



Observing the Role of DSL proteins in hair cell regeneration using *C. elegans*

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Background

Problem:

- Sensorineural hearing loss causes deafness in many individuals across the globe.
 - Caused by damaged sensory receptors called hair cells.
- Certain factors induce hair cell growth, others negatively regulate it, such as DSL proteins in notch signalling pathways.

Model Organism:

- *C. elegans* have similar pathways in their mechanoreceptors.
- In *C. elegans* the gene *lin-12* is responsible for creating DSL proteins.

Methods

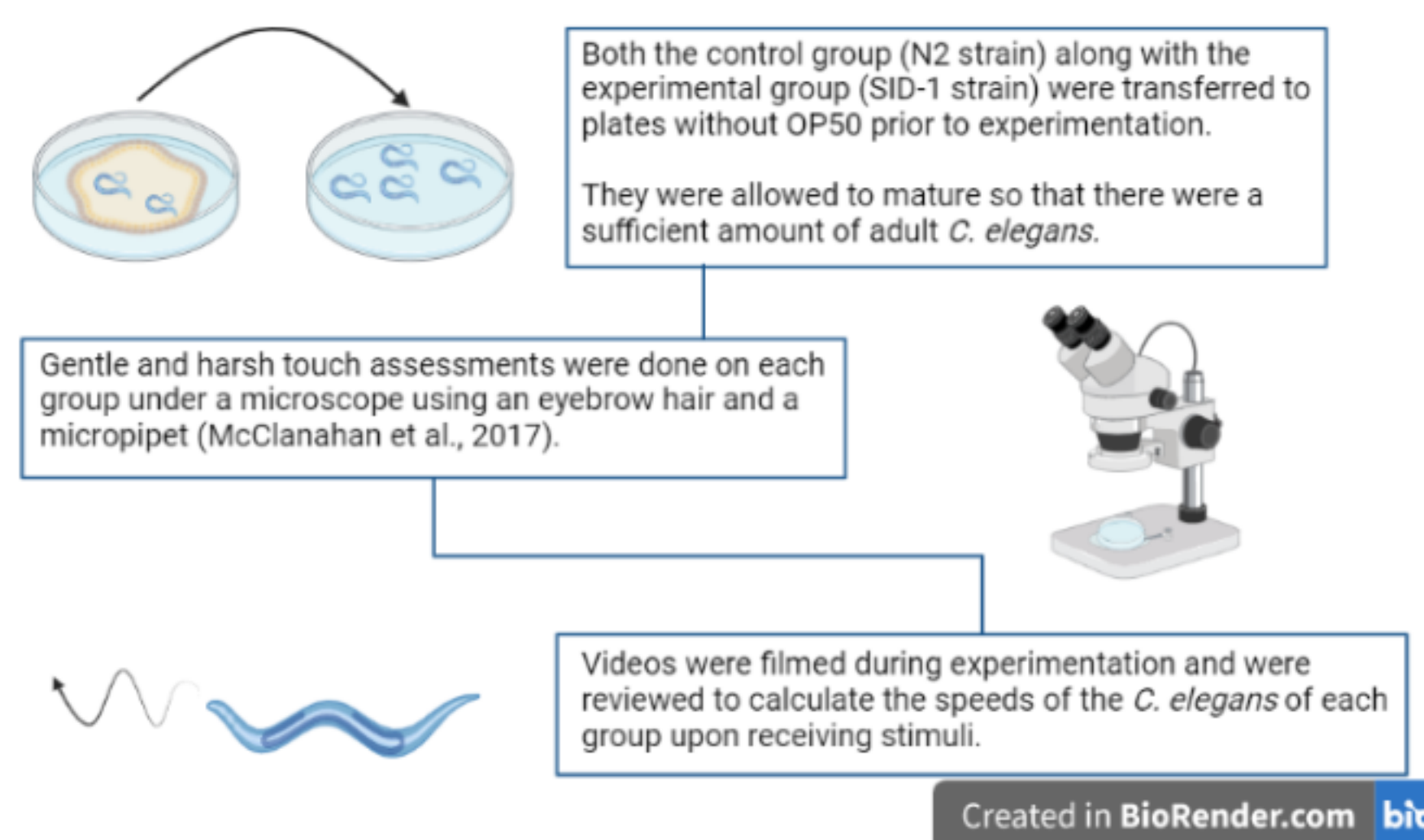


Fig 1: Methodology for research project. The calculations from the videos taken were made using the software ImageJ.

Research Question

How can the function of hair cells in the human cochlea be enhanced through gene therapy?

Hypothesis

The removal of the *lin-12* gene will allow more hair cell growth.

Results

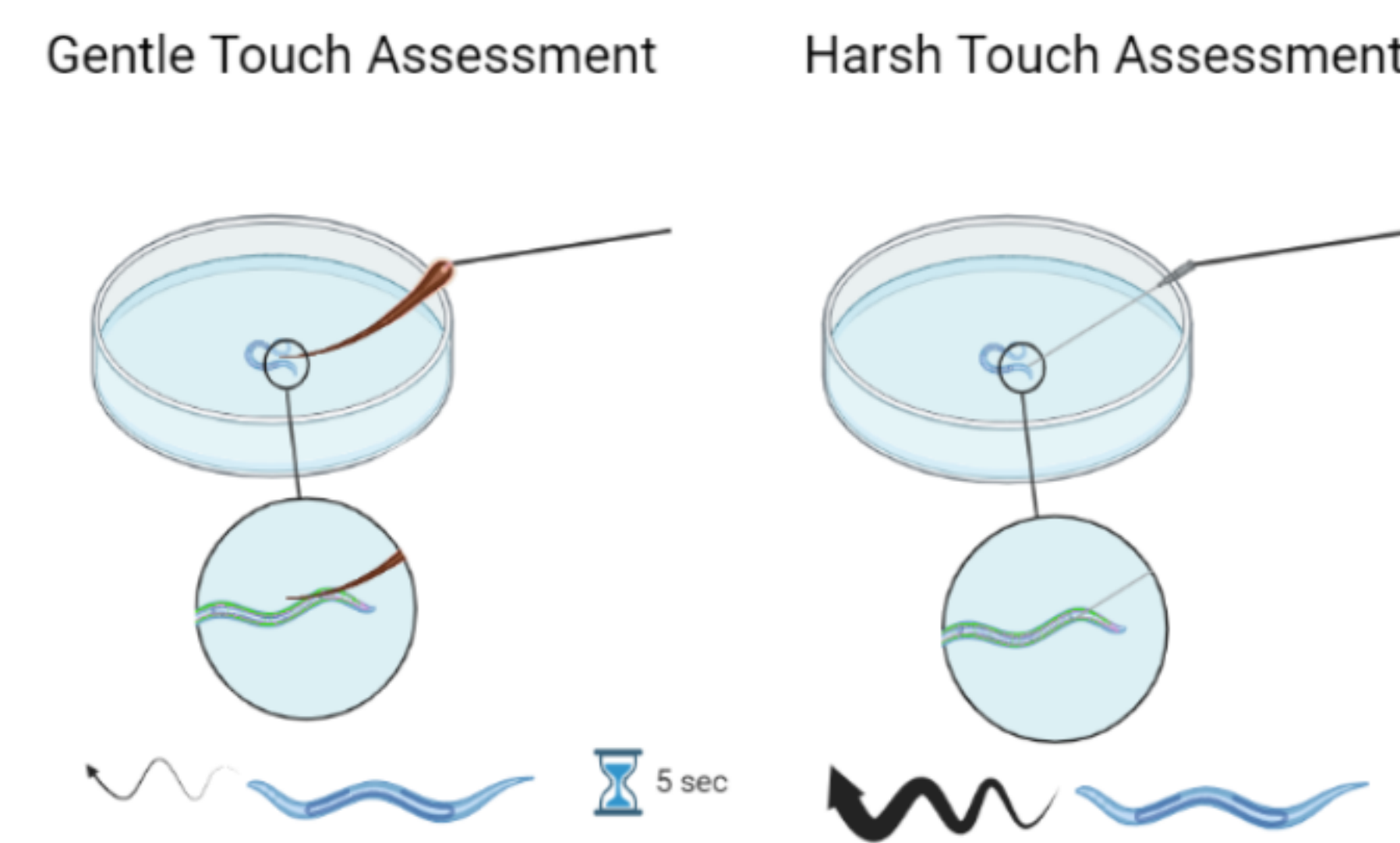


Fig 2: Graphical abstract of gentle and harsh touch assessments.



Fig 3: Two frames from a video taken during experimentation. The first frame shows a *C. elegans*'s location at 0 seconds (red) and the second at 5 seconds (blue), without stimuli received. The areas covered by only one color (either blue or red) were used to measure the distance traveled by the worm.

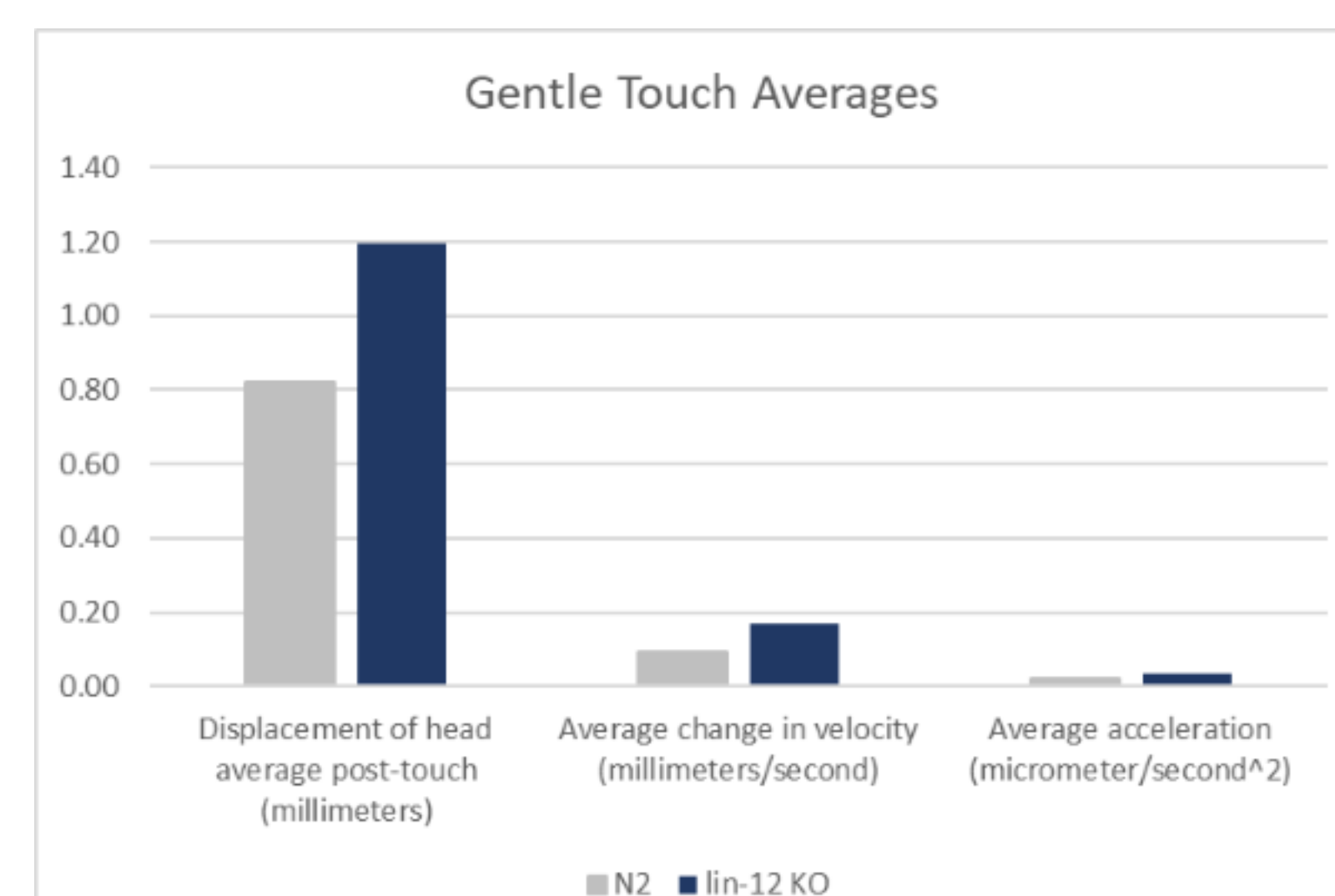


Fig 4: Graphs of average displacement post touch, average change in velocity, and average acceleration of N2 strain (grey) vs SID-1 strain (blue) for gentle touch assessments. The difference in average displacement after 5 seconds between the two groups was found to be slightly statistically significant (P-val<0.1).

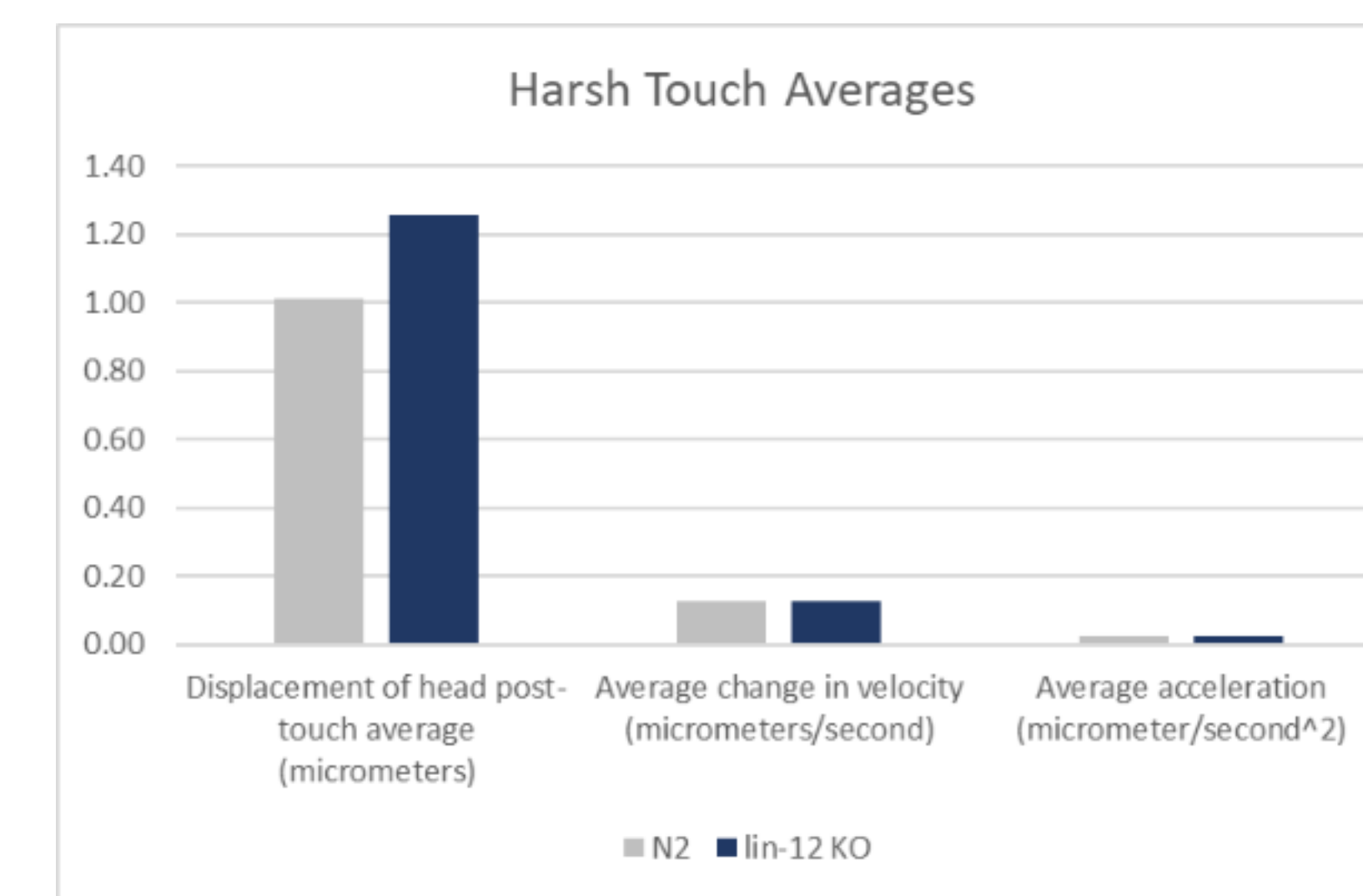


Fig 5: Graphs of average displacement post touch, average change in velocity, and average acceleration of N2 strain (grey) vs SID-1 strain (blue) for harsh touch assessments. The difference in average displacement after 5 seconds between the two groups was not found to be statistically significant (P-val = 0.3).

Conclusion

- The removal of the *lin-12* gene may increase mechanosensation efficiency.
- During the gentle touch assessment, the *lin-12* KO group almost reached their maximum speeds, and continued reacting at those speeds during the harsh touch simulation.

Future Extensions

- Measuring hair cell area on mice with and without *lin-12* homolog.
- Researching difference in levels of *lin-12* in hearing and deaf individuals.

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