Investigation of New Pathological Markers in Cadaveric Nervous Tissue

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Abstract

Abstract: Cadavers have provided an unparalleled method for teaching anatomy to health care students many years. The study of anatomy also provides a method for studying abnormal states. Neurodegenerative diseases have a massive toll on individuals lives with few effective treatments. Therefore, we aim to take a look at the brain and spinal cord which together encompasses the central nervous system (CNS). This research project's objective is to take a look at the changes in normal anatomical structure in regions of the CNS and attempt find a correlation to abnormal physiology states. While correlation does not prove causation, know that structure determines function, a change in structure can indicate a change in function. When tied into a premortem neurological disease diagnosis, along with previously established brain region function, can provide insights into the disease process. These insights could lead to improvements in future treatments. Using various common histochemical staining procedurals will provide further details that could not be obtained otherwise. The molecules in the stains will bind to specific binding sites on proteins and other cellular structures, the presence or lack of stain in certain regions will inform us of the molecular makeup of the tissue that is being analyzed. Using known cases of neurodegenerative diseases, a database can be created for tissue presentation for specific diseases. Using this database, it could be possible to find undiagnosed neurodegenerative diseases postmortem. It is also well known that neurodegenerative diseases can have a genetic/familial factor, therefore postmortem analysis can provide useful information for surviving family members. Providing the family members with more time to explore preventive measures.

Research Questions

- Does histological tissue analysis provide unique markers that provide indications for pathological conditions?
- Are there distinct morphological changes in either neural cells or glial cells?
- Are there clear markers for inflammation induced damage?
- Is it possible to create a database of tissues correlated with various neurodegenerative disease from cadaveric donor tissue?

Methods

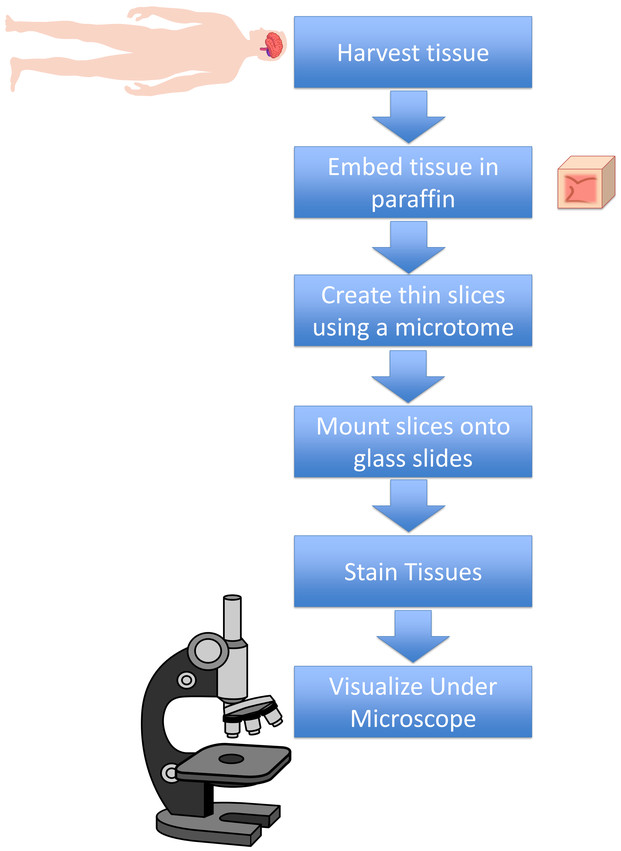
Tissue samples were obtained from cadaveric donors whose tissues had previously been fixed via the industry standard formalin preservation. After preforming a completes laminectomy the spinal cord was accessed and regions of the cervical enlargement along with the lumbar enlargement were obtained.

After a craniotomy was performed the brain was removed from the cranial cavity. From the brain, various regions of the frontal lobe, premotor cortex, motor cortex, somatosensory cortex, and the occipital cortex were obtained.

Both the spinal cord and brain tissues underwent paraffin embedding, slicing via a microtome, and plating onto microscope slides.

After which, samples with stained with various stains, (H&E, LFB, Golgi staining, etc.) following each stains appropriate staining procedures.

The slides with then visualized via a microscope and digital photos were recorded.



Results and/or Conclusion

Results are pending the research completion. We expected the results to show a clear morphological deference in non neurodegenerative diseased donor vs donors with a neurodegenerative disease. We expected the change in tissue structure to be have a positive correlation with the state of progression in the disease state. We also expect the region of the CNS affected to be related to the disease associated with the donor.

Future Work

1. Increase the tissue bank in order to analyses different neurodegenerative diseases to provide statistically significant results.
2. Examine regions of the basal ganglia, brain stem, and cerebellum.

References and/or Acknowledgments

We would like to think the donors who graciously made the decision to donate their earthly bodies to enable us to further our medical education.

References: