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Identifying Chewing Alterations in a Parkinsonian Model

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Identifying Chewing Alterations in a Parkinsonian Model

Nicholas P. Zanghi, Taylor Good, Shivam Patel, Dr. Francois Gould

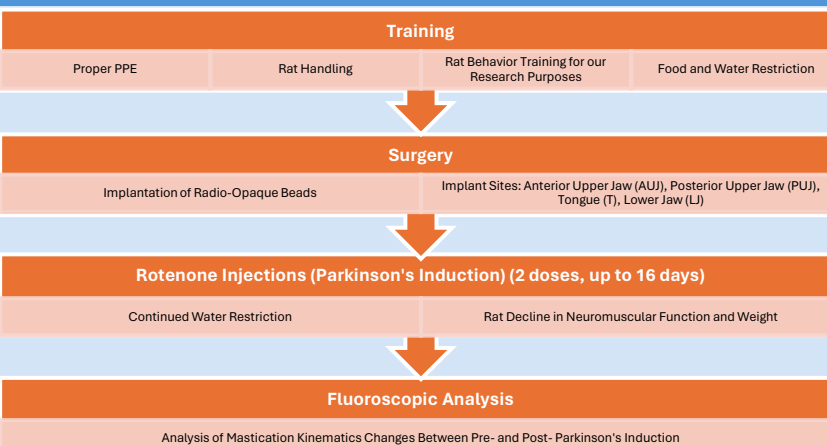
Background

- Patients suffering from Parkinson's Disease will typically experience a range of motor and nonmotor symptoms that affect individuals to varying degrees and with differing patient perceptions.¹
- It is a common neurodegenerative disorder that presents with characteristic signs such as pill-rolling tremor, stooped posture, and shuffling gait.
- Parkinson's symptoms can be remediated through treatment, yet, the disruption of oropharyngeal function is not responsive.
- Understanding the deficits it may induce in patients is key to developing the proper treatments.

Significance

- Dysphagia disables patients of meeting their most basic physiologic needs for survival, food and water (Defined by Maslow's Hierarchy of needs).
- With this in mind, we seek to lay the foundation for understanding mastication kinematics so that these important needs for the survival of humans can be understood and met with future treatment.
- This rotenone-induced rat model of Parkinson's Disease characterizes functional deficits in musculoskeletal swallowing dynamics.

Methods



Results

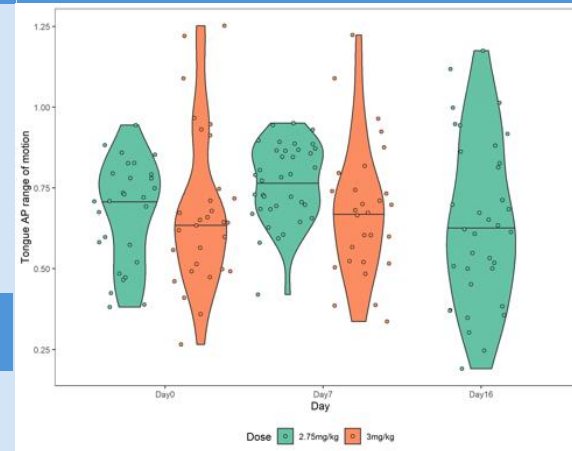


Figure 1. – Tongue anterior/posterior range of motion for Rotenone doses 2.75mg/kg and 3mg/kg

- Parkinson's induction (through Rotenone injections) demonstrated an increase in anterior/posterior range of motion of the tongue, regardless of dose.
- This finding was significant compared to baseline (rats before Rotenone injections).

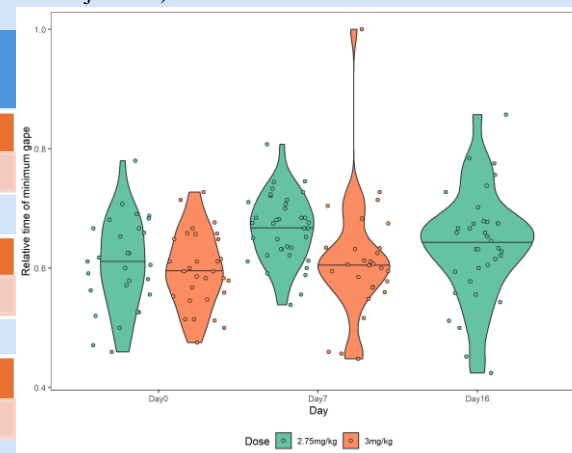


Figure 2. – Relative time of minimum gape for Rotenone doses 2.75mg/kg and 3mg/kg

- Parkinson's induction demonstrated a significant delay in jaw closure after Rotenone treatment.
- This finding was significant compared to baseline rats.

Other Findings

- No effect on chew cycle duration between different doses of Rotenone
- No effect of treatment time on chew cycle duration
- No impact of dose on jaw ROM
- Jaw range of motion is decreased after 16 days compared to before treatment
- No effect of dose or duration of treatment on timing of the tongue's AP position

Discussion

- Parkinsonian oropharyngeal dysfunction and weight loss was noted among the rats injected with Rotenone, indicating the method of induction was proper
- With Parkinson's we typically do not see an increase in range of motion whatsoever, therefore, the significant increase in the anterior/posterior range of motion of the tongue was unexpected
- An expected outcome of Parkinson's would be rigidity or tremor, therefore, the significant delay in jaw closure was expected

Future Directions

- Alter treatment duration
- Alter Rotenone concentration
- Utilize alternate measurements to assess oropharyngeal dysfunction

References

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