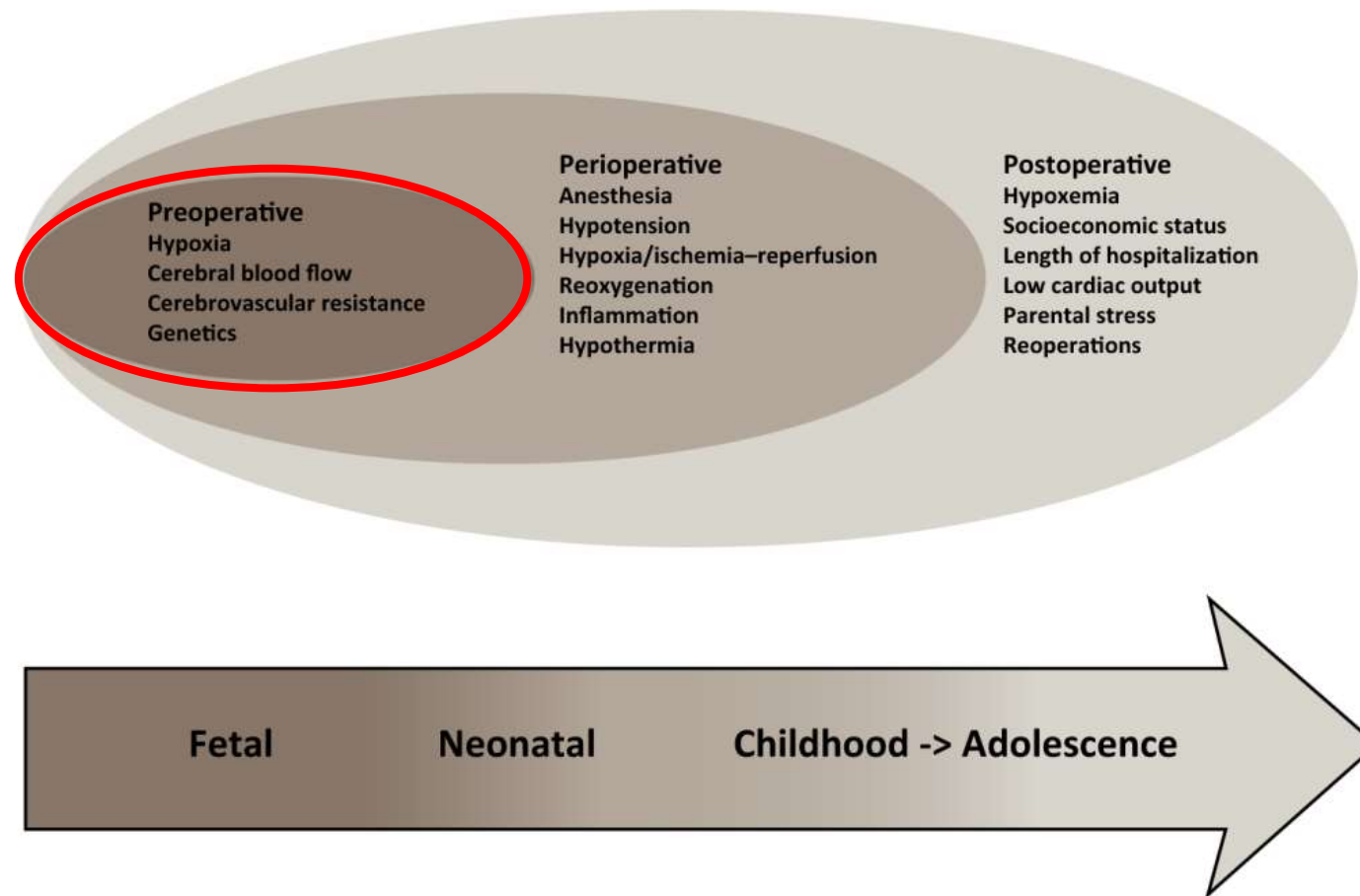


Development of Piglet Brain Atlas

Madison Harris

Congenital Heart Disease (CHD)

Multifactorial causes of neurological deficits associated with CHD



TRENDS in Neurosciences

Morton PD, Ishibashi N, Jonas RA, Gallo V; Trends Neurosci 2015

Why Pigs?

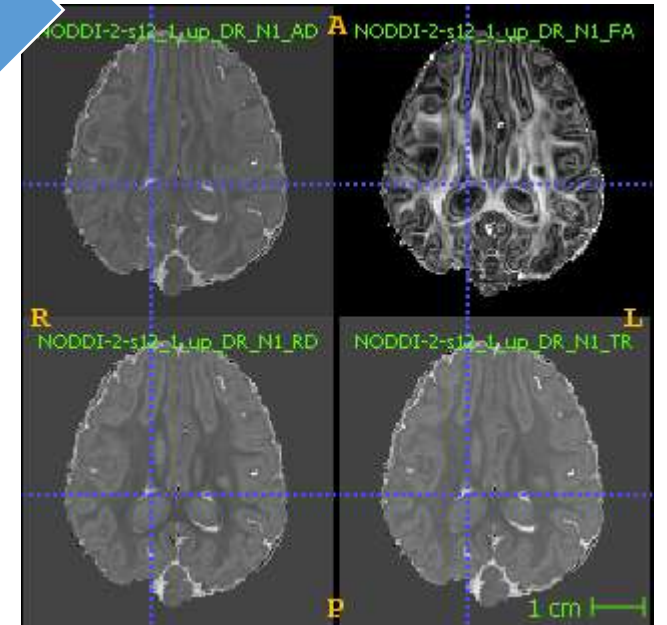
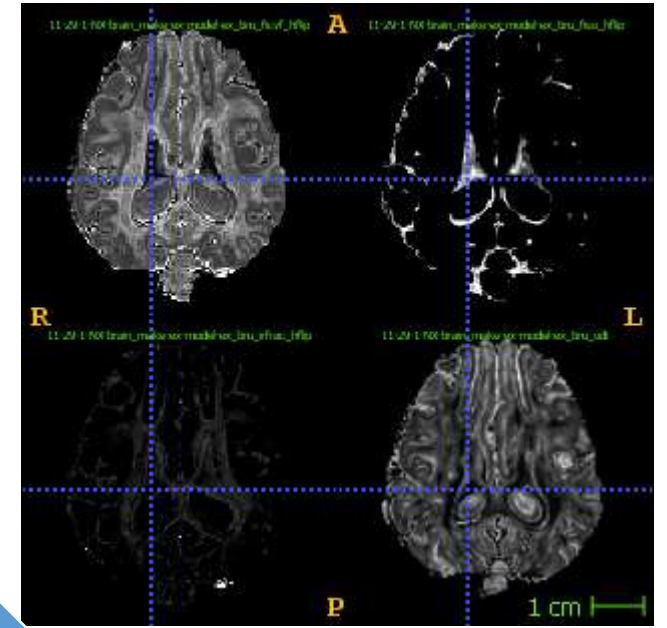
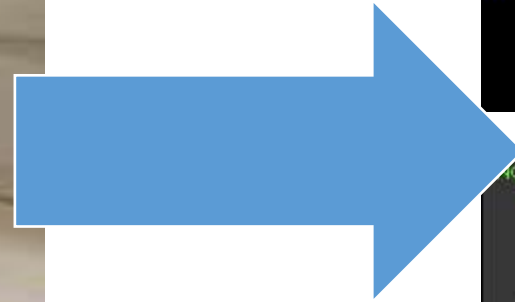
- Similar white matter to grey matter ratio as humans
- Develop at similar speed
- They can fit inside coil

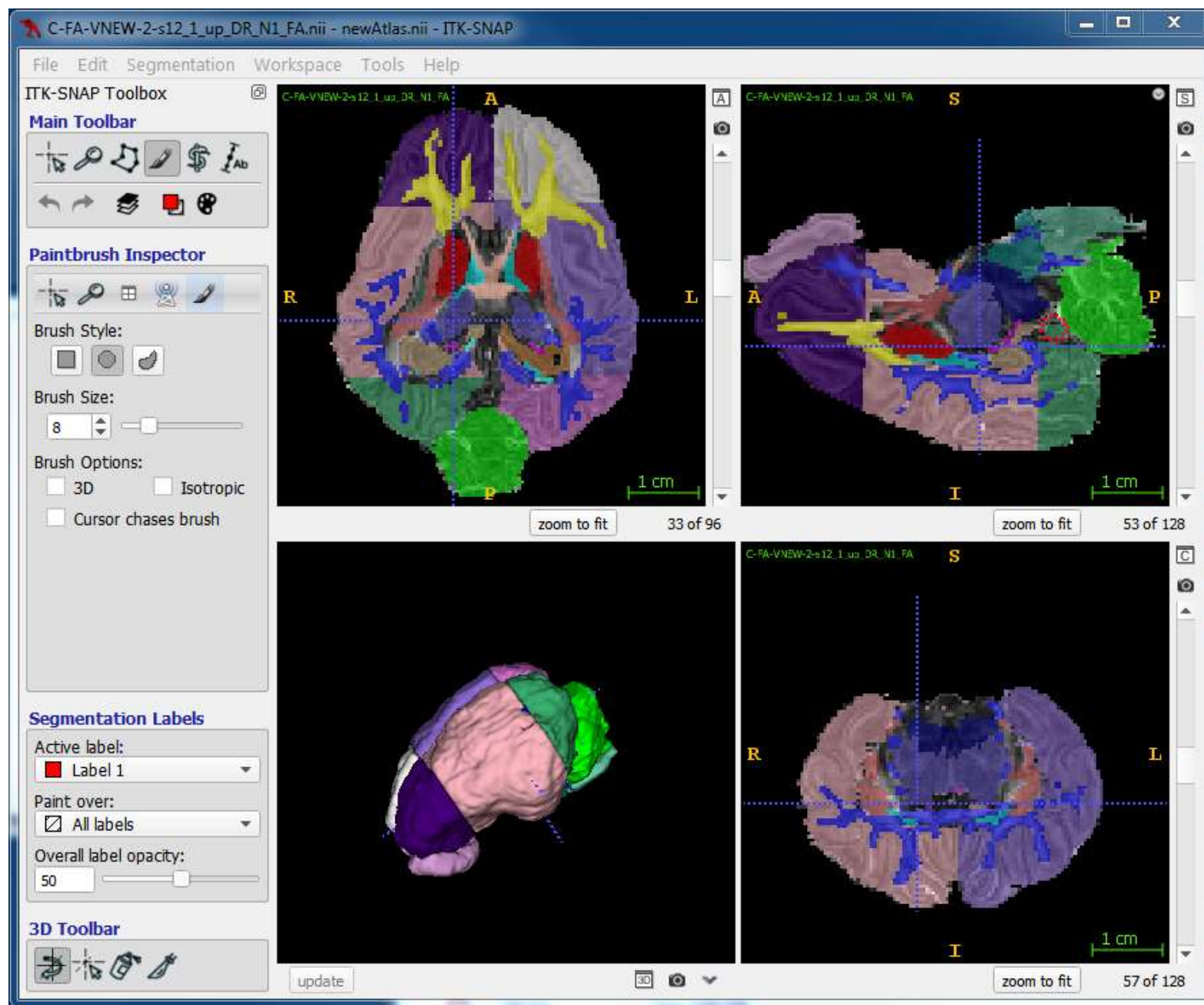


Methods

- Hypoxia
 - 3 pigs
 - 10.5% oxygen for 2 weeks
- Normoxia
 - 4 pigs
 - Regular cage for 2 weeks
- Brain Atlas
 - 3D map of brain that can have data about hydrogen molecule diffusion

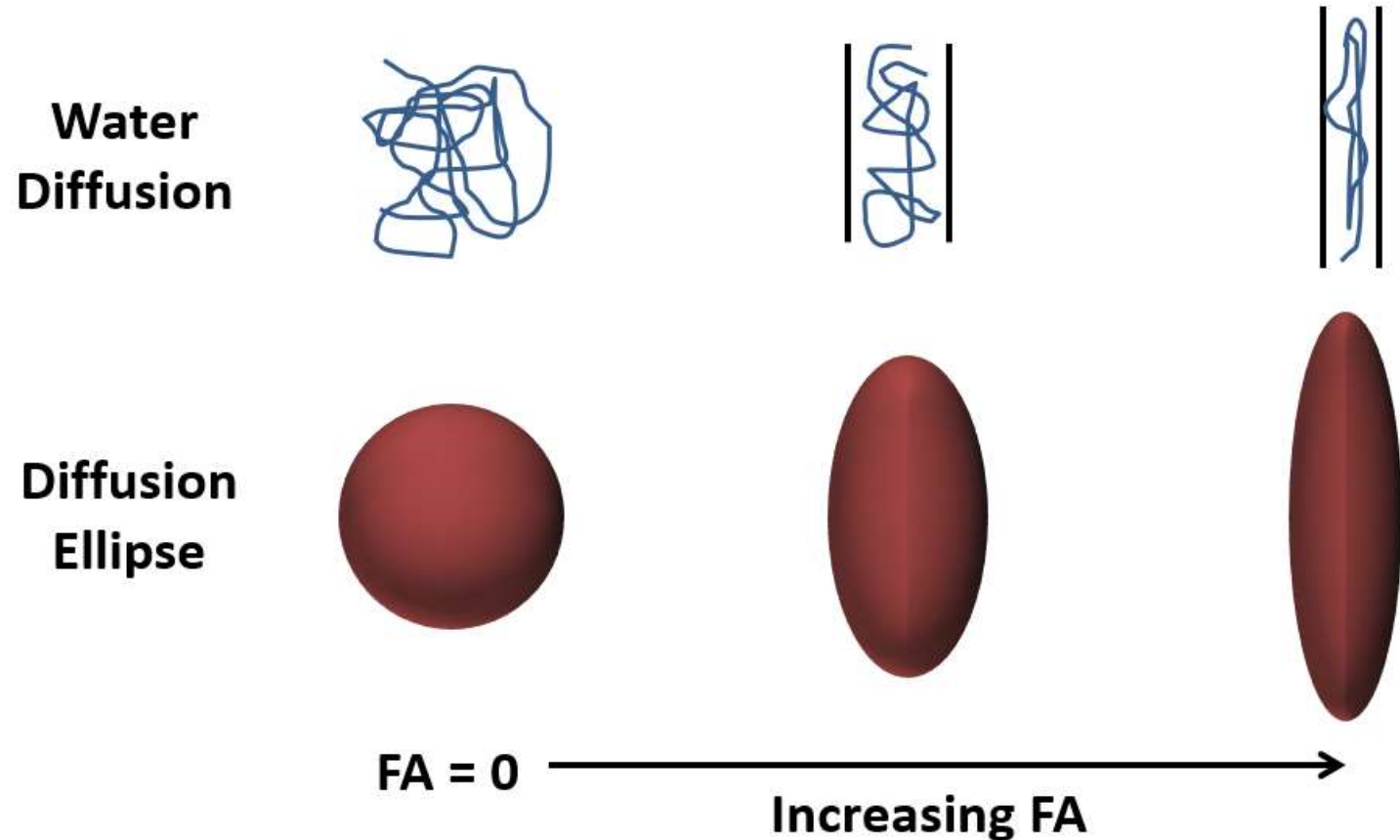
Magnetic Resonance Imaging

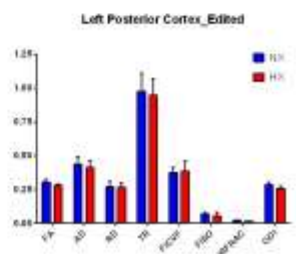
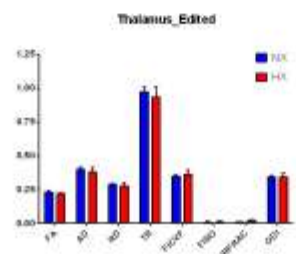
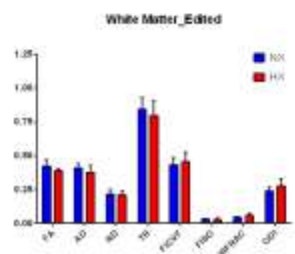
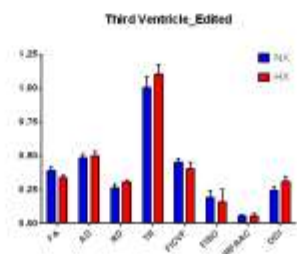
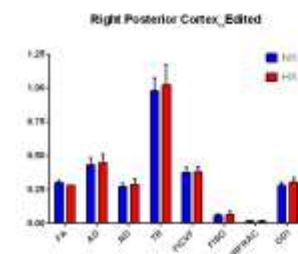
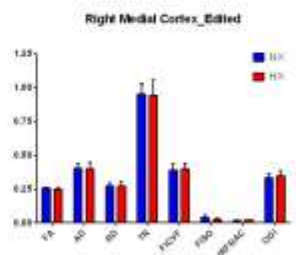
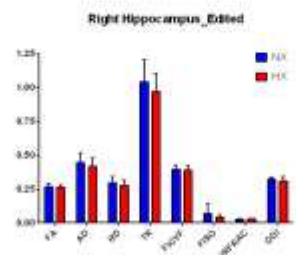
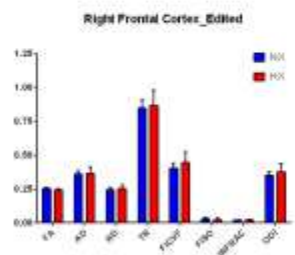
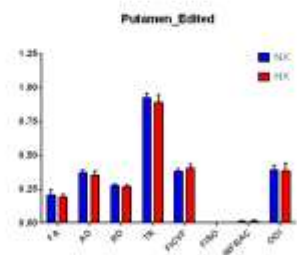
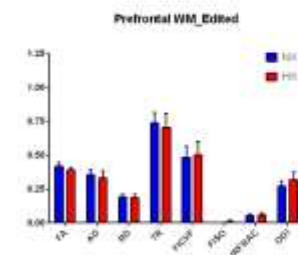
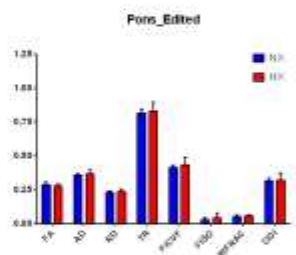
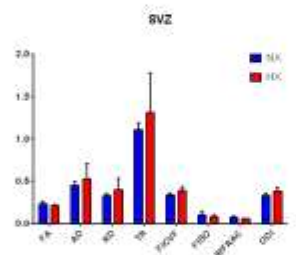
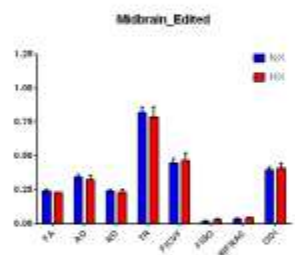
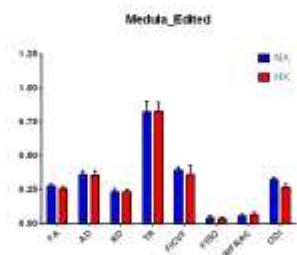
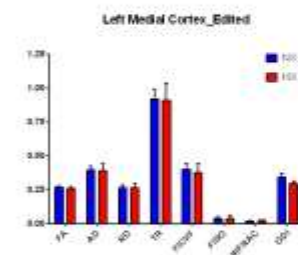
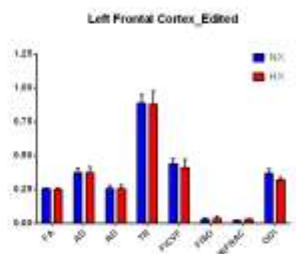
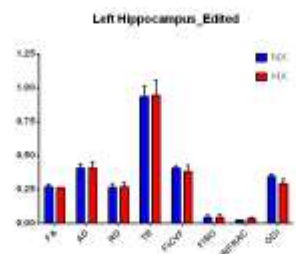
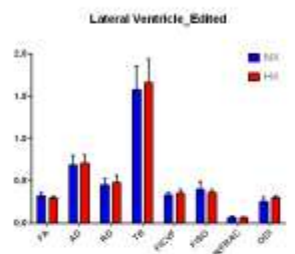
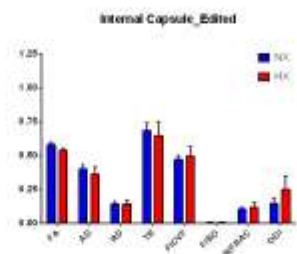
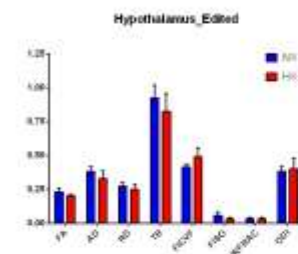
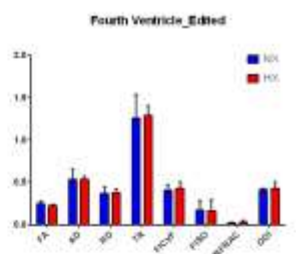
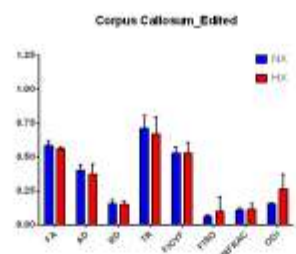
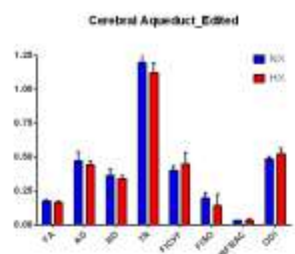
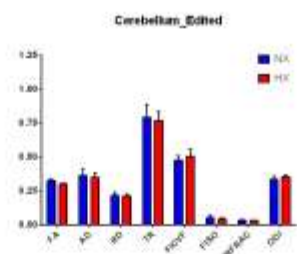
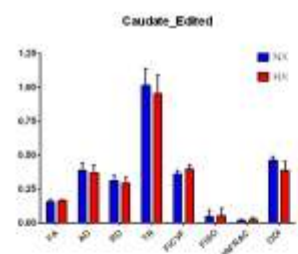




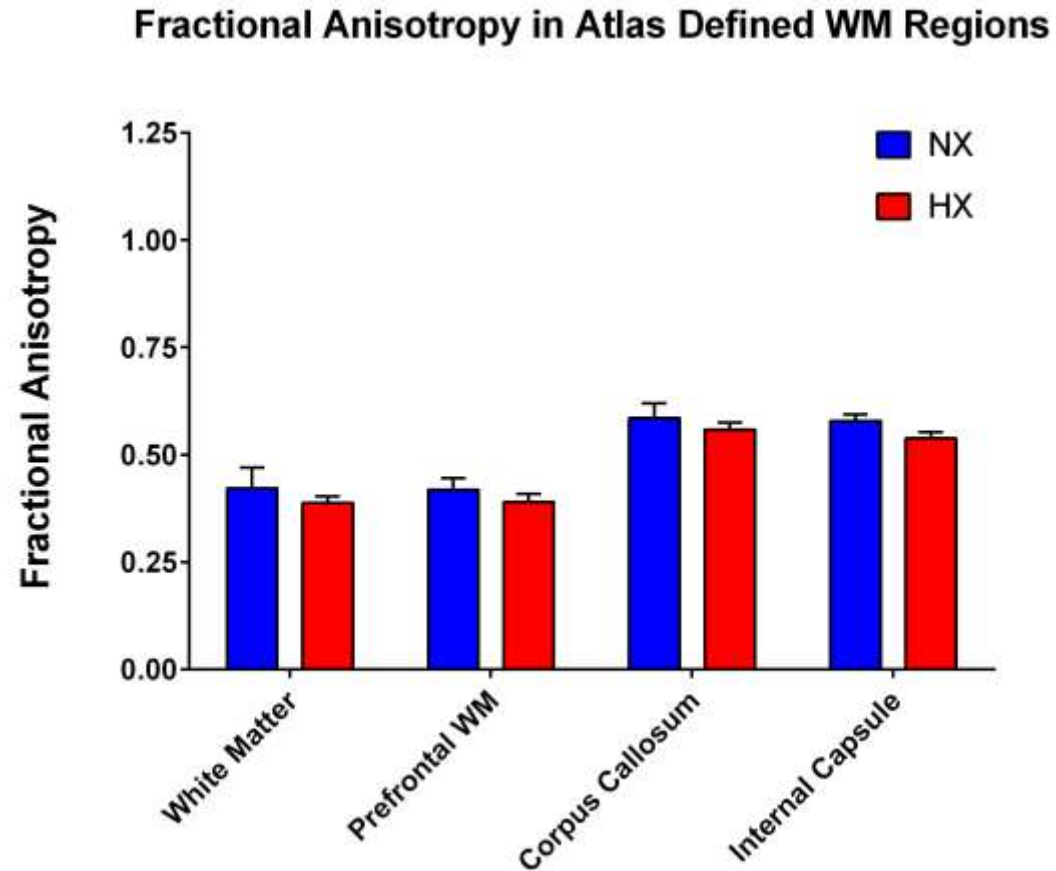
What is Fractional Anisotropy?

FA is a scalar value between 0 and 1 that describes the 3D ellipsoidal directionality of water diffusion within brain tissue





Results



Overall decrease in fractional anisotropy
for white matter in hypoxic brains

Chronology

Week 1: Learning how to use software and shading in brain images

Week 2: Registering brain Images, brain atlas development

Week 3, 4: Brain atlas development

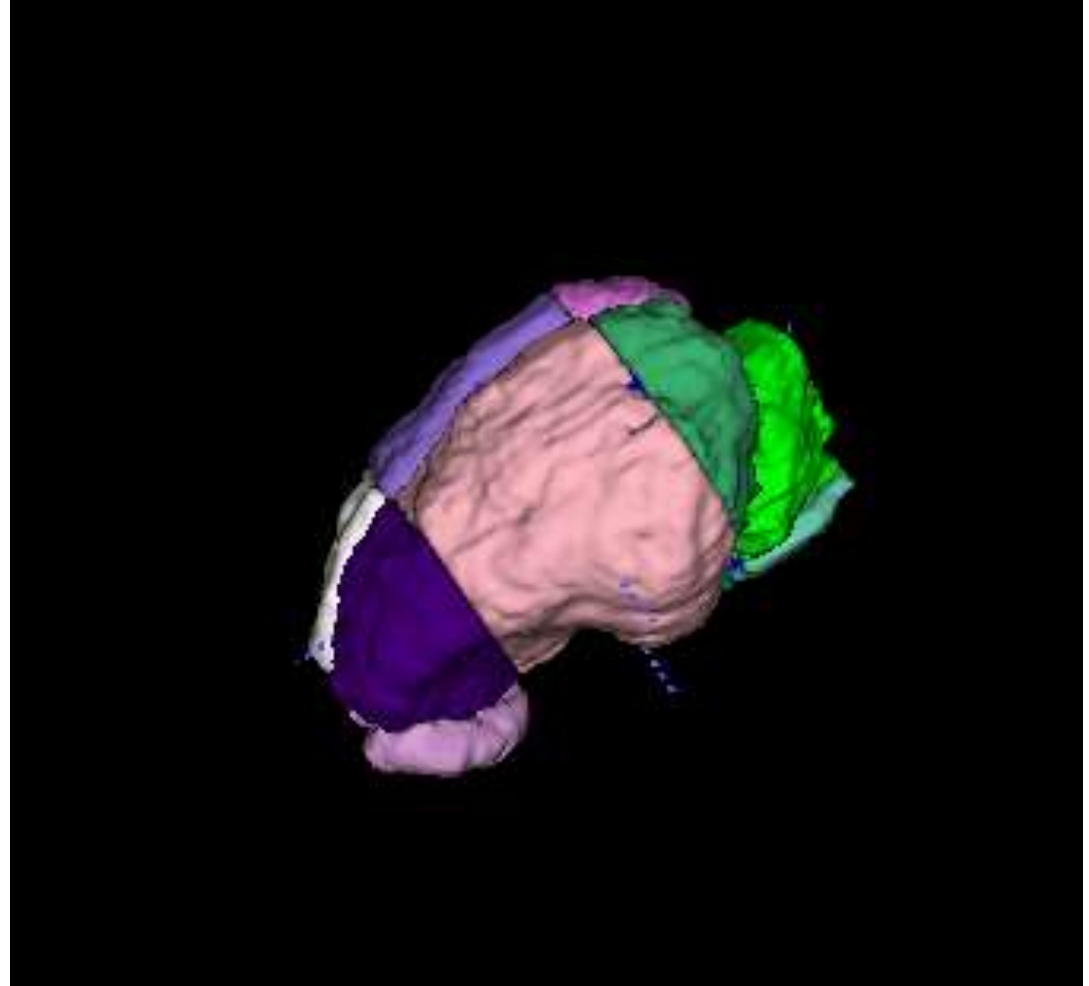
Weeks 5, 6: Registering Atlas to other brains, editing by hand

Week 7: Data Analysis



Lessons

- Science can be tedious
- Collaboration is key
- Mistakes are okay!
- So is asking lots of questions



Acknowledgements

Ishibashi / Jonas lab

Richard A. Jonas, MD
Nobuyuki Ishibashi, MD
Paul D. Morton, PhD
Kamil Sarkislali, MD
Fahad Soma, PhD
Camille Leonetti, PhD
Mahmut Ozturk
Ludmila Kortocova MD

Children's National:

Catherine Limperopoulos, PhD

NIH:

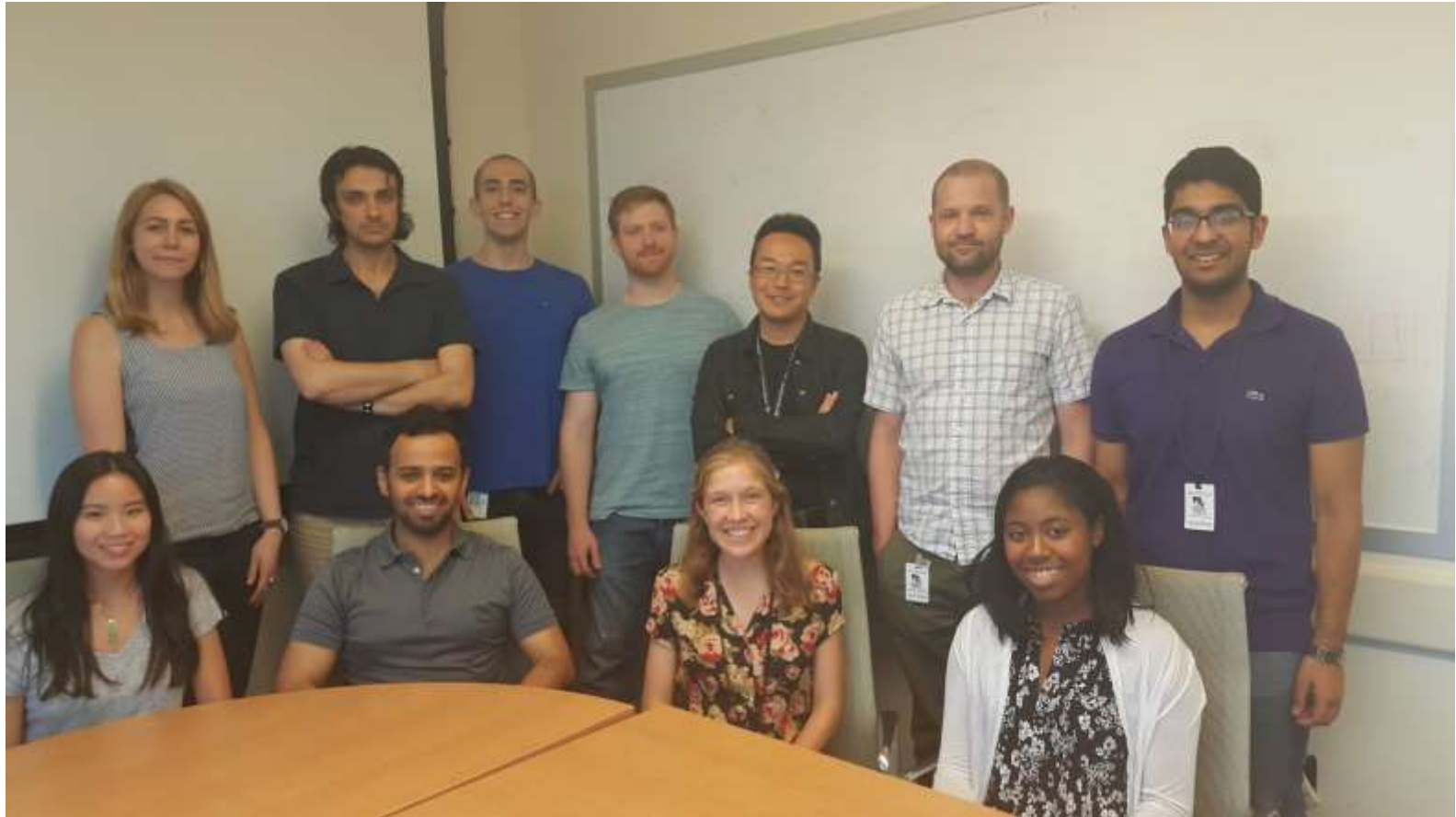
Pierpoali lab

Howard University:

Paul C. Wang, PhD
Stephen Lin, Mengr
Alexandru Korotcov PhD

Harvard:

David Zurakowski



Funding:

NHLBI (R01 HL104173, R01 HL128546)
IDDRRC (P30 HD40677)
CRI, Neonatal Brain Injury Project
Baier Cardiac Research Fund
Foglia-Hills Pediatric Cardiac Research Fund