CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)

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Project Number

S0504

Project Title

Efficacy of BIBR1532 in Combination with Nutrient Deprivation on Reduction of Cell Viability in MCF7 and HT1080

Abstract

Objectives/Goals

Previous studies have shown that BIBR1532, a non-competitive inhibitor molecule to the protein telomerase, may be a promising approach to inhibition of cancer cell proliferation. Unfortunately, more recent studies have also led to the discovery of the ALT pathway as an alternative to telomerase, such that when cancer cells are treated with BIBR1532 natural selection will favor adoption of ALT pathway phenotype for tumor survival. Due to such complications, past studies have shown that the best approach to incorporating BIBR1532 into cancer treatment is by synergistically combining it with other forms of cancer treatment (ex. chemotherapy, radiation). Our project combines BIBR1532 with nutrient deprivation to investigate effects on cell viability.

Methods/Materials

MCF7 and HT1080 cancer cell lines were used, and cultured in high glucose/high glutamine (scenario #1), high glucose/low glutamine (#2), low glucose/high glutamine (#3), and low glucose/low glutamine (#4) situations both with and without the BIBR1532 molecule. Afterwards, cell viability is measured.

Results

Effects on cell viability as follows:
With the addition of BIBR1532 versus without,
HT1080: #1: 6.05% increase, #2: 7.07% decrease, #3: 6.00% increase, #4: 0.04% decrease.
MCF7: #1: 6.02% increase, #2: 6.98% decrease, #3: 6.39% increase, #4: 0.88% decrease.

Conclusions/Discussion

The results we found were not as expected- in some scenarios (i.e. #1,3), adding on the BIBR1532 drug seemed to grant the cancer cells higher viability. The only successful scenarios, in which the addition of BIBR1532 led to decreases in cell viability, were #2,4 where viability dropped 6.7% on average, which does not reflect a very significant decrease in cell viability. BIBR1532 in combination with glucose/glutamine restriction alone appears not sufficient to effect large reductions in cell viability. Future research potentially involves combining BIBR1532 with chemotherapy drugs and nutrient deprivation to investigate the reduction in cell viability created by this combination.

Summary Statement

Our project investigates the efficacy of combining BIBR1532, a telomerase inhibition molecule, along with nutrient deprivation on reducing the cell viability of MCF7 and HT1080 cancer cells in cell culture.

Help Received

We would like to graciously thank Dr. Xiaoling Li, who offered us lab space in which to conduct the experiment we designed. We also thank Mr. Zahir Uddin, who taught us laboratory protocols and watched over our laboratory safety as we worked on our procedure.