Determining the Embryonic Origin of Primate Encephalization via High Resolution MRI

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Introduction

This research project aims to study embryonic alterations to brain growth in a variety of primate species as compared with non-primate mammals. Our goal is to compare brain and body weights/volumes in primate and non-primate mammal embryos at comparable developmental stages to (1) confirm or disconfirm the conservation of shared primate and shared non-primate growth patterns, and (2) estimate the timing of divergence in primate brain/body growth and to identify its developmental mechanisms.

Experimental

Following initial scans of two rat embryos from the Museum of Vertebrate Zoology (MVZ), methods were improved by employing flourinert rather than phosphate buffered saline (PBS) and by replacing foam with gauze in order to remove air from the solution. All scans utilized the 750 MHz Bruker magnet. Overnight FLASH images were obtained that are sufficient for subsequent tissue analyses.

Results and Discussion

These preliminary scans using flourinert provide the methodological basis for scanning a large number of embryos in 2015. In addition to the embryos available at the Museum of Vertebrate Zoology already planned for scanning, additional embryos were identified at the American Museum of Natural History which may further expand the phylogenetic diversity of species represented. Discussions are currently underway with AMNH curators to make these embryos available for scanning. Finally, we have recently secured a research grant from the Leakey Foundation to support this work; this money will allow the purchase of additional NMR tubes and shipping costs, and provide financial support for the project overall.

Figure 1. FLASH scan of rat embryo in flourinert in 25mm NMR tube used to refine scanning protocols.

Conclusions

While the bulk of embryonic scanning required by this project has been delayed by both improvement of scanning protocols and securing of funding, we expect to commence with our research protocols in Spring 2015.

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