Reproductive senescence is correlated with many deleterious health conditions, and in many species reproductive decline is associated with end of life. In human females, the decline of health associated with reproductive function is termed menopause. Previously, restoration of ovarian function was shown to increase mean lifespan (Peterson). In order to understand how ovaries contribute to longevity, we further studied the structure of ovaries. Within ovaries there are two types of cells:

- **Germ cells (oocyte)**: Play a central role in reproduction
- **Somatic cells**: Supporting cells for the germ cells

This experiment aimed to understand the relationship between germ cells and somatic cells and their role in expanding different aspects of health.

### Methods

1. Female mice of the CBA/J strain were used in this experiment.
2. Mice that did not undergo surgery served as controls.
3. Germ-cell containing ovaries from 60-day-old mice were transplanted into 12-month-old post-reproductive recipient females.
4. Ovaries from mice were transplanted as above with the exception that ovaries were germ-cell depleted prior to transplantation.
5. Health span was evaluated through established assays.

### Results

**Figure 1**: Very little change in mice 800 days apart in age.

**Figure 2**: GLUCOSE TOLERANCE TEST - AUC

<table>
<thead>
<tr>
<th>Age (months)</th>
<th>CTL</th>
<th>16mo CTL</th>
<th>16mo GD</th>
<th>16mo GC</th>
</tr>
</thead>
<tbody>
<tr>
<td>25mo</td>
<td>953</td>
<td>786</td>
<td>674</td>
<td>584</td>
</tr>
</tbody>
</table>

Area Under the Curve

- **GLUCOSE TOLERANCE TEST**: Area under the curve for the GTT increased with age and decreased with new ovaries. Germ cell depletion decreased this benefit by only 13%.
- **CTL=control, GC=received young ovary transplant, GD=received germ cell-depleted young ovaries.**

**Figure 3**: Musculoskeletal muscle testing with a grip test.

**Figure 4**: Metabolic changes in control vs. recipient mice

Mice were evaluated at 16 and 25 months. Body composition, cognitive behavior, and sensory function were evaluated. Significant health benefits were noted in germ-cell depleted mice. These included:

- **Metabolic function** was also evaluated. Glucose metabolic ability improved in young ovary recipient mice, both in germ-cell containing and germ-cell depleted ovaries.

### Conclusions

Current results revealed that mice receiving germ cell-depleted ovaries experienced restoration of health associated with reproduction, including metabolism, muscle strength, and overall body composition. Supplemental assays remain in progress. We expect remaining assays to further conclude germ cell-depleted ovaries restore health benefits similar to germ-cell containing ovaries.

These results hold promise for somatic cell hormone replacement therapy for treatment of menopause-related symptoms. Further exploration can be done in regards to treatment in humans.