



2012 LIFE Scholars Presentation

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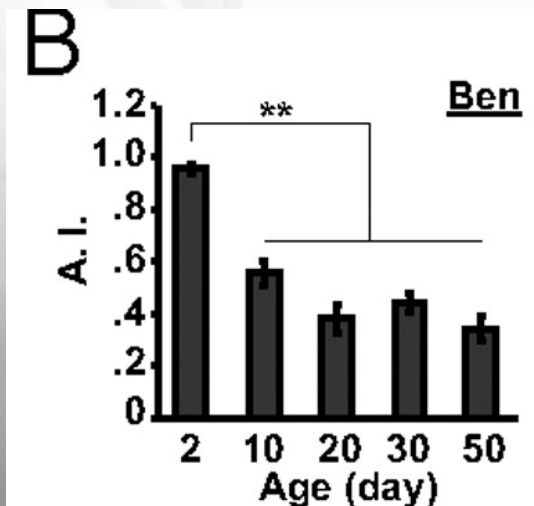
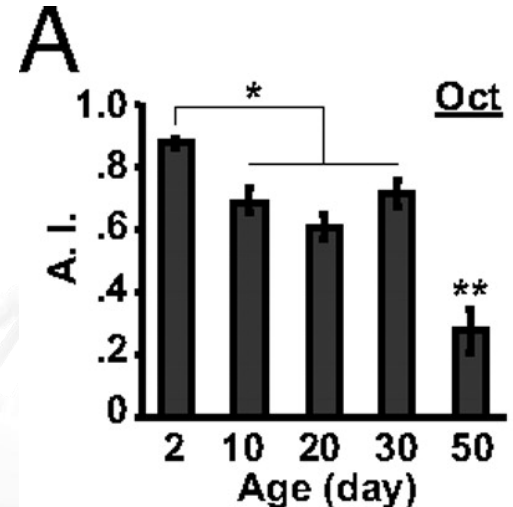
Background

Lab Focus

- Aging
- Circadian Biology

Biomarkers of Aging

- Dampened circadian oscillation
- Decline in climbing ability
- Decline in smelling ability: potential biomarker of brain function decline?



Pilot Experiment

Purpose 1

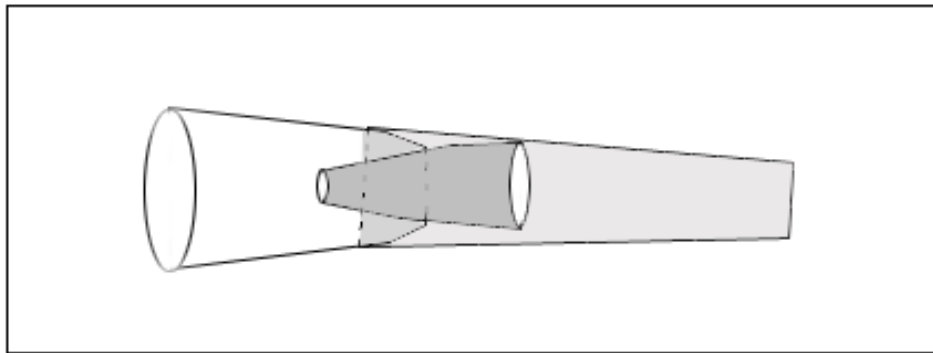
Examine changes in the sense of smell in aging flies

Rejected!

Older flies will require more time to find food due to decreased olfactory (smelling) function

Procedure

To test, flies were placed in petri dish "arena" with access to a food trap



Food Trap

Procedure

1. Rearing flies

Flies were grown at specific time intervals to ensure groups reached ages 35d and 5d simultaneously.

2. Starvation

Once flies reached target age, all were starved for 14h, the optimum starvation period for a one-day experiment

3. Transfer

Starved flies were immobilized by briefly cooling and were loaded into trap arenas

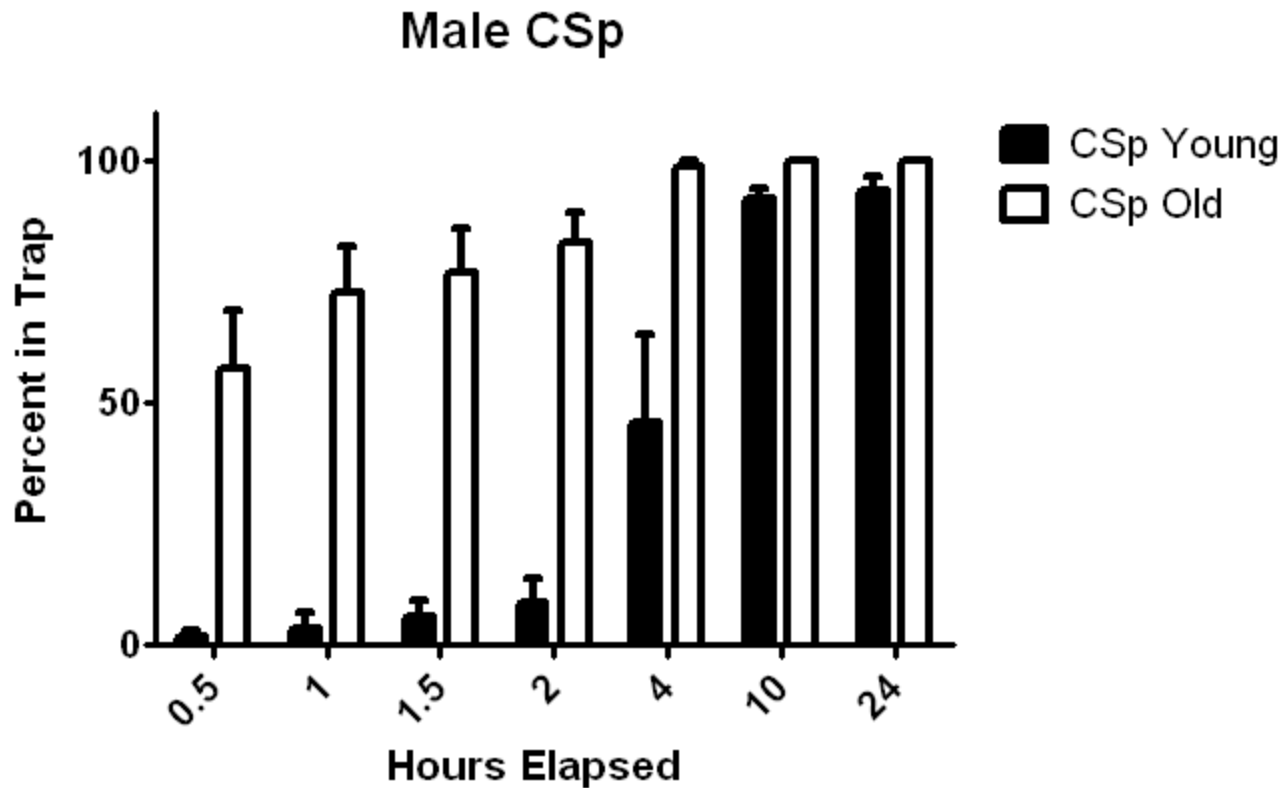
4. Observation

The number of trapped flies in each arena was recorded at half hour intervals for the first 2h, then again at 4h, 10h, and 24h



Results

As in pilot experiment, old flies located food more quickly than young flies



Possible Explanation

Older flies have smaller fat reserves to draw on, which reduces the length of time they can go without food before they initiate food search behavior.

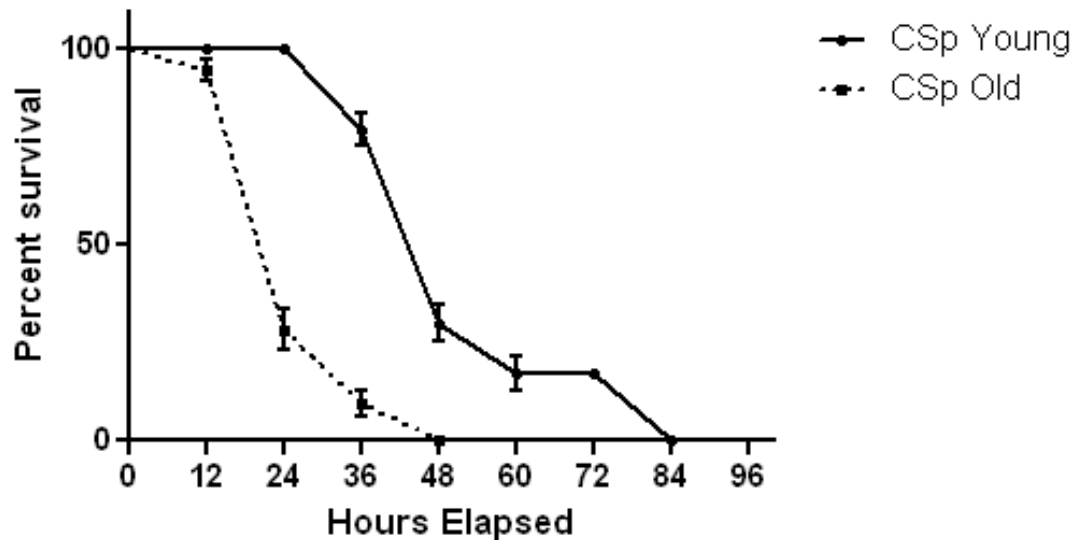
To Test:

1. Groups of old and young flies were loaded into agar (starvation) vials
2. Number alive and dead in each vial were recorded every 12h

Starvation Results

Results of starvation experiment agree with trap results.

Survival of CSp Males: Survival proportions



Young flies survived starvation significantly longer than old flies.

Experiment 2

Purpose

Compare the time required to locate food in young flies subjected to increased starvation duration

Hypothesis

Young flies starved longer will locate food more quickly

Procedure

Food trap procedure repeated, but with only young flies: one group starved 14h and another 25h

Starve 14h

Starve 25h

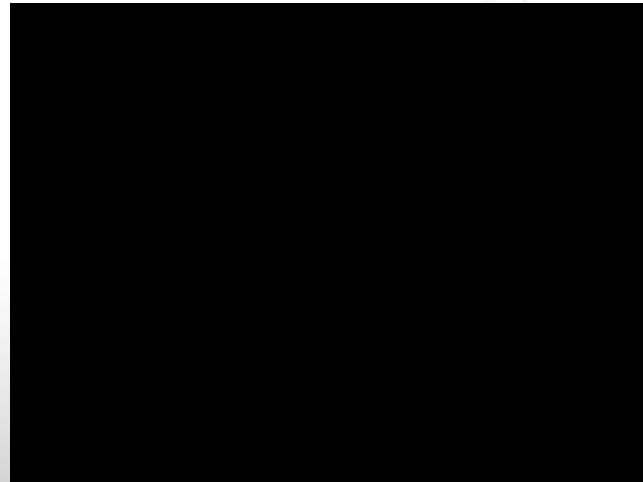
Transfer

Observe



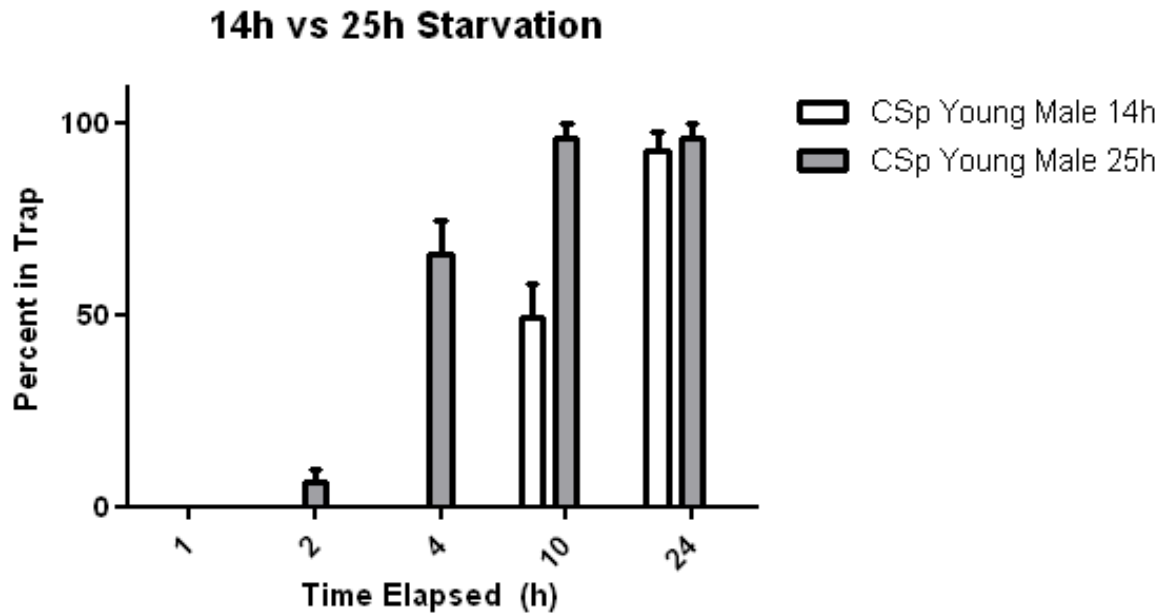
Results

Young flies starved for 25h found food more quickly than young flies starved 14h

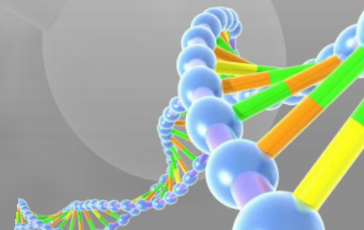


Results

Young flies starved for 25h found food more quickly than young flies starved 14h

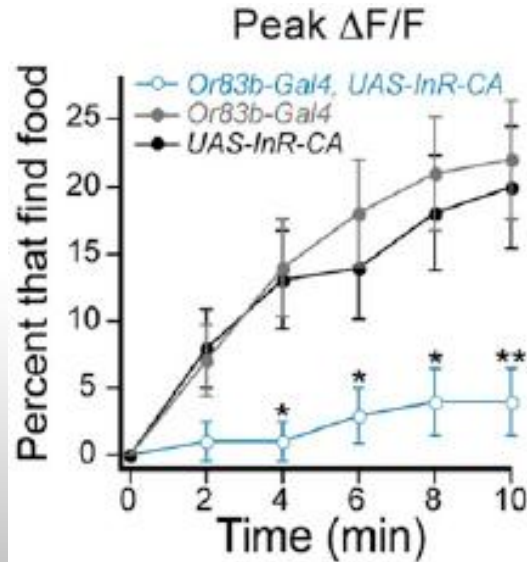


These results suggest that young flies require a much longer starvation duration than old flies before they initiate food search behavior.



Possible Explanation

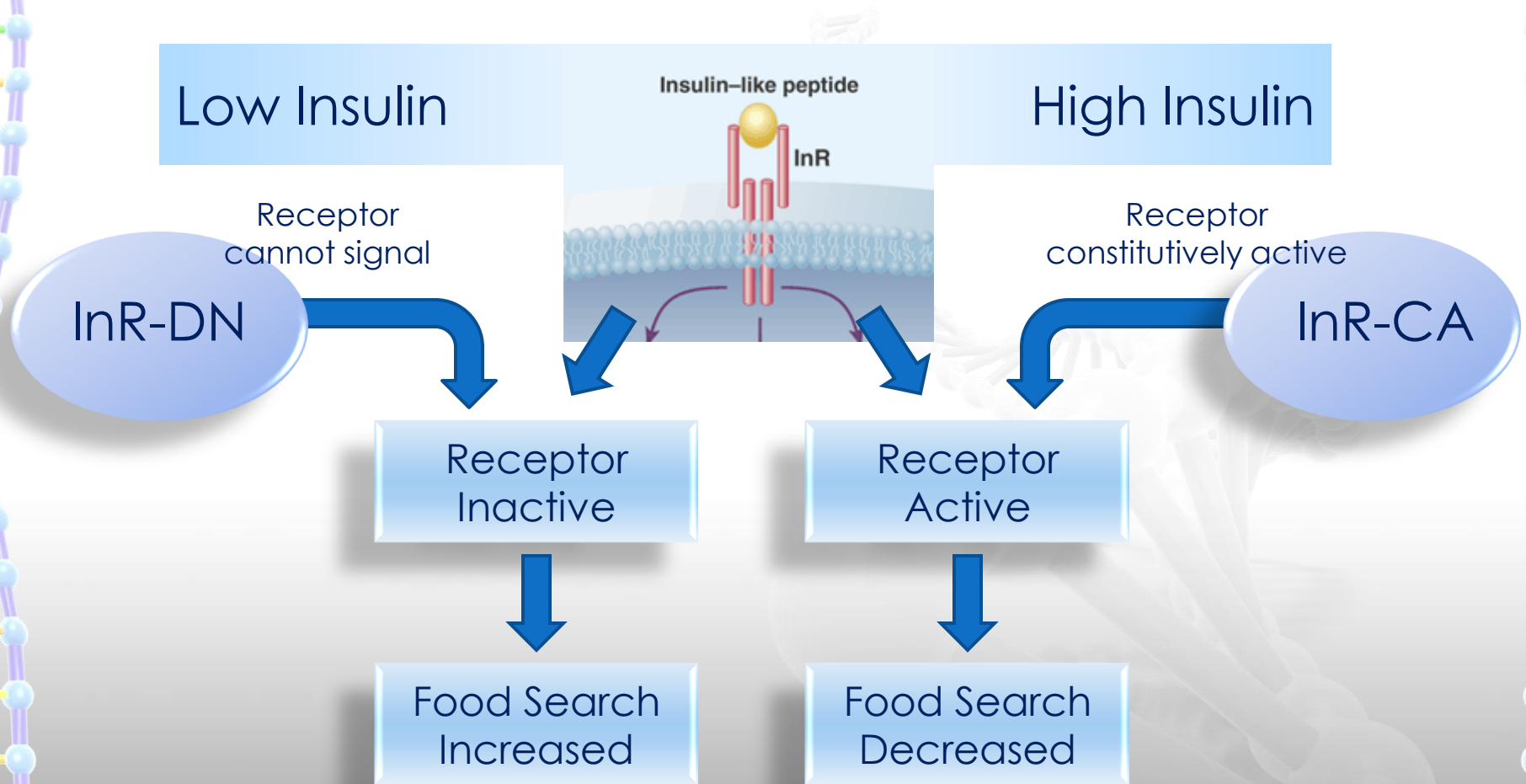
Food search behavior may be related to changes in insulin signaling.



Root et al, 2011

Research in young flies suggested that the insulin receptor in neurons that detect odors is the metabolic sensor that triggers food search behavior

Possible Explanation



Is a change in insulin signaling responsible for the faster initiation of food search behavior in old flies?

Next Experiment

Purpose

Examine food search behavior in flies with genetic mutations associated with insulin signaling

Hypothesis

Young flies with InR-DN will find food more quickly than wild-type control, while old flies with InR-CA will take longer than wild-type control

Procedure

Food trap procedure repeated with young and old flies of both InR-DN and InR-CA phenotypes.

References

Root, C. M. et al. (2011). Presynaptic facilitation by neuropeptide signaling mediates odor-driven food search. *Cell*, 145(1), 133-144.

Root, C. M. et al. (2011). Aging impairs intermediate-term behavioral memory by disrupting the dorsal paired medial neuron memory trace. *Neuroscience*, 109(16), 6319-6324.

