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### The Role of Food Accessibility in Weight Loss in a Rat Model of Parkinson's Disease

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## Introduction

Parkinson's disease (PD) is a progressive neurodegenerative disease that primarily affects movement in the human body. The swallowing pathology and neurological mechanism behind dysphagia in patients with PD remains poorly understood (Michou et al 2014). Patients with PD often show significant weight loss and signs of mal- and undernutrition (Kwon and Lee, 2019). Current treatments for PD have limited impact on dysphagia (Troche et al. 2014). Understanding the impact of dysphagia on general health of patients with PD is critical.

## Goal

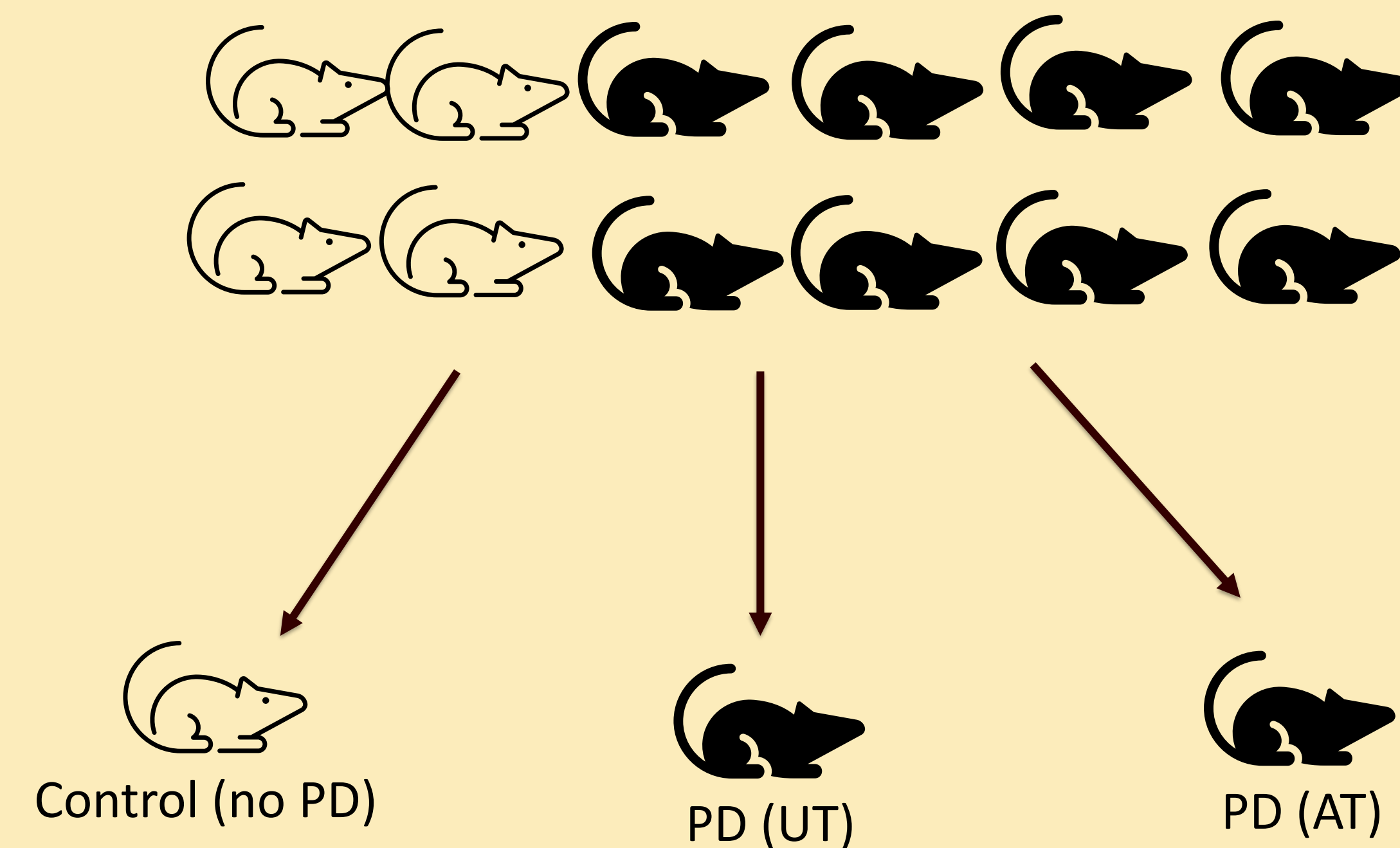
The goal of this project was to understand whether the weight loss seen with Parkinson's disease was due to the lack of being able to access the food because of the food placement or because of inability to chew the food due to degeneration of muscles required for chewing food.

## Materials/Methods

We induced Parkinson's disease in rats using daily rotenone (a pesticide) injections (2.75 mg/kg), which produces end state parkinsonian rats in 10 days (Cannon et al., 2009). We tracked and assessed swallowing kinematics using video fluoroscopy (Gould et al. 2018).

For my study specifically, the animals were divided into three groups: control, treatment with adjusted access to food (food on floor of cage), and treatment without adjusted access to food (food only in cage lid hopper). I collected weights of all the rats twice a day (once in the morning and once in the afternoon). Additionally, we collected swallow times during eating and drinking data on all rats throughout the 10 days from high-speed video fluoroscopic video

## Study Design



## Results

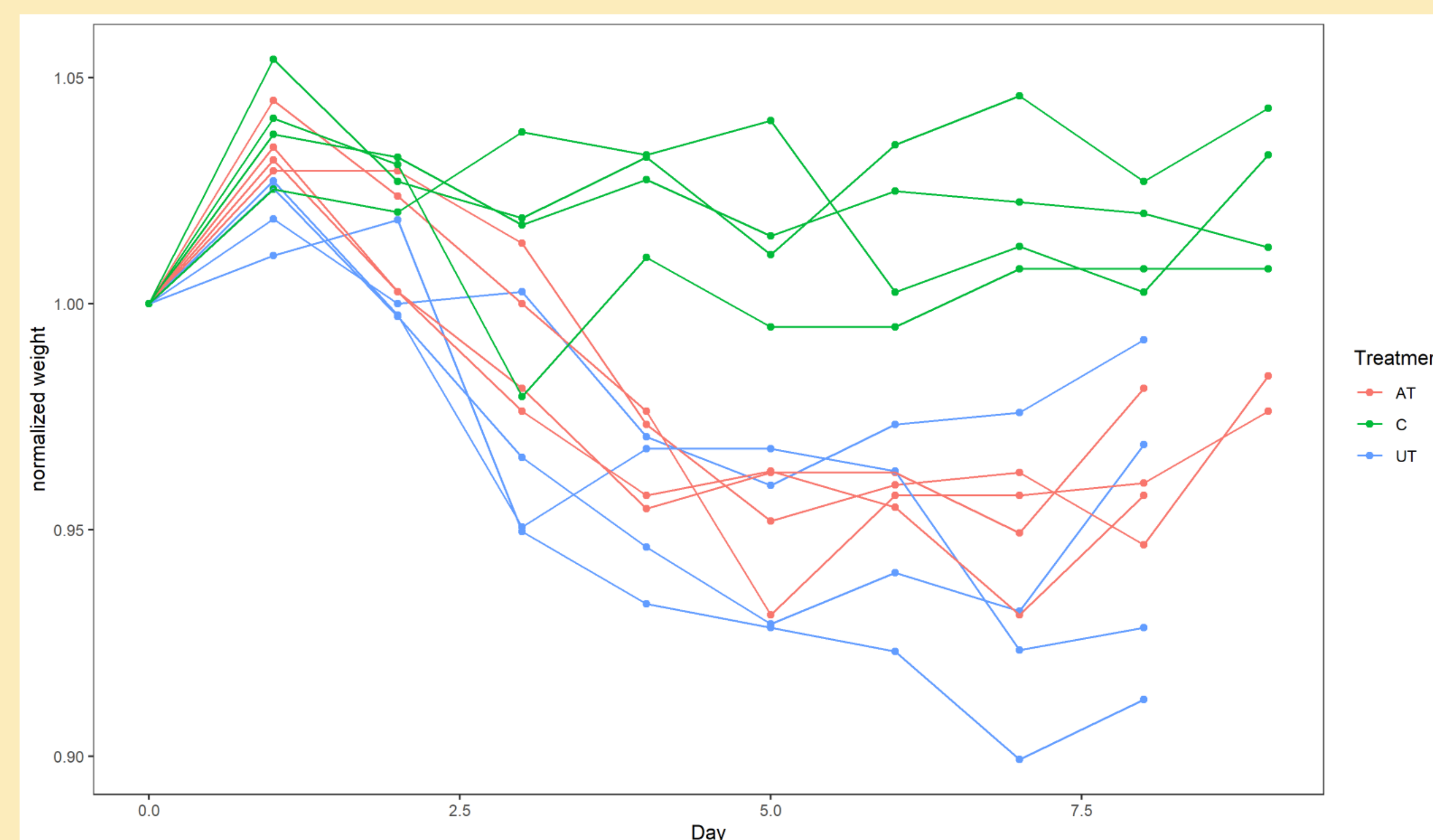


Figure 1. Normalized Weights of Rats Over the Experiment Course

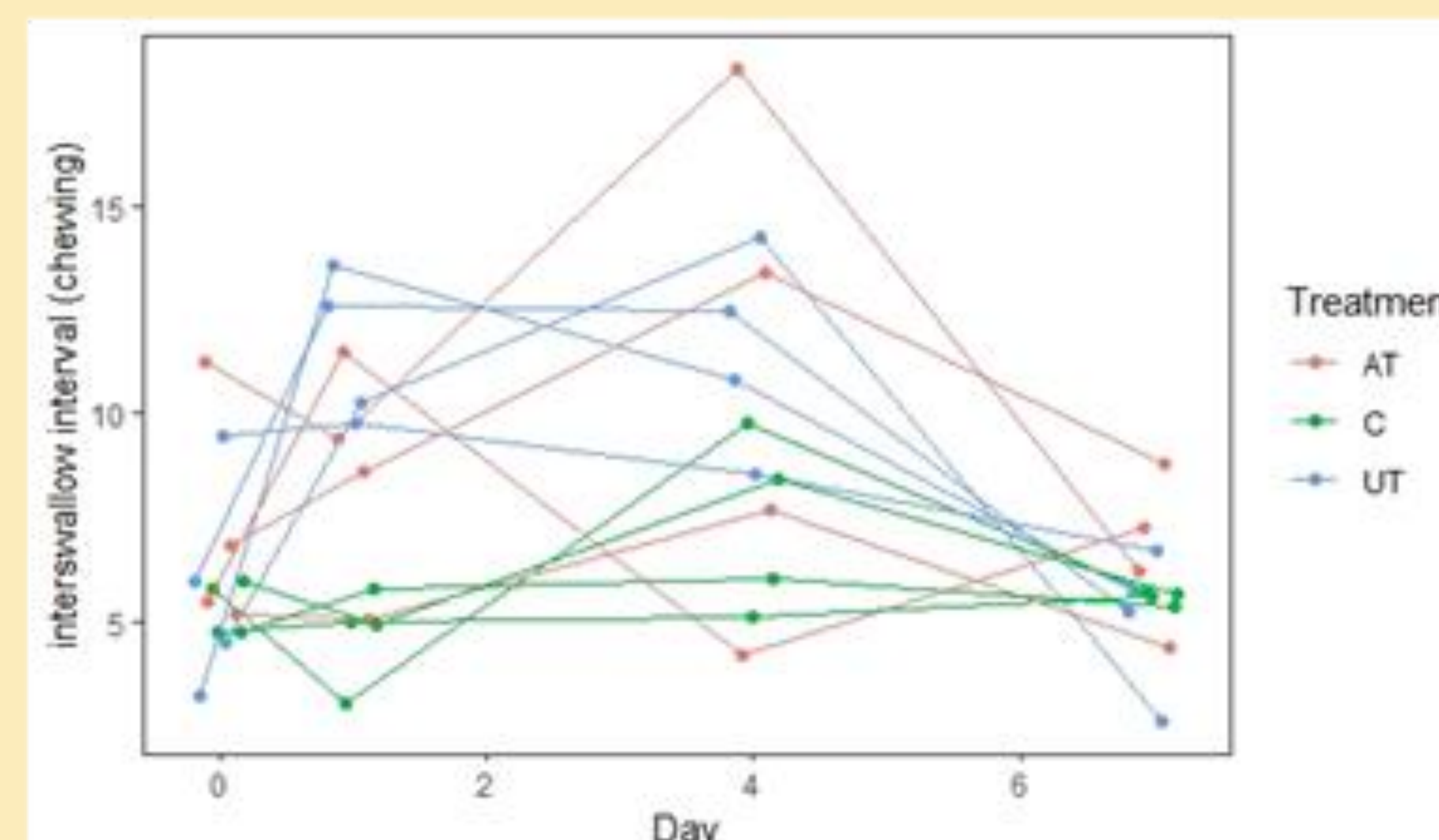


Figure 2. Interswallow Intervals in Chewing

## Conclusion

Both treatment groups, Adjusted Diet and Unadjusted Diet, lost weight after injections started, whereas control weights were stable throughout the experiment. There is no statistically significant difference in weight loss between our adjusted and unadjusted groups (p-value = 0.8152918). However, the means of controls and both treatment groups are statistically different (p-value, control and adjusted treatment = 0.0069873 and p-value, control and unadjusted treatment = 0.0028979). There is a trend towards the unadjusted group being more variable in weight at the end of the experiment (Figure 1).

Along with changes in weight, I compared interswallow intervals (ISI) between all three groups. I found that there is no change in ISI across the days in any group when drinking. However, when eating solid food, on day 4 ISI in both treatment groups are longer than in control but not different from each other (p-value control and adjusted treatment = 0.0424 and p-value control and unadjusted treatment = 0.0337 (Figure 2).

## Implications/Future

Because there were no statistically significant findings between the two groups (adjusted food vs. unadjusted food), the weight loss seen with Parkinson's disease still needs to be explored.

## Acknowledgements

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