

Investigating How Maternal *Iguana iguana* Characteristics Relate to Follicle Innate Immunity



Dr. French Lab
Grad Mentor:
Daniel Emanuel

Kiara D'Amico

01. Abstract

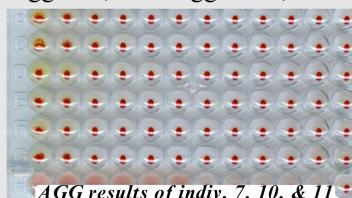
Organisms have finite energy to devote to survival, growth, reproduction, and immunity. Here we examined if physiological factors within offspring egg yolk are reflective of Green Iguana maternal characteristics that are indicative of such energetic constraints. This research investigated the correlations between maternal characteristics (snout-vent length, fat body mass), reproductive efforts (follicle number, total egg mass, maximum egg size), and offspring innate immunity measured by yolk ability to perform lysis and agglutination (Agg). 28 invasive Green Iguanas were collected and measured from five locations in Florida. Yolk samples were assessed for lysis and agglutination capabilities. SVL had a positive correlation with FB mass, follicle #, and Agg score. Females who were longer had larger energy stores and were able to contribute more immunological components into a greater number of follicles. These results build a foundation for future work investigating factors that affect yolk immune physiology in oviparous reptiles, and likely confer a survival advantage to offspring.



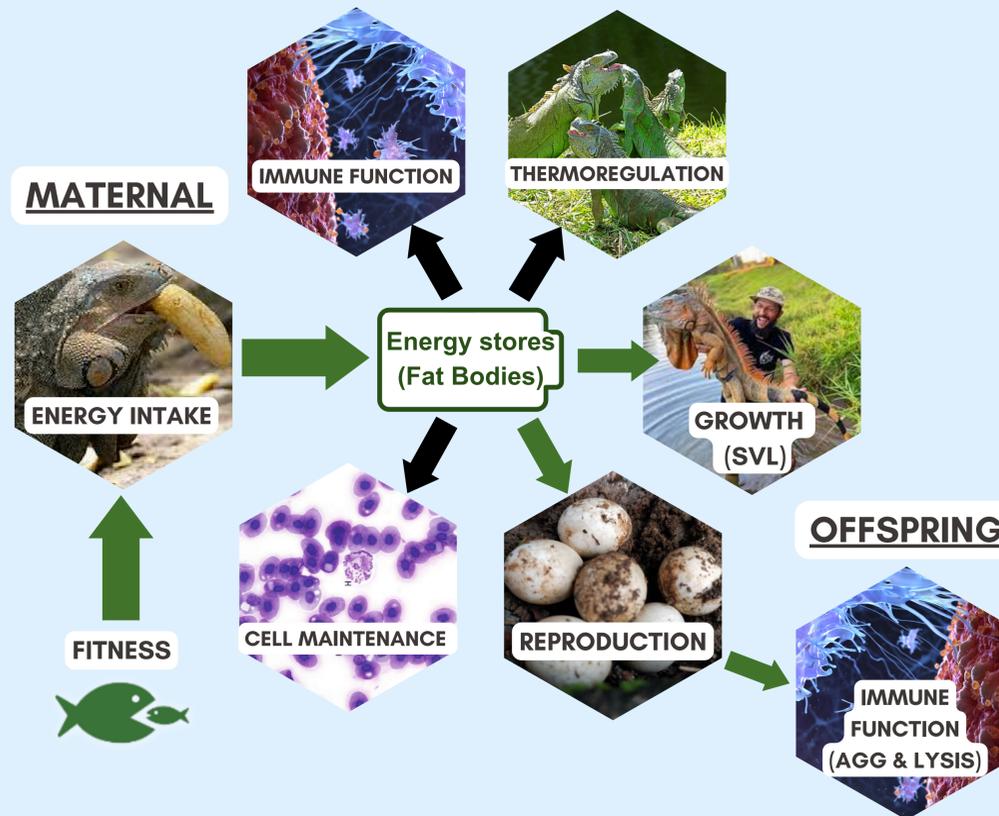
04. Methods

- 28 Green Iguanas were collected from five sites in Southern Florida
- Individuals were sexed, weighed, and measured
- Because of the invasive species status, they were humanely euthanized and dissected
- Data about maternal characteristics, ovaries, fat bodies, and follicles were recorded
- One follicle from each ovary was randomly chosen and the yolk was sampled
- Lysis and Agg tests were run on the yolk to assess innate immunity then average scores were calculated
- Statistical tests were run for the correlation between Snout vent length (SVL), fat body mass (FB), max egg size, total egg mass, and follicle lysis/Agg scores

Lysis: destruction of a cell membrane
Agglutination: antibodies cluster and bind pathogens together



AGG results of indiv. 7, 10, & 11



02. Introduction

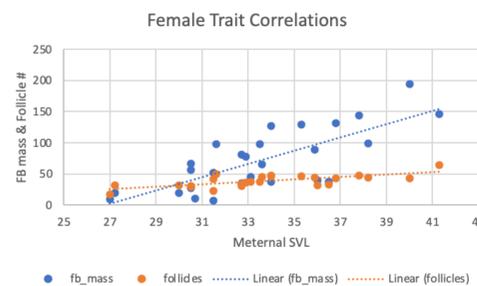
There is no conclusive data on the exact relationship between maternal characteristics and offspring immunity, especially in oviparous reptile species. However, several other studies have assessed oxidative costs of reproduction in rock iguanas and side-blotched lizards, which found that the relationship between reproduction and maternal immunity is driven by energy investment. This current research hopes to fill a knowledge gap between maternal characteristics and offspring immunity.

03. Objectives

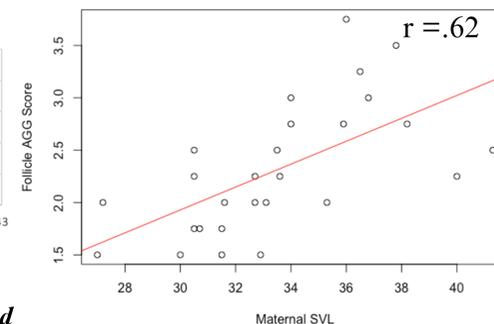
To answer:

- How do maternal characteristics relate to the offspring's innate immunity?
- How does the max egg size and total egg mass relate to offspring innate immunity?

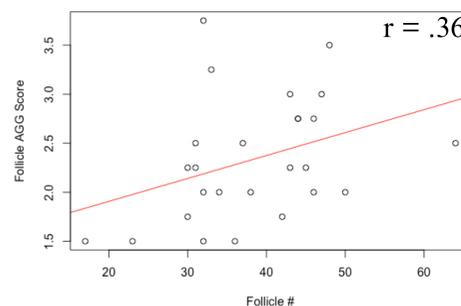
05. Results



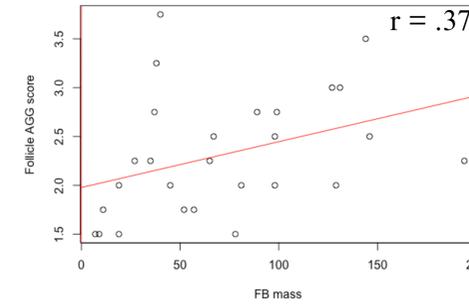
SVL was significantly, positively correlated with FB mass (p -value: 6.1×10^{-5}) as well as with Follicle # (p -value: 5.2×10^{-6}).



SVL was significantly, positively correlated with Agg score (p -value: 5.9×10^{-3}).



Follicle # was positively correlated with Agg score however the p -value: 0.067 was slightly larger than the threshold of 0.05.



FB mass was significantly, positively correlated with Agg score (p -value: 0.05)

The ability to lyse was not present in the follicles at this stage. There was no significant relationship between max egg size - Agg and total egg mass - Agg. There were significant relationships between SVL - Agg, FB mass - Agg, and follicle # - Agg.

06. Conclusion

Longer Iguanas had larger fat stores and more follicles. All three of these variables were associated with higher innate immunity scores. This suggests **larger females were in better condition and invested more into reproduction** (i.e., more follicles and immune components). This may ultimately provide an advantage to offspring, where they have a more robust immune system which may increase survival. Overall, this supports the hypothesis that **maternal characteristics (SVL) that are constricted by energetic costs positively relate to follicle physiology (immunity).**