INVESTIGATION INTO THE CYTOXICITY OF FLAVONOIDS ON MAMMALIAN CELLS

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Introduction

Flavonoids are polyphenol antioxidants that can be found in plants, herbs and fruits. They usually function as powerful antioxidants and play an important role in our metabolism. Identification of what types of flavonoids are cytotoxic to mammalian cells involves a number of procedures before being able to obtain the final result. This includes the extraction of essence from the selected test samples and exposing them to the mammalian cells. Another test conducted involves exposing the various food extracts to the control bacteria to test for its anti-bacterial effect.

Abstract

The purpose of this project is to identify what kind of food substances are toxic to the growth of living cells. We conducted two experiments and the two experiments involves the use of different categories of food extracts, ranging from herbs, vegetables and fruits, that are spread over a plate of agar with bacteria cells and a 96-well plate with cultivated mammalian cells. Thereafter, we will observe whether a zone of inhibition forms on the agar plate after a day and the number of cells which died in the 96-well plate. If there is a zone of inhibition, it means that the compound is an effective anti-bacterial agent. If the cells in the 96-well plate do not stay alive, it proves that the compound is cytotoxic to mammalian cells. We can deduce which compounds aids in cell growth or which are toxic through conducting these experiments. The results for mammalian cells show that prunella does not promote cell growth and hence is toxic to cells and the results for bacteria cells show that tea, grapes and oranges has anti-bacterial effects.

Hypothesis

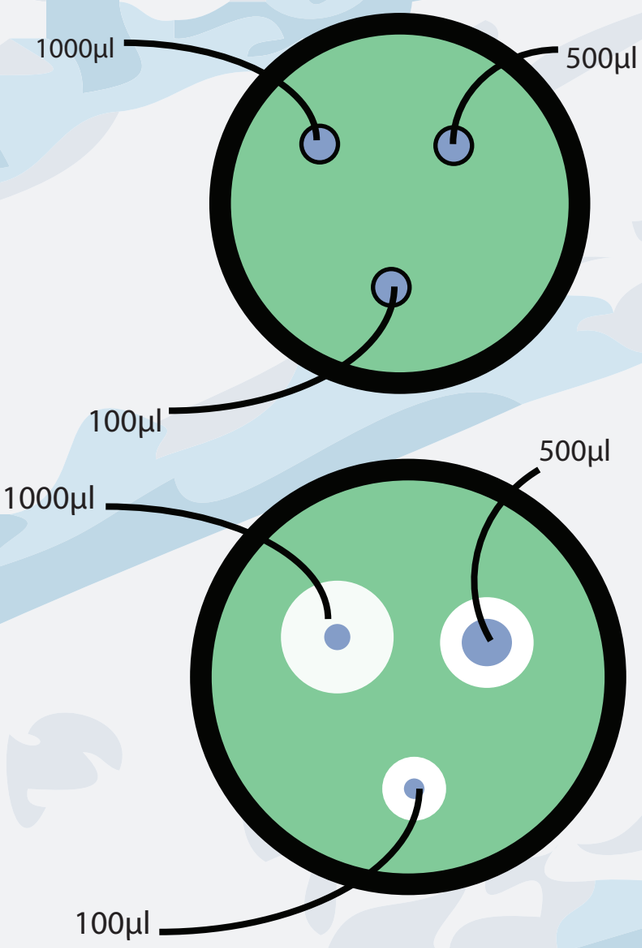
We predict that vegetable, fruit and herb extracts will not inhibit the growth of cell and instead, promote the growth of the cells. The more concentrated a test sample is being placed on the bacteria cells, the greater the zone of inhibition.

Test Samples Used

1. Ginger 2. Carrot 3. Cabbage 4. Green Pepper 5. Chye Sim 6. Orange
7. Kiwi 8. Tea 9. Wolfberry 10. Prunella 11. White fungus

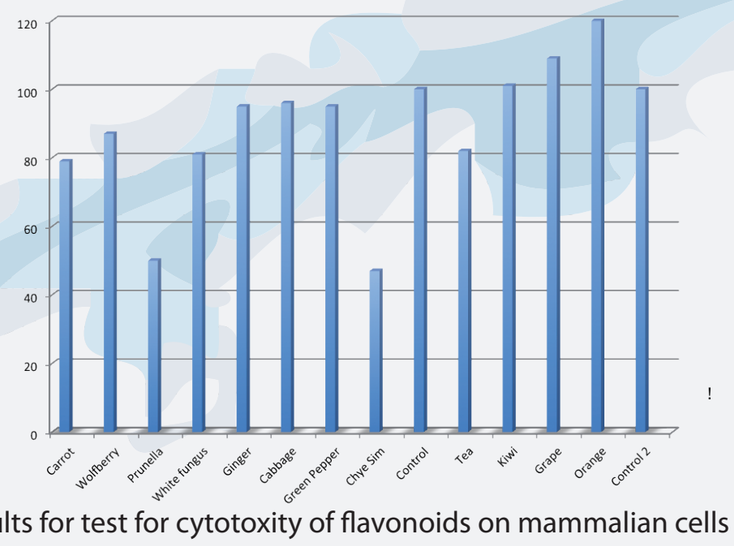
Tests on determining anti-bacterial effect of food extracts

Three mini filter discs were placed in each petri dish (labelled 100µl, 500µl and 1000µl by the number of dots respectively). 100µl, 500µl and 1000µl of the food extracts were placed on the respective filter using a micropipette. For every 100µl of extract placed on the filter disc, it is dried in the incubator at 60°C for 5 minutes. This was repeated until the filter discs have reached the specific concentration of extract it was supposed to contain. All three mini filter discs containing the same dried extract are then placed on the bacteria lawn. The bacteria dishes were kept at an environment with room temperature to allow bacteria to grow. After incubation, the diameter of each clear zone around the filter discs were measured and recorded.



Determining cytotoxicity of test samples on mammalian cells

Using the 96-well plate, 1/2 dilution, 1/4 dilution and 1/8 dilution of food extracts were placed into it under correctly labelled well.
The resulting 96-well plate was then transferred to another 96-well plate that contained the mammalian cells.
The 96-well plate was then viewed under the microscope to determine if the cells were alive or dead by counted using a cell counting kit.



Results for test for cytotoxity of flavonoids on mammalian cells

Conclusion

Based on our experimental findings the flavonoids in the chosen fruits, vegetables and herbs, with the exception of chye sim and prunella, have proved to be non-cytotoxic to mammalian cells and also, orange, grape and tea have the ability to act as an effective anti-bacterial agent which can be used in various industries that are looking into more natural, enviromentally friendly antimicrobials, antibodies and even as crop protection agents. This has led to our deduction that most fruits, vegetables and herbs are healthy. For future experiments, we suggest to include a wider variety of food samples and
repeated experiments, to repeat the experimets at least twice. This is because with a wider variety of food samples and repeated experiments, the results obtained will be more accurate.

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