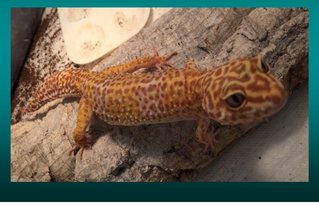
Neuronal Density in Navigation-Related Regions of the Adult Leopard Gecko Brain



Kyleigh C. Adorno[1]

Kayley M. Ozimac[1], Emma E. Kinerson[1,2], Nikki S. Boon[1], **Scott L. Parker[2], & Ryan M. Yoder[1]**

[1]Psychology & [2]Biology · Coastal Carolina University · Conway, South Carolina

Introduction

- We evaluated cell density in navigation-related brain regions of adult leopard geckos (*Eublepharis macularius*).
- Previous studies of reptile navigation suggest that the medial cortex contributes to navigation[2].
- The basal region and dorsal thalamus project to the medial cortex and contribute to its function[1].
- We used the brain atlas of the Gekko gecko brain[2] to compare it to the brain slices of the leopard gecko in order to obtain and record the optical density of those brain regions.

Methods

Animals: Three adult leopard geckos (n=3) were used.

Histology: Equipment included an AO860 freezing microtome, a Nikon microscope, and Image J software.

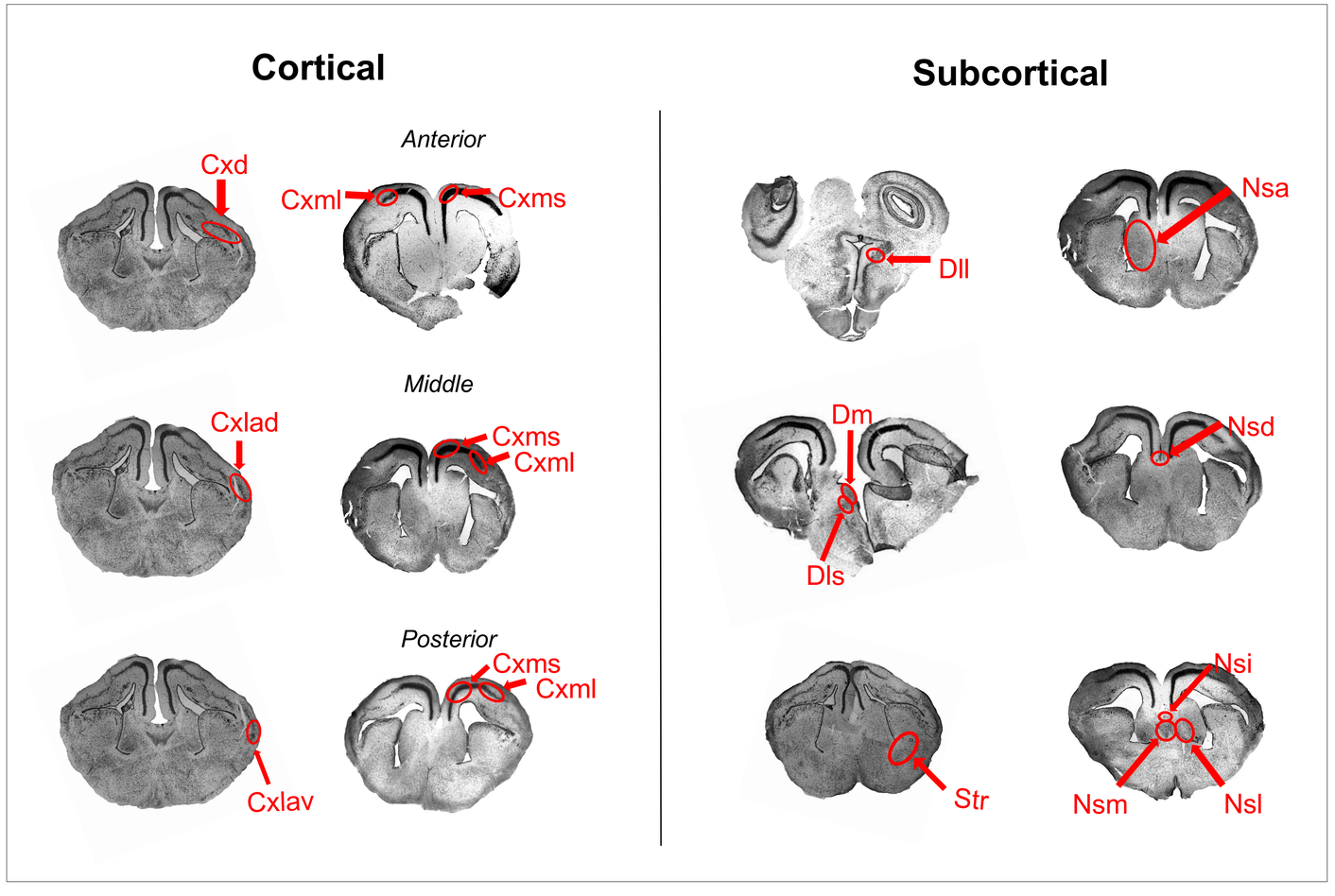
Procedure: Geckos were individually anesthetized with Halothane and then perfused through the heart with 10% formalin. The brain was then post-fixed in 10% formalin and sliced coronally at 40 microns. Brain slices were stained with Cresyl violet and mounted on gelatin-subbed microscope slides.

Analysis: Optical density values were obtained for three sites within each brain region.

Project in Brief

Design and Purpose: We evaluated the optical density of the cell populations in the cortex, medial cortex (anterior, middle, posterior), the dorsal lateral thalamus, and the basal forebrain of adult leopard geckos.

Future Directions: Optical density values serve as a reference for our current studies of cell damage following hypoxia or other insults to brain development in leopard geckos.



Results

Optical Density Values for Select Regions of the Leopard Gecko Brain

Region of Interest	Cell Density M(SEM)
Cxml	39.8 (6.75)
Cxms	88.7 (10.7)
Cxd	44.0 (4.83)
Cxlad	45.9 (7.48)
Cxlav	60.5 (13.0)
Dll	39.8 (9.09)
Dls	44.4 (15.3)
Dm	53.1 (6.55)
Nsa	49.6 (16.7)
Nsd	43.2 (1.19)
Nsi	63.0
Nsl	22.0 (4.93)
Nsm	39.9 (6.76)
Str	32.3 (0.58)

M = Mean
SEM = Standard Error Mean

Note: Optical density value for area Nsi are from one animal.

Key

- **Cortex**
  - **Cxd** = cortex dorsalis
  - **Cxlad** = cortex lateralis anterior, pars dorsalis
  - **Cxlav** = cortex lateralis anterior, pars ventralis
- **Medial Cortex**
  - **Cxml** = cortex medialis, magnocellular
  - **Cxms** = cortex medialis, parvocellular
- **Dorsal Lateral Thalamus**
  - **Dll** = nucleus dorsolateralis thalami, magnocellular
  - **Dls** = nucleus dorsolateralis thalami, parvocellular
  - **Dm** = nucleus dorsomedialis thalami
- **Basal Forebrain**
  - **Nsa** = nucleus septalis anterior
  - **Nsd** = nucleus septalis dorsalis
  - **Nsi** = nucleus septalis impar
  - **Nsl** = nucleus septalis lateralis
  - **Nsm** = nucleus septalis medialis
  - **Str** = striatum

References

1. Rodríguez, F., López, J.C., Vargas, J., Gómez, Y., Broglio, C., & Salas, C. (2002). Conservation of Spatial Memory Function in the Pallial Forebrain of Reptiles and Ray-Finned Fishes. *The Journal of Neuroscience, 22*, 2894 - 2903.
2. Smeets, W. J., Hoogland, P. V., & Lohman, A. H. (1986). A forebrain atlas of the lizard Gekko gecko. *The Journal of comparative neurology*, *254*(1), 1–19.