

# Nose Goes: Bowman's Glands Recovery in Hamsters Infected with COVID-19

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## Introduction

Current known mechanisms related to the COVID-19 anosmia pathology:

- A. Olfactory Cleft Inflammation
- B. Acute Respiratory Distress Syndrome (ARDS)

**Question:** Does SARS-CoV-2 influence the olfactory epithelium's mucus secretions, leading to anosmia?

**Purpose:** Analyze histological changes in Bowman's Glands (BG) of hamsters infected with SARS-CoV-2 which developed anosmia

## Methods

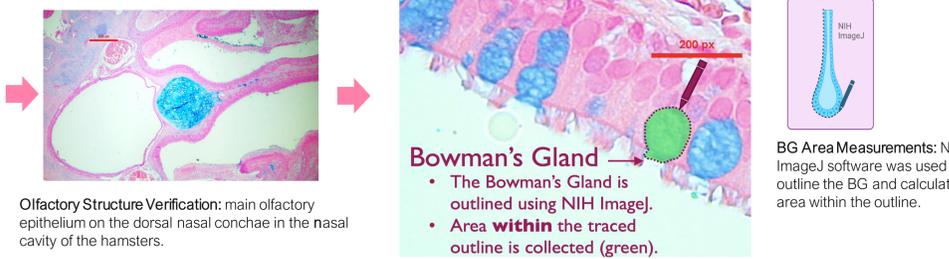
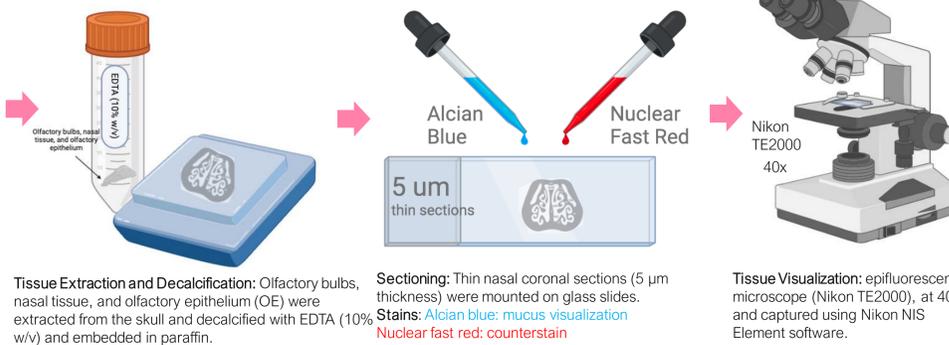
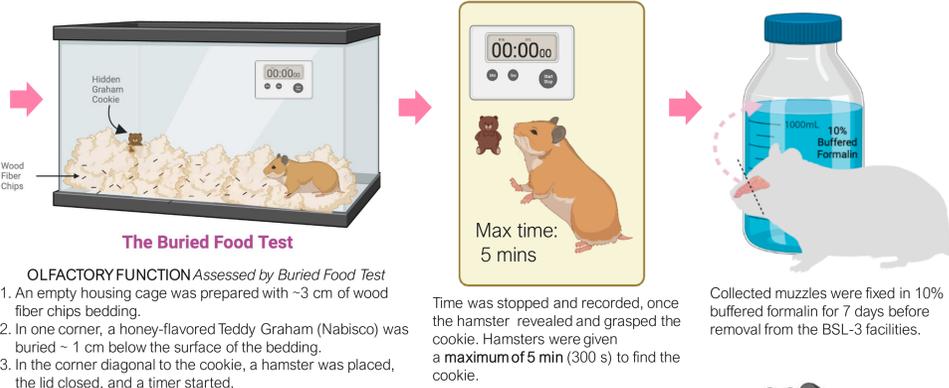
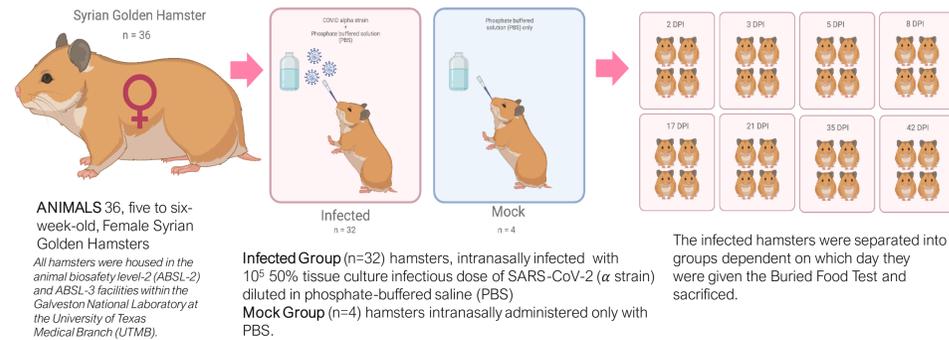


Fig. 1 Visual for Experimental Protocol, Staining, and Data Collection

## Results

### Areas of Bowman's Glands in Hamsters Infected with SARS-CoV-2

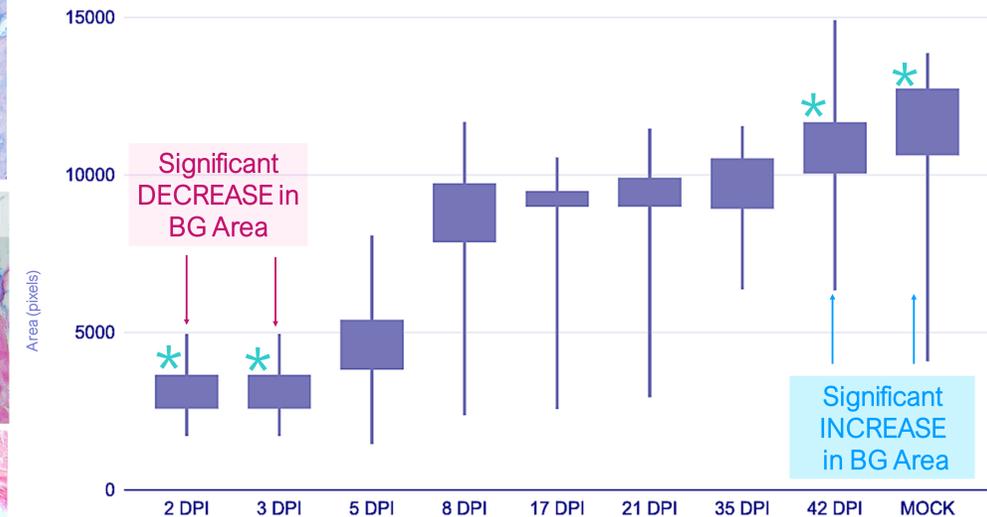


Fig. 3 Box-and-Whisker plot of the Bowman's Glands' Area in Hamsters Infected with SARS-CoV-2. Significant differences compared to the mock group were determined by one-way ANOVA followed by post-hoc paired t-test. \* p<0.05. Mock n=4; all infected groups n=4

### BOWMAN'S GLANDS HISTOLOGY

- 2, 3, 5 DPI: Decreased ciliated epithelium
  - 2, 3, 5 DPI: Crescent-like BG morphology
  - Mock group: more elongated, oval shapes.
- Further analysis is needed to quantify the degree of change.

### BOWMAN'S GLANDS AREA

- The BG area between groups was found to be significantly different via ANOVA testing (p<0.05).
- Ad hoc paired t-testing revealed significant differences when the mock group was compared with 2, 3, 35, and 42 DPI (p<0.05).
- Significant decrease in BG area in 2 and 3 DPI, compared to the mock group.
- Significant increase in BG area in 35 and 42 DPI groups, compared to the mock group.

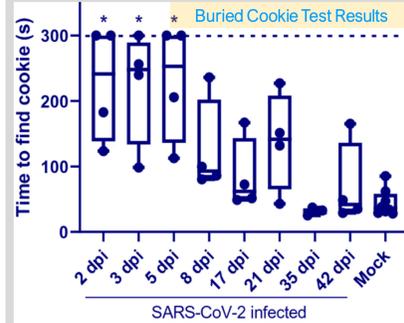


Fig. 4 Box-and-Whisker plot of the Time (s) taken for hamster to find hidden cookie. The time required for the hamsters to find the hidden cookie were shown in the box plots. The broken line indicates the cut-off value of measurement (300s). Significant differences compared to mock group were determined by one way ANOVA followed by Dunnett's post hoc test. \* p<0.05. Mock n=8; all infected groups n=4

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Recovery of Anosmia in hamsters infected with SARS-CoV-2 is correlated with repair of the olfactory epithelium

Fig. 2 Histological imaging of the olfactory epithelium at 40x on Light Microscopy; DPI: days post-infection; \*\*: compared to earlier DPI

## Conclusion

From these findings, we speculate that:

- SARS-CoV-2 infection significantly **decreases** mucin production at 2 DPI and 3 DPI
- increase in BG area at later timepoints suggests BG **remodeling** → recovery can be attained post-infection
- increase in BG area in 35 and 42 DPI suggests BG **overcompensation** → increased mucin production.

We speculate that olfactory behavior is enhance through the regulation of mucin production by the BG.

## Acknowledgements

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