**Effects of Panax ginseng extract on Alzheimer’s Disease patients through Paralysis Assay of CL4176 (Amyloid-Beta Protein Transgenic) C. elegans.**

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### INTRODUCTION

We will be testing the effects of Panax ginseng on Aβ toxicity in Alzheimer’s Disease patients, looking for a method of alleviating symptoms. To do this, we will be testing these effects by using engineered transgenic C. elegans as a model for Alzheimer’s Disease. We collected evidence indicating that there is a significant effect of ginseng in alleviating symptoms in C. elegans.

### BACKGROUND AND SIGNIFICANCE

Alzheimer’s is a prevalent disease affecting more than 5 million people in the united states. It causes eventual brain decay to a point where certain common functions can no longer be performed (D). While it is known to be a neurodegenerative disease, the true root cause is still debated. The three most prominent hypotheses are the Cholinergic Hypothesis, Amyloid Hypothesis, and Tau Hypothesis (A). We will be building off of the amyloid Hypothesis, which states that the primary cause of AD is from an over accumulation of beta-amyloid peptide plaques in brain tissue.

Panax ginseng is a root, often classified under Chinese Medicine, that has been used for centuries to treat many diseases and injuries. Recently, there have been results showing many neurological benefits from Panax Ginseng, such as maintaining homeostasis, and such as anti-inflammatory, anti-oxidant, anti-apoptotic, and immunostimulatory activities. Some studies show that AD patients who take significant Panax Ginseng treatments tend to perform better on AD rating tests after the treatment period; there is also evidence that the pharmaceutical components of ginseng, ginsenosides, have the potential to lower Aβ (beta-amyloid) levels and toxicity (C).

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Alzheimer’s disease, the most common cause of dementia in older people, is characterized by progressive loss of neurons in AD patients.

There have been some previous studies on the effect of Ginseng Extracts on AD Patients (in vivo). Korean red ginseng powder showed significant improvement on the AD assessment scale, the mini mental state examination scores, and the clinical dementia rating after 12 weeks of ginseng therapy compared to the control group. Furthermore, the extract showed significant prevention of memory loss in SAMP8 mice.

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### RESEARCH METHODOLOGIES

#### 1. Previous research methods

Many laboratory experiments using transgenic rats have shown that treatments with Panax Ginseng extracts have led to improvements in memory (E). Previous studies have also studied the effects of coffee on Aβ peptide expressing C. elegans, where C. elegans exposed to coffee exhibited a decrease in their rate of paralysis (F). This implies that coffee, or some substance in coffee, could reduce the severity of Alzheimer’s Disease.

#### 2. Research Methodology (Procedure)

**General Timeline (total time: ~12days):**

- **Day 1:** Make big plates - Use NGM on 10 cm petri dishes to create large plates in order to pick adult worms. We added solutions of C02 and M9 and some cultures of OP50.
- **Day 2:** Chunk the worms from the original plates onto the large plates made prior. The worms will then be allowed to grow into gravid adults.
- **Day 3:** Pick the gravid adults off the large plates and plate them on separate large plates, so that the ages of the worms are synchronized. The worms will then be given 7 days for an egg laying period.
- **Day 6-9:** Make smaller plates (at least 3 caffeine, 3 ginseng, 3 control). This step will take two days total. One day is required for the NGM to solidify, and then another day is required to spread the treatment group extract (either coffee or ginseng).
- **Day 10:** Remove “second day” progeny and put them on new plates to grow worms to use for paralysis assay. We did this step through a bleach solution that effectively gave us a standard solution of just C. elegans eggs. Place the plates in an incubator for 16 degrees C.
- **Day 12:** Ushp气势 the temperature to 25 degrees in order to begin the paralysis process.
- **Day 13:** Perform the paralysis by periodically (every 2 hours) use a worm picker to count the number of paralyzed worms, and record the percent of worms that are paralyzed.

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### DATA ANALYSIS AND RESULTS

#### 1. CL4176

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<thead>
<tr>
<th>Caffeine</th>
<th>Ginseng</th>
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After conducting a one-sided proportional t-test, there is less than 1% chance that the worms on the plates treated with ginseng reflect the worms on the untreated place. This result gives us statistically significant evidence to state that the Ginseng extract did affect the C14176 worms. Because this type of transgenic worm employs the beta-amyloid peptide plaques also found in Alzheimer’s disease patients, we can reasonably conclude that some of the chemicals found in the Panax ginseng extract have positive effects in alleviating symptoms of the disease. The plates treated with coffee were used as a positive control, while the untreated plates were used as a negative control.

### CONCLUSION

Ginseng does significantly reduce the rate of paralysis in Aβ peptide expressing C. elegans. No solid conclusions could be made about the distinction between the effects that ginseng and coffee have, however. Assuming that the effects of ginseng are the same in C. elegans as they are in humans, we can conclude that ginseng could reduce Aβ peptide toxicity in Alzheimer’s Disease patients, and could therefore be used as part of a treatment for the neurological diseases.

### ACKNOWLEDGEMENTS / REFERENCES

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**Works Cited:**


