Life Science Research Plan Document

Rationale/Goal

For this section, copy down the first part of your Project Proposal, from "General Area" through "Goal" (includes: general topic, specific problem, and goal)

Humans have been taking vitamin supplements since the early 1940's when they first became available (National Institutes of Health, 2015). The topic of this project is vitamin C supplements which are important because although vitamin C is FDA regulated, this only means it is safe *until* proven unsafe by serious harm such as death, injury or liver damage (Marcus, 2015). Most consumers are not aware of this and continue buying vitamin supplements, making it a multi billion dollar industry (Marcus, 2015). People need to know if they should continue buying vitamin C or if it is better to just eat the actual fruit.

Vitamin C was chosen for this study because it is required for the synthesis of collagen, and it is an important structural component for connective tissue, blood vessels, tendons, ligaments, cartilage, gums, skin, teeth and bones (Engel, 2010). Without vitamin C we would not be able to function properly. However, even though Vitamin C is important to our bodies, our bodies do not actually produce vitamin C. This is why we have to consume Vitamin C through food. There are several fruits and vegetables with high vitamin C content including strawberries, oranges, grapefruits, kiwifruits, mangos, sweet red and green peppers, cauliflower, green peas, and broccoli. (Engel, 2010). For this study, kiwis will be tested because Kiwis contain 137.2mg, about twice as much mg than a stereotypical medium sized orange with a 69.7mg (Mattheis, 2013).

Dietary supplements are a $40 billion industry worldwide (Marcus, 2015). This means that many people prefer the easy route of taking vitamins over eating healthy; about half the american population (Swift, 2013). My question: What has the most vitamin C, supplements or a kiwi?

Hypothesis/Engineering Goal

"I predict that if the [Independent Variable] is ___, then the [dependent variable] will __."
OR: "How can I design a ____ in order to ____?"

I believe one kiwi fruit serving has more vitamin C over vitamin C supplements because even though supplements claim to have more *mg* the potent of them diminishes with time (Ddrops, 2015).

Materials

List the materials you will use in your experiment. You can use bullet points for this section.

- Pencil
- Graphing Paper to record data
- Burette
- Pipette, graduated
- Pipette filler
- Fruit juice sample (Kiwifruit)
- Vitamin C solution, 1%
- DCPIP solution, 1%

Procedure

Explain the procedure you will use to test your hypothesis. ***This does not need to be 100% perfect, a rough outline is fine.*** *However, you need to for sure include any steps that may be dangerous and/or need ethical consideration. You can simply list the steps.*

Preparation

A. Make up a 1% solution of vitamin C with 1 g of kiwifruit juice in 100 mL ; this is 10 mg/mL.
B. Make up a 1% solution of DCPIP with 1 mL DCPIP and fill to 100 mL with water.
C. Make up a 1% solution of ascorbic acid with 1 mL vitamin c and fill to 100 mL with water.
D. Make up a 1% solution of vitamin C (pill) with 1 g of the pill powder in 100 mL ; this is 10 mg/mL

Investigation (part 1)

E. Pipette 2 mL of kiwifruit juice solution into a test tube.
F. Using a graduated pipette or a burette, add 1% DCPIP drop by drop to the vitamin C solution. Shake the tube gently after adding each drop. Add DCPIP solution until the blue colour of the final drop does not disappear*.
G. Record the exact amount of DCPIP solution that was added.

H. Repeat the procedure two more times and calculate an average result.

I. Multiply data to equal 1 kiwifruit serving (2 whole medium sized kiwi fruit equals 1 serving)
J. Calculate the amount of vitamin C in the standard solution in mg/mL. Calculate how much vitamin C there is in the kiwifruit.

*If more than 5 mL of DCPIP are completely decolourised, dilute the fruit juice and repeat the test. If the fruit juice has a strong colour that will interfere with determining the endpoint, dilute the juice before testing.

Investigation (part 2)

K. Repeat steps E-I for the vitamin C pill solution
L. Compare 1 serving kiwifruit mg data to 1 vitamin c pill mg from Alive! Brand
M. Record data onto a graph

One way error will be reduced is by measuring the chemicals with the same instruments.
Another way error will be reduced is by only focusing on one fruit instead of many.

Safety

One way risks will be reduced in my testing is by wearing gloves when handling chemicals. Another way safety will be maintained is by wearing goggles to avoid accidental chemical splashes.

Data Analysis

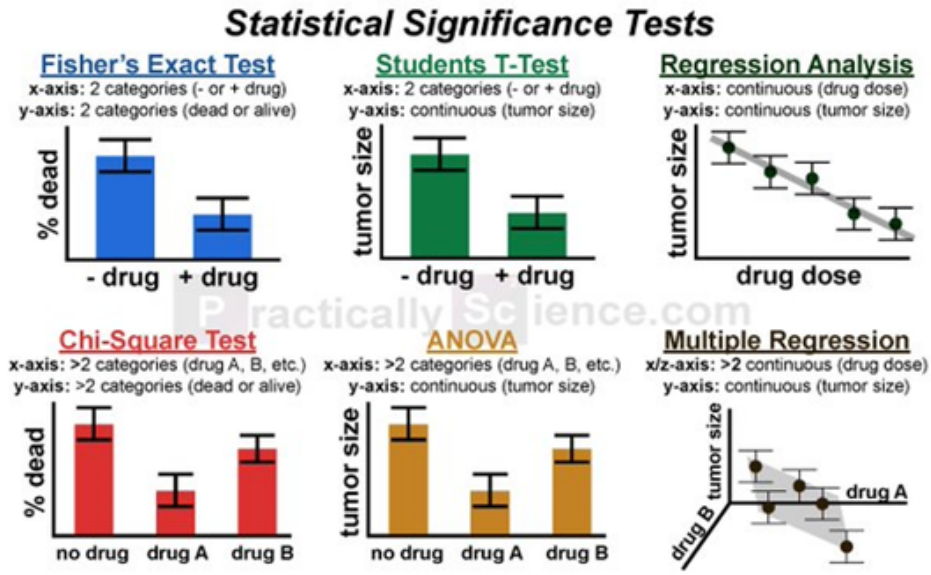
Continuous Variable: fits on a number line, has an infinite number of possibilities (ex. Size of tumor, height of person, length of time, speed, distance, etc.)
Categorical Variable: Does not fit on a number line, has only a certain number of possibilities. If you are *counting* the number of something, it is probably a category. (ex. Dead vs. Alive, Positive vs. Negative, Pictures vs No Pictures, etc.)

Independent Variable of Your Experiment (what you're changing): Source of Vitamin C (fruits vs supplements)

Is this variable continuous or categorical?: Categorical

Dependent Variable of Your Experiment (result you're measuring): Amount of Vitamin C

Is this variable continuous or categorical?: Continuous



Use the image above to help you decide the type of graphs you will use to represent your data and the statistical test you will use to analyze your data. (Do not worry about understanding the statistical tests. We will learn them later, just **identify** which one you will use based on your variables.

*"I*n my data analysis, I will use a bar graph to represent my data and a Students T-Test to analyze my data because my independent variable is categorical and my dependent variable is continuous.

More specific on why i picked vitamin c (rationale)

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