition of PFK-1 as the truncated enzyme may still exhibit sufficient catalytic activity for the function of healthy cells yet may have a significant impact on energy-centric metabolism in cancer cells.

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