Role of Gut Microbiota in Disease and Stress among Shelter Cats

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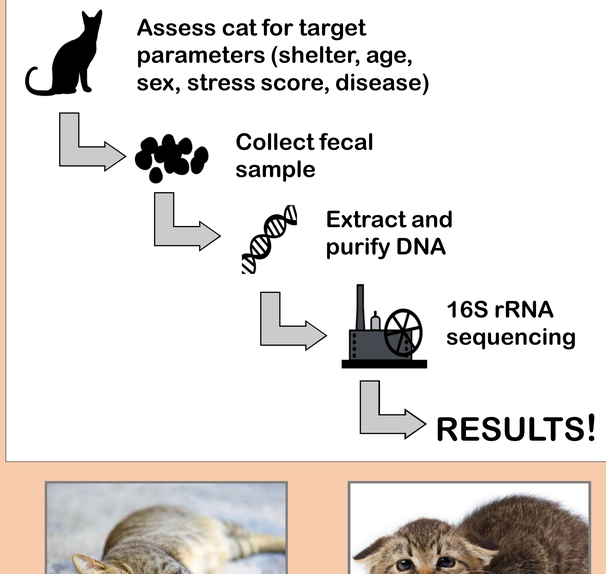
Background

- Cats are extremely susceptible to stressors in their environment
- Many of these stressors are present in shelters, and they can significantly impact a cat's wellbeing

Purpose

- We aim to understand how various stressors to shelter cats can correlate with changes in their gut microbiome (GM)

Methods



	(1) Fully Relaxed	(2) Weakly Relaxed	(3) Tense	(4) Fearful	(5) Terrified
Body Position	Laying on back or side	Laying on side or standing with back horizontal	Sitting or slighting crouching with body lower in behind than in front	Sitting on top of all paws or significant crouching with whole body near to ground	Whole body crouching or near to ground, may be shaking
Eyes	Closed or opened normally	Closed or opened normally	Widely opened	Fully opened	Fully opened
Pupils	Normal	Normal	Slightly dilated	Fully dilated	Fully dilated
Ears	Half back or normal position	Half back or erected to front	Erected to front or slightly flattened	Fully flattened to front or back	Fully flattened to back
Vocal Cues	None	None	Meowing	Meowing, yowling, or quiet growling	Growling or hissing

GM Variation within a Shelter

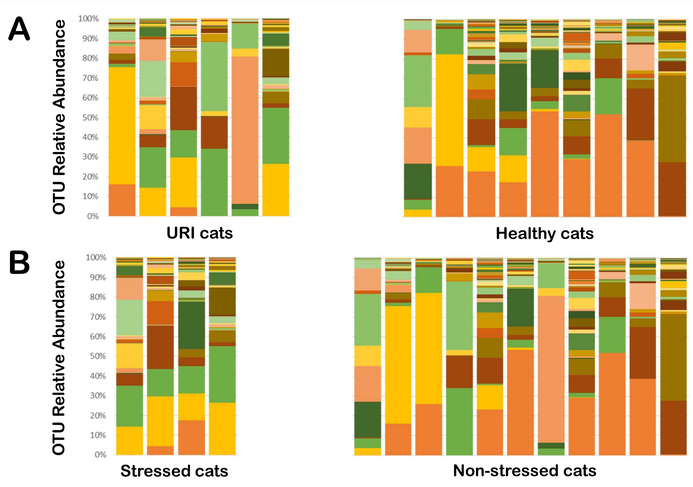


Figure 1: Stacked bar charts of samples collected from Central Missouri Humane Society (CMHS) show marked variation in GM at the OTU level for A) disease state and B) stress

Disease-associated Differences in GM

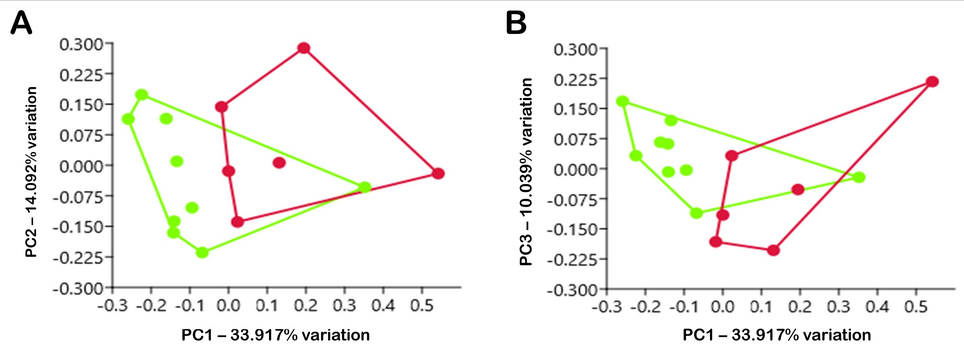
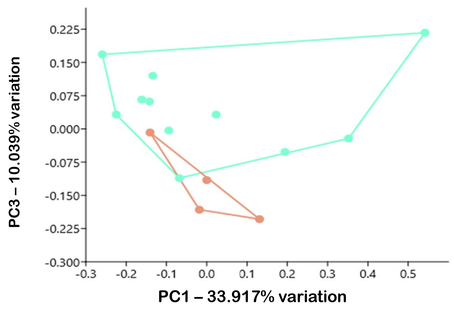


Figure 2: Principal component analysis of samples collected at CMHS shows some clustering based on disease-state. PERMANOVA analysis revealed that the differences in GM are statistically significant ($p < 0.05$)

Healthy cats
URI cats
F: 2.349
p-value: 0.0267

Stress-associated Differences in GM

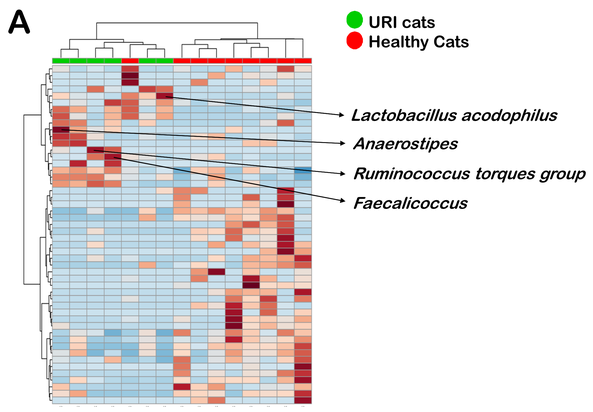


Non-stressed cats (1-2)
Stressed cats (3-5)

F: 1.791
p-value: 0.0767

Figure 3: Principal component analysis of samples collected at CMHS shows some clustering based on stress scores. While PERMANOVA analysis revealed that the differences in GM are not statistically significant ($p > 0.05$), this study is currently underpowered and awaiting analysis of additional samples

Results



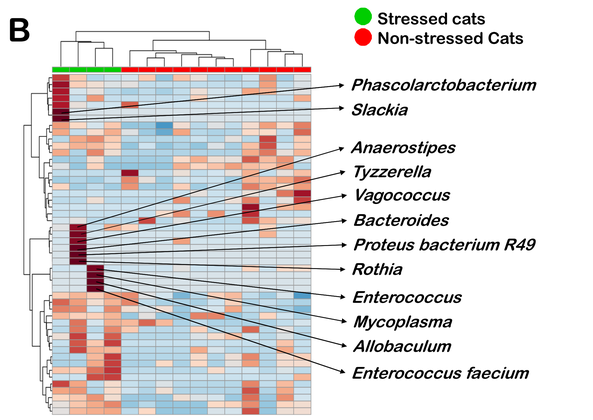


Figure 4: Heatmaps reveal specific bacteria as sources of greatest GM variation for A) disease state and B) stress

Conclusions/Future Directions

- Our initial findings show there may be a difference in the GM of cats that develop URIs and/or maintain a stress score above three
- Analysis also identified target species of bacteria that warrant further investigation about their role in disease and/or stress of shelter cats
- Sample collection is ongoing and will be processed in the coming weeks

Acknowledgements

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