



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Raymond Kuan; Derek Tan	Project Number S1515
Project Title Effectiveness of Phycocyanin, Isolated from Spirulina platensis, on the Inhibition of Neoblast Tumor Growth	
<p style="text-align: center;">Abstract</p> <p>Objectives Spirulina platensis is a type of cyanobacteria also known as the blue-green algae. It contains a pigment called phycocyanin, which is made up of protein molecules, and is shown to be a highly effective antioxidant and anti-inflammatory substance. Most importantly, it has also shown the potential to bind to carcinogens and neutralize their effects. Using planarian neoblasts as a model for human stem cells, we visualized the impacts of phycocyanin on tumor development. The objective of this experiment is to investigate the possible anti-cancer and antiproliferative effects of phycocyanin isolated from Spirulina platensis with the hopes of identifying a future inhibitor to neoplasia.</p> <p>Methods We hypothesized that planaria exposed to both phycocyanin and a carcinogen will develop fewer tumors than planaria exposed solely to a carcinogen. There have been no similar experiments prior to ours; as a result, we needed to come up with a guideline and protocol to effectively test our hypothesis. We refer to this process as Stage 1, which identifies the correct dosage and lethal dosage of phycocyanin and glyphosate on neoblast cells. By using a titration test, we were able to determine the LD(50) of phycocyanin and glyphosate were 1 ml and 0.2 ml (5% and 1% m/v dilutions) in 20 ml spring water respectfully. By applying a safety factor of 45%, we calculated 0.5 ml and 80 ul (2.5% and 0.4% m/v dilutions) as the values for Stage 2. Then, in Stage 2, we divided planaria into 4 groups: Group 1 exposed only to phycocyanin, Group 2 exposed to both phycocyanin and a carcinogen (glyphosate), Group 3 exposed only to the carcinogen, and Group 4 living in spring water as a control. After 7 days, we analyzed the planaria under a light microscope to check for neoplasia.</p> <p>Results Group 3 was the group with planaria that developed the most tumors (31.25%). Group 2 also developed tumors (9.09%), and the rest of the groups appeared normal without any significant physical or developmental changes.</p> <p>Conclusions By running a 2 Proportion Z-Test and Chi-Square analysis, we were able to conclude a statistically significant ($p < 0.05$) correlation between phycocyanin and tumor prevention in planarian neoblasts, supporting our initial hypothesis. Our experiment demonstrates that phycocyanin does exhibit anti-proliferation characteristics and is a potential agent in preventing and mitigating neoplasia.</p>	
Summary Statement This project aims at validating phycocyanin as a potential agent that inhibits neoplasia.	
Help Received We had access to our school's biology classroom and borrowed basic laboratory equipment.	