2012 LIFE Scholars Presentation
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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?

Tonoki and Davis, 2011
Pilot Experiment

Purpose 1
Examine changes in the sense of smell in aging flies

Hypothesis
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

Rejected!
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.

Young flies survived starvation significantly longer than old flies.
Young flies starved longer will locate food more quickly.

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

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

Starve 14h → Transfer → Observe

Starve 25h
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.

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

Root et al, 2011
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.