Hong Kong Student Science Project Competition 2022
Template of Extended Abstract (Investigation)
(Word Limit: 1,000 words, Pages: 2 pages only)

Team Number: SBBC250

Project Title: Effect of resveratrol on the growth rate of planarians

Project Type: Investigation

To our best knowledge and after thorough literature research, as at 30/06/22 , there are no[*] similar works. If there are, the reference links are as below:

I.

The enhancement our project has made for the existing related products or research is summarized as below:

II.	**Researched how resveratrol is transported in planarians**
III.	**Researched how resverateol is absorbed in planarians**

*Please delete if not applicable. HKSSPC values the originality of works. Students must conduct literature research thoroughly to ensure that their works are unique, and to list relevant reference materials to complement the research or invention.

IV.   Hypothesis

> Higher concentrations of resveratrol boost the growth rate of planarians. The optimal resveratrol concentration for planarian growth is 2.08×10^{-5}M. Planarians under higher concentration than this will inhibit growth rate instead. 4.1×10^{-5}M solution is detrimental to planarians.
>
> Planarians would be soaked in a resveratrol solution of different concentrations in a petri dish. We would measure and record the length of planarians regularly and calculate the growth rate. Hence, drawing the conclusion of whether planarians grow best 2.08×10^{-5}M and whether an extremely high concentration of resveratrol would be detrimental to them.

IV. Methodology

Resveratrol capsule	adjustable pipette	25mL pipette	dropper
Filter funnel	glass rod	beaker	volumetric flask
Lab magnetic stirrer	petri dish	measuring cylinder	distilled water

1.1×10^{-5}M resveratrol solution:
Dissolve 1 capsule of resveratrol, then obtain a $100 cm^3$ solution(1.74×10^{-2}M) by adding the dissolved resveratrol solution into a $100 cm^3$ volumetric flask
Dilute the solution to 1.74×10^{-5}M by pipetting 0.5ml of 1.74×10^{-2}M solution into a 500mL volumetric flask
Pipette $100 cm^3$ of 1.74×10^{-5}M and add it in $150 cm^3$ of water, obtaining a **1.1×10^{-5}M** resveratrol solution
Prepare the rest of the solutions using a different number of capsules and adding different amount of water.
Same mechanism for other concentrations but different calculations.
Dimethylsulfoxide (DMSO) solution(0.04%)(control)
Mix 1mL of DMSO (99%) solution and 2249mL of water
Planarians: feed them with beef liver per week and record their length and activity during recess, lunchtime and after school. For weekends, one of our teammates would bring the planarians home for observation.
Preparing setups:
Put six planarians in each petri dish(six in total) and pour 20 mL of 1.1×10^{-5}M resveratrol solution into a petri dish
Repeat this with the remaining concentrations but using different petri dishes, and place a piece of grid paper for future measurements under each of it
Scientific theory: We provide them with an aquatic environment to live in and feed them with the beef liver to ensure fairness and allow them to obtain nutrients for growth. Planarians grow fast so we would check them regularly. One of our teammates would take all the planarians home for observation to ensure they grow in the same environment and lower experimental error.

V.   Results

Average length (in mm)/concentration (M)	water	DMSO solution	1.1×10^{-5}	2.08×10^{-5}	3.12×10^{-5}	4.1×10^{-5}
Day 1	5.56	4.05	4.33	4.96	6.27	4.48
Day 8	6.42	6.80	7.57	6.98	7.92	5.83
Increase in length	0.86	2.75	3.23	2.02	1.65	1.35

For setups with a higher concentration of resveratrol than 1.1x10-5M, the growth rate of planarians decreases with increasing concentration. Planarians in the 4.1x10-5M setup grew the least among all the setups with resveratrol, only increasing by 1.35mm.

This shows that 1.1x10-5M is the optimal concentration of resveratrol for planarians to increase their growth rate. First, with resveratrol concentration higher than the optimal, fewer nutrients can be absorbed from the beef liver. Resveratrol may have caused a reduction in SIRT-1 expression, which increases the time taken to begin feeding and the food intake of planarians.

This data is reliable because each setup consists of 6 planarians which reduce the chances of having human errors. The data has high reproducibility as all biological materials used can be traced back to the original source and we used google sheet to analyse and interpret data so it is simple to recreate.

The first limitation is not all planarians are fully extended, resulting in an unfair comparison. The second will be each of us measuring different planarians, causing different measurement standards.

Resveratrol is said to be exerting anti-ageing effects, but it does not have clear authoritative dosing guidelines. Our research helps to find out the optimum dosage to get the maximum benefit. If further research based on this research is done on humans, resveratrol could be applied in the medical field, improving public health.

VI.   Conclusion

The growth rate of planarians fluctuated, but the overall growth rate of planarians increased.

For the follow-up research, we would target higher concentrations, aiming to observe detrimental effects, simulating drug abuse in humans. Moreover, further research could be done to investigate the optimum dosage of resveratrol for humans to achieve the best results in wound healing. Different ways to intake resveratrol could be taken into account.

☐ Our project is developed based on our school's previous project and the enhancement is as below:

We have further researched how resveratrol is transported and absorbed instead of only the relationship between resveratrol and planarians.