

Hong Kong Student Science Project Competition 2023

Template of Extended Abstract (Investigation)
(Word Limit: 1,600 words, Pages: 3 pages only)

Team Number: JBBC194

Project Title: Therapy for Hepatic Cancer patients

Project Type: Investigation

*To our best knowledge, there are/are no * similar works in the field;*

I. Background

Liver cancer was the third most leading cause of death in the world, around 830k people died because of liver cancer (World Health Organization, 2022). There are some common conventional treatments that are used to treat liver cancer in Hong Kong and worldwide.

Currently, there are some treatments for cancer, such as surgery, thermal ablation, targeted cancer medicines and radiotherapy. But all these methods may have some negative impacts or sequelae which can affect the patient's normal life. Hepatic G2 is a human hepatic cancer cell that is commonly used in research.

The first veggie is tomato. Lycopene in tomatoes has the effects of antihypertensive and cardioprotective and can lower the risk of prostate cancer (Fraser, 2021). The second veggie is celery. Apigenin in celery prevents and destroys the growth of cancer cells (Kooti & Daraei, 2017). Celery is effective in preventing lung cancer, ovary cancer and breast cancer (Madhusudhan, 2017). The third veggie is ginger. Gingerol helps prevent colorectal cancer, breast cancer and ovarian cancer. (Leech, 2021). The third veggie is garlic. Compounds in garlic can kill cancer cells (Hayes, 2020). Garlic can lower the risk from suffering large intense cancer.

MTT assay is a colorimetric assay for assessing cell metabolic activity. Migration Assay is an experiment to check the rate of the metastasis of the cells under the treatment of different vegetables.

II. Objectives

Aim: To observe the effectiveness of the four veggies on suppressing Hepatic G2.

Objectives: To investigate if the four types of vegetables are useful to suppress Hepatic G2 or not.

To compare and investigate which concentration and which veggies are more effective to suppress Hepatic G2.

To compare the migration rate of Hepatic g2 added with 4 different veggies.

III. Hypothesis

- Propose an explanation for a phenomenon and stating how the **hypothesis** can be tested by experiments

Liver cancer whose prevalence is the third common cancer in Hong Kong and worldwide, with male to female ratio 3:1. Using tomatoes, celery, gingers and garlics for food therapy, which have shown inhibitory effects on the other types of human cancer, could be a possible way out for patients who have to undergo chemotherapy and radiotherapy that has irreversible side effects.

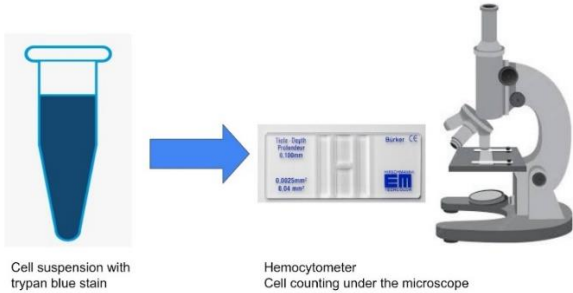
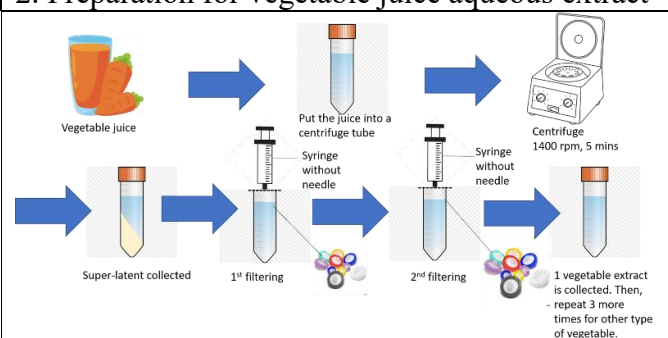
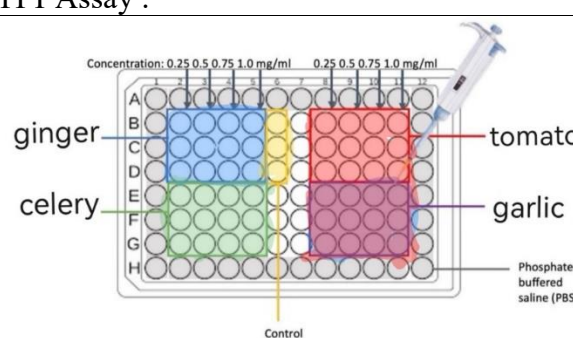
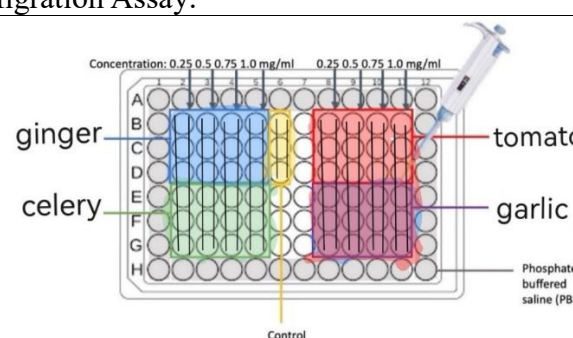
ative effects of the four types of vegetables on the Hepatic G2 cells under different concentrations. For the Migration Assay, it helped us to have a finer understanding of whether the vegetables can suppress the Hepatic G2 cells metastasis, by measuring the distance Migration over time using MotiConnect.

IV. Methodology

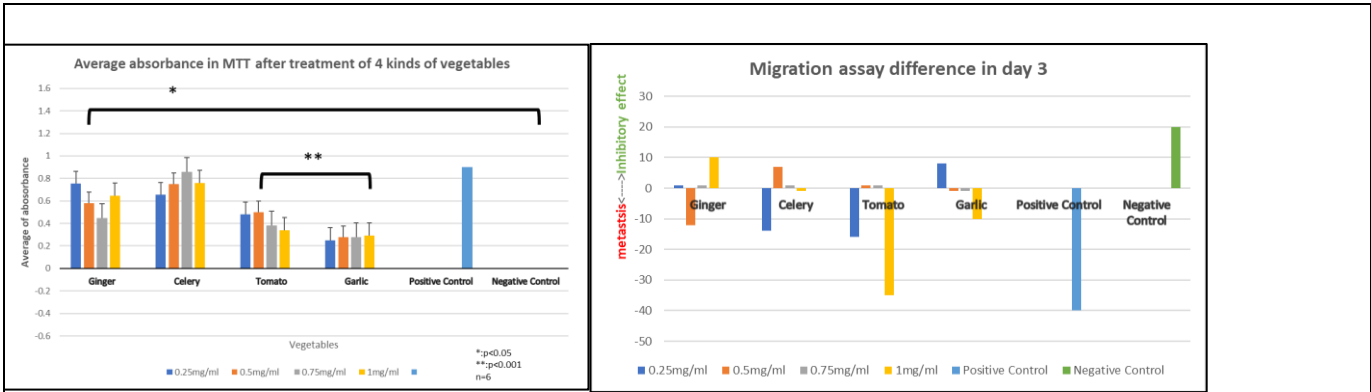
- List out the materials used
- Describe the **experimental protocol** including the set-up of **control experiment** (if any), **repeated experiment** (if any), and its scientific theory
- Indicate with the support of reasons, the **analysis** used in the investigation

Pre - test

In order to observe a higher quality of the results , a series of pre - tests and preparation were done .

<p>1.Cell counting and accurate cell seeding</p>  <p>Cell suspension with trypan blue stain</p> <p>Hemocytometer Cell counting under the microscope</p>	<p>2. Preparation for vegetable juice aqueous extract</p>  <p>Vegetable juice</p> <p>Put the juice into a centrifuge tube</p> <p>Centrifuge 1400 rpm, 5 mins</p> <p>Super-latent collected</p> <p>1st filtering</p> <p>2nd filtering</p> <p>1 vegetable extract is collected. Then, - repeat 3 more times for other type of vegetable.</p>
<p>3. MTT Assay :</p>  <p>Concentration: 0.25 0.5 0.75 1.0 mg/ml</p> <p>ginger</p> <p>celery</p> <p>tomato</p> <p>garlic</p> <p>Phosphate-buffered saline (PBS)</p> <p>Control</p>	<p>4.Migration Assay:</p>  <p>Concentration: 0.25 0.5 0.75 1.0 mg/ml</p> <p>ginger</p> <p>celery</p> <p>tomato</p> <p>garlic</p> <p>Phosphate-buffered saline (PBS)</p> <p>Control</p>

V. Results



A high difference indicates a better ability to prevent the spread and growth of hepatic G2.

According to the above bar chart of the migration experiment, ginger in 1mg/ml concentration performed the best. It was able to lengthen the gap between hepatic G2s after 3 days of migration assay. Which means that it is able to prohibit the growth and the spread of hepatic G2. (This effective ability was contributed by curcumin in ginger. Curcumin has the ability to anti oxydixation and anti inflammatory. Also, ginger contains Vitamin B3, B6 and C as well as zinc and protein which may contribute to its ability in preventing the spread of hepatic G2 cells or even kill it.)

VI. If your team will compete the Sustainable Development Award, please indicate the specific sustainable development goal the project is related to, and provide justification for competing for this award. (Word limit: 300 words)

About good health and new trend of living style of healthy eating with more vegetables. If by eating low cost of the vegetables could help reducing the chance of hepatic cancers , it is of hope that it could decrease the medical burden to Hong Kong.

VII. If your team will compete the Social Innovation Award, please list the target group or social issue the project focuses on, and provide justification for competing for this award. (Word limit: 300 words)

In Hong Kong, around 32.9 males and 10 females per 100k population died because of liver cancer, causing a total of 1530 people died just because of the cancer. It shows how serious cancer is affecting our health and life. Liver cancer was the third most leading cause of death in the world, around 830k people died because of liver cancer. Food therapy has become a new trend of maintaining good health or curing diseases. Some methods are discovered to cure hepatic cancer with only eating vegetables. It is hoped that hepatic cancer patients can cure the disease with the aid of the discoveries.

VIII. Conclusion

According to the experiment results, garlic in 0.25mg/ml concentration performed the best among all. Garlic has the best inhibitory effect against Hepatic G2 cells. Tomato comes right after garlic, its concentration in 1 mg/ml concentration also has the second highest inhibitory effect against Hepatic G2 cells. It is hoped that people will eat these vegetables as food therapy.

□ Our project is developed based on previous project and the enhancement is below: