Screening the Candidacy of Monosodium Glutamate as an Addictive Substance in *Drosophila melanogaster*

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Objective

Develop Nutritional Strategies to Combat Obesity

- **Economic Impact:** $147-210 Billion Annually (USA)
- **Morbidity:** 2.8 million Adult Deaths Annually (USA)
- **Co-Morbidity:** Diabetes, Hypertension, Heart Disease

Objective

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Top Ten Foods Containing Monosodium Glutamate (MSG)

1. Doritos(Frito Lay Company)
2. Chick-Fil-A
3. Pringles
4. KFC (Kentucky Fried Chicken)
5. Campbell's Soup Company
6. Ramen Noodles
7. Hidden Valley Ranch Dressing
8. LightLife's Veggie Hotdog and Tofu
9. Lean Cuisine
10. Plum organics

http://www.top10grocerysecrets.com/2015-07-20-top-10-grocery-store-foods-contain-hidden-msg.html

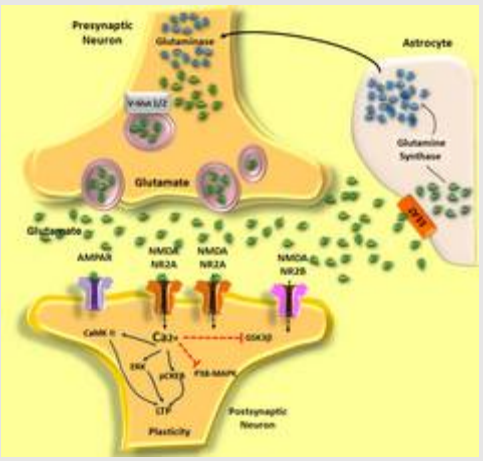
Hypothesis:

Consuming MSG on a Regular Basis will Result in a Physical Dependency on the Compound

Background

Properties of Monosodium Glutamate

- Enhances the flavor of food
- Converts into Glutamate *in vivo* (after consumption)
- Glutamate is an Excitatory Neurotransmitter
- Glutamate is also classified as an "Excitotoxin"

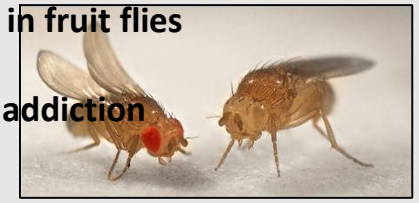


www.intechopen.com/books/neurochemistry/alzheimer-disease-the-role-of-a-in-the-glutamatergic-system

Background

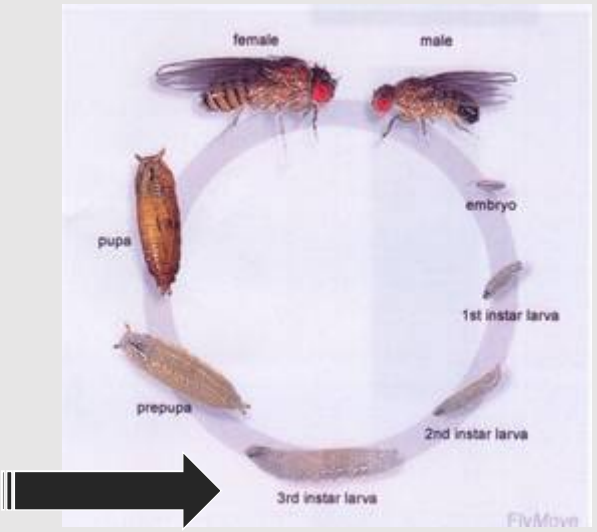
The Power of the *Drosophila* Model System

- Genome sequenced
- **70% of human disease genes have homologs in fruit flies**
- Short life cycle
- **Used as a model system to study diseases of addiction (example: alcoholism)**
- Inexpensive and easy to manipulate
- Sophisticated genetics
- **Used as a model system to study obesity-associated disorders**

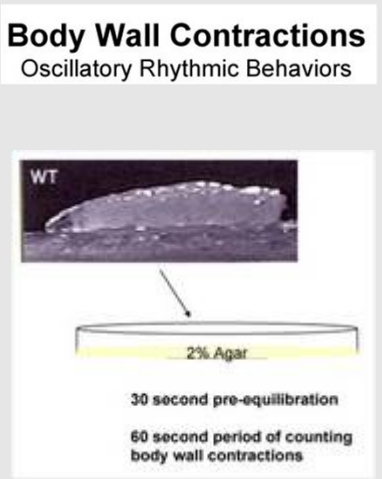


Background

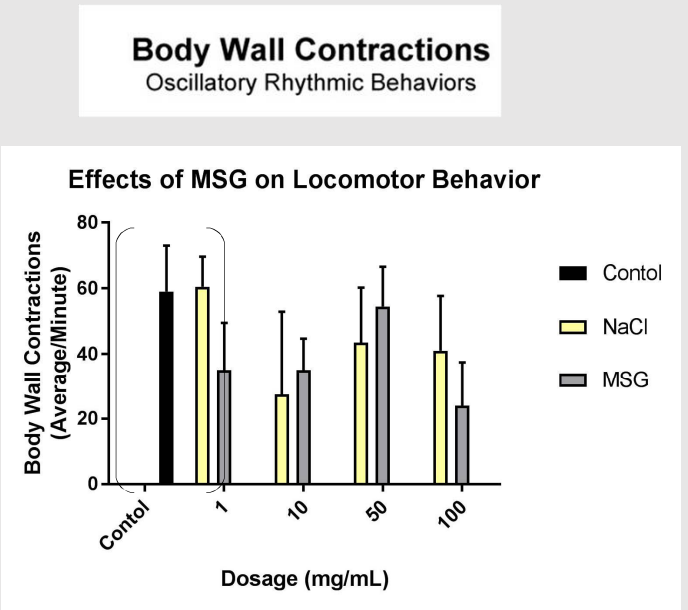
The *Drosophila* Life Cycle



Methods

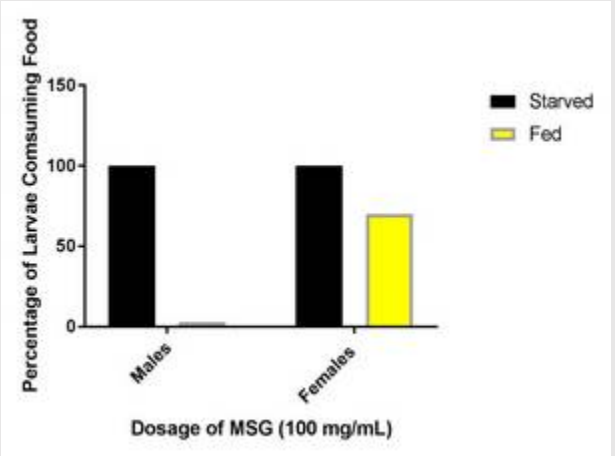


Results



Methods & Results

Starved and Non-Starved Female Flies Consumed MSG; This Behavior is Sex-Specific

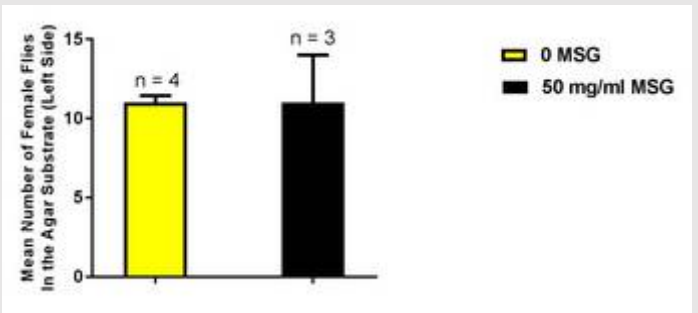


Methods & Results

Adult Preference Assays

1.5 % Agar

1.5 % Agar +/- MSG



Conclusion

- **1 mg/mL of MSG inhibits larva locomotion: this may be the "set-point" for the future drug addiction assay**
- **To determine whether 1 mg/mL MSG is preferred in the adult female flies**
- **Female will consume MSG !**
- **Adult *Drosophila* do not prefer MSG**

Future Directions

Completing Behavioral Assays

Immunolabeling Treated Tissues

Hypothesis Two:

Will Overconsumption of MSG lead to obesity?

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Thank You !

NSF – HBCU-UP

Did you Know?

Is MSG safe to eat?
FDA considers the addition of MSG to foods to be "generally recognized as safe" (GRAS). Although many people identify themselves as sensitive to MSG.

These adverse event reports helped trigger FDA to ask the independent scientific group Federation of American Societies for Experimental Biology (FASEB) to examine the safety of MSG in the **1990s.**

Any Questions?

https://www.fda.gov/Food/IngredientsPackagingLabeling/FoodAdditivesIngredients/ucm328728.htm

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Thank You !

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