Greater Understanding of Lipids in *Caenorhabditis elegans* Exposed to Oxygen Deprivation

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Health Problems Related to Oxygen Deprivation

- Myocardial infarction
- Stroke
- Shock due to low blood pressure caused by vascular disease, inadequate heart function, or low blood volume
- Solid tumor cell resistance to radiation and chemotherapy
- Pulmonary disease and dysfunction
- Underdeveloped lung function in premature babies
- Anemia due to blood loss from severe injury or destruction of red blood cells

Stroke alone accounts for 1 out of every 15 deaths in the United States and is the third leading cause of death in most developed countries.
Research Approaches to Studying $O_2$ Deprivation

- Physiology
  - Sea turtles
  - Brine Shrimp
  - Diving Seals
  - Birds

- Cell Biology
  - Cell culture

- Genetic approach
  - *Drosophila melanogaster* “Fruit flyes”
  - *Caenorhabditis elegans*
Anoxia-Induced Suspended Animation

Embryos and larvae were exposed to either normoxic or anoxic conditions

Anoxia (<0.01 kPa oxygen in environment)

Question and approach to Evaluating lipids in *C. elegans* exposed to anoxia.

- **Hypothesis:** Oxygen deprivation affects lipid accumulation.

- **Approach:** Use the dye Nile Red to assay lipid/fat accumulation in *C. elegans*.
  - In *C. elegans* Nile Red is taken up and attaches to lipids in intestinal cells. Lipids are visualized using fluorescent microscopy.

- **Results:** Increased detection of lipids in worms exposed to anoxia.
  - This result leads to the question of whether lipids are important for anoxia survival.

Fluorescent microscopy can be used to assay lipids via Nile Red detection.
Nematodes Exposed to 1 or 2 days of Anoxia Accumulate Lipids as Seen by Nile Red Detection.

Size bar equals 100µm.
Comparison of Lipid Accumulation in Wild type (N2) and \textit{daf-2} Strains

<table>
<thead>
<tr>
<th>Normoxia</th>
<th>1 Day Anoxia</th>
<th>2 Days Anoxia</th>
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<tbody>
<tr>
<td>N2</td>
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<td>daf-2</td>
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Size bar equals 100\(\mu\)m.
• Lipid accumulation
  - Measure intensity
  - RNAi experiments
  - Viability

• Continue with *daf-2* experiments
  - RNAi experiments
  - Viability
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http://www.celegans.de/