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Introduction

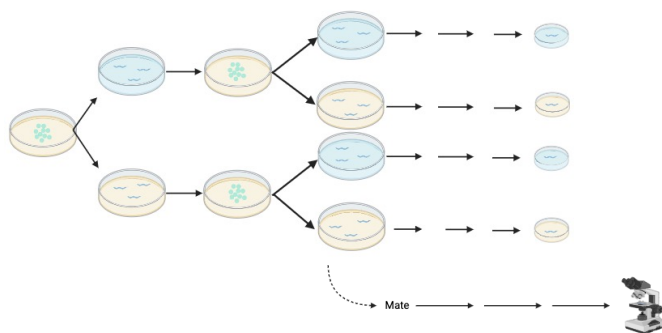
- Glucose can have detrimental effects on the body's systems including reproduction. It has been shown that a diet that is high in glucose can decrease the brood size and the size of the progeny themselves.¹
 - 'Fetal Origins of Disease Theory' suggests that the environment of the parents can impact the health of the offspring.²
 - *Caenorhabditis elegans* is used as a model for exploring mechanisms in biomedical research due to their short lifespans and their ability to be easily maintained in a laboratory setting.³

Hypothesis: Parental nutrition can impact the offspring's ability to cope with nutrient profiles and offspring are better suited to the environment of their parents.

Methods

Parent Generation Offspring Generation

Egg → 48h → L4-D2 → Bleach → Egg → 48h → L4-D2 → 48h → D2-D4 → 24h → D4-D5 → Mate



References

1. Wang, Xiong, et al. "Effects of excess sugars and lipids on the growth and development of *Caenorhabditis elegans*." *Genes & nutrition* 15.1 (2020): 1-18.
2. Law, C. M., Barker, D. J., Osmond, C., Fall, C. H., & Simmonds, S. J. (1992). Early growth and abdominal fatness in adult life. *Journal of epidemiology and community health*, 46(3), 184-186. <https://doi.org/10.1136/jech.46.3.184>
3. Brenner, S. 1974. The genetics of *Caenorhabditis elegans*. *Genetics* 77:71-94.

Results of Late Mating Assay and DIC Imaging

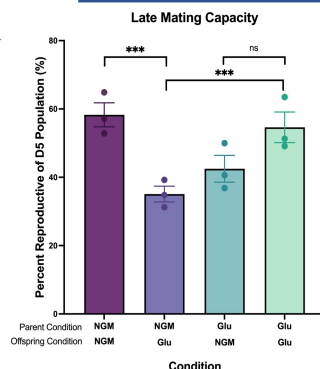


Figure 1. Late Mating Assay. Points indicate replicate values and bars indicate SEM values. Data was analyzed using a Cochran-Mantel-Haenszel Test. Significance between NGM/NGM and NGM/Glu, Glu/Glu and NGM/Glu using $p < 0.0167$. $n = 30-90$ per group.

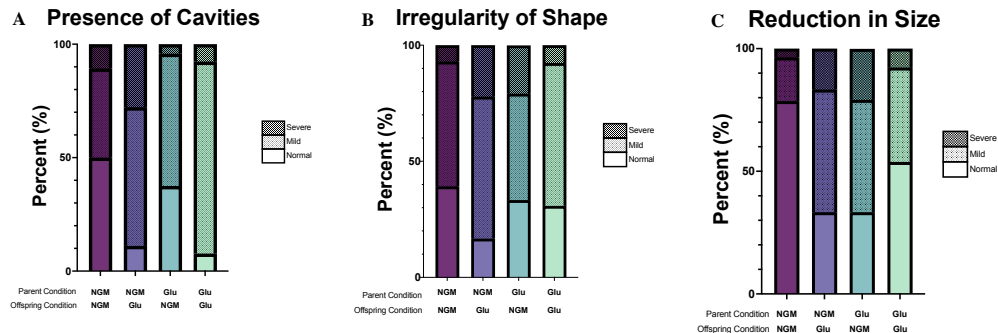


Figure 2. The quality of the oocytes was scored by three phenotypes: presence of cavities, regularity of the shape and size of the oocyte. In each category, oocytes were scored as normal, mild or severe. **A)** Healthy oocytes should have no cavities. The group that had largest percentage of normal oocytes remained on NGM for both generations followed by the group that transitioned from NGM to glucose between generations. **B)** Healthy oocytes are cuboid in shape. The group that had largest percentage of normal oocytes remained on NGM for both generations followed by the group that transitioned from NGM to glucose between generations. **C)** Normal oocytes occupy approximately half of the individual's body. The group that had largest percentage of normal oocytes remained on NGM for both generations followed by the group remained on glucose for both generations

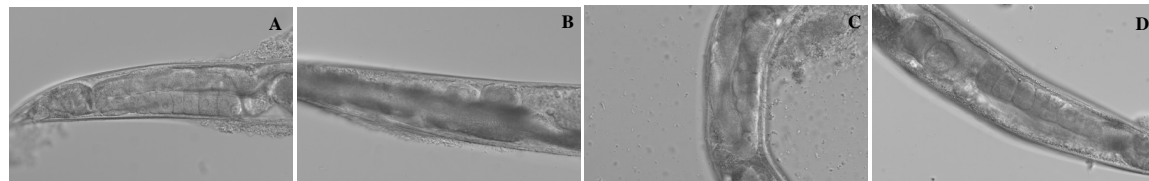


Figure 3. DIC images were taken to assess the quality of each of the four conditions. Representative images of the four conditions were chosen based on the scoring of the groups. **A)** Parent NGM, offspring NGM **B)** Parent NGM, offspring glucose. **C)** Parent glucose, offspring NGM. **D)** Parent glucose, offspring glucose.

Conclusion

- Exposure to glucose environments as an oocyte can benefit an individual's ability to cope with nutrient profiles as seen by the longer reproductive span the populations that remained on the same medium compared to those who were on a different medium than their parents. A similar trend can be seen in the oocyte quality analysis. Overall, these results lend support to the hypothesis.
 - To expand on this research, the experiment should be repeated with more replicates and should perhaps include mammalian models to better understand how these results could translate to humans.