Increased Amyloid Deposition after TBI Correlates with Cognitive Deficits and Symptom Worsening

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INTRODUCTION

- **Each year, in the United States, approximately 2.5 million people sustain a traumatic brain injury (TBI);**
- **TBI is a risk factor for Alzheimer's disease;**
- **To date, there are no biomarkers that consistently predict injury severity or neurological outcomes in people suffering from TBI;**
- **Imaging and fluid-based biomarkers of neural injury such as florbetapir F18 PET imaging and beta-amyloid42, respectively, may be promising for predicting neurological outcomes after TBI;**
- **The overall goal of this project was to determine if detection of amyloid in the brain of TBI subjects predicts long-term outcomes.**

METHODS

- **Patients (n=7) admitted to Parkland hospital, Dallas, Texas, that suffered a mild or moderate TBI (GCS 9-15) were enrolled in the TBI And florbetapir F18 PET imaging (TAP) study;**
- **Florbetapir F18 PET imaging was conducted at ~day 14 and at 12 months after TBI;**
- **Data from the ImPACT (cognitive, symptom) test was collected at 12 months after injury;**
- **Blood (8cc) was also collected from the participants on days ~14 and at 12 months after injury.**

RESULTS

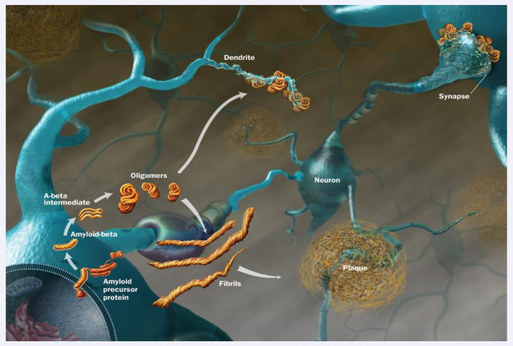

Figure 1. Amyloid Plaque Production in the Brain.

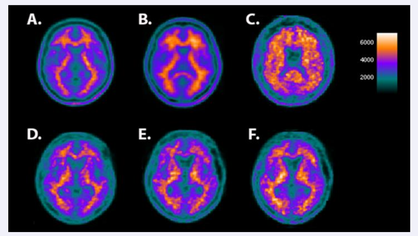

Figure 2. Florbetapir F18 PET Images from Mild, Moderate, and Severe TBI Subjects. Transverse sections of florbetapir F18 PET scans obtained from healthy age-matched controls (A, 50 year old control; B, 38 year old control), and mild (D), moderate (E) and severe (F) TBI subjects at ~14-30 days after injury. Panel C is a positive control (AD subject) for cortical uptake of florbetapir F18.

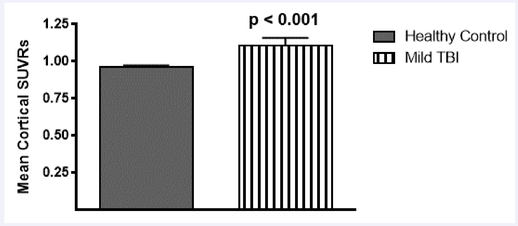

Figure 3. Mean Cortical Standard Uptake Value Ratios are Increased in Mild TBI Subjects at day 14 after TBI

Subject	Injury Severity (ER GCS)	12 Month Cognitive Efficiency Index (CEI)	12 Month Symptom Score	12 Month Outcome
1	13	0.34	3	Good
2	10	0.11	37	Poor
3	13	0.53	0	Good
4	14	0.35	0	Good
5	15	0.10	43	Poor
6	14	0.41	3	Good
7	14	0.02	57	Poor

Table 1. 12 Month Symptom Scoring and Cognitive Outcomes in Mild TBI Subjects.

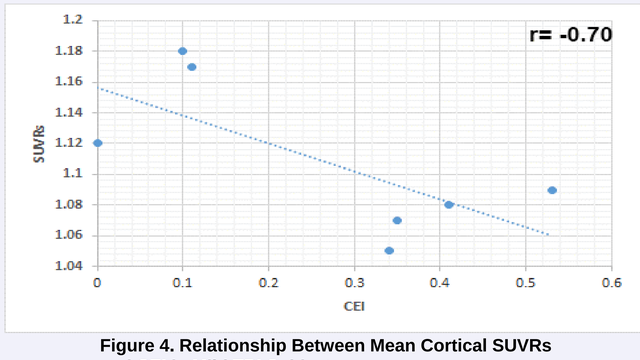

Figure 4. Relationship Between Mean Cortical SUVRs and CEI in Mild TBI Subjects.

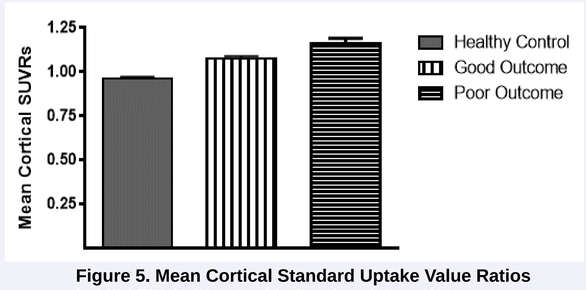

Figure 5. Mean Cortical Standard Uptake Value Ratios in Mild TBI Subjects with Good and Poor Outcomes.

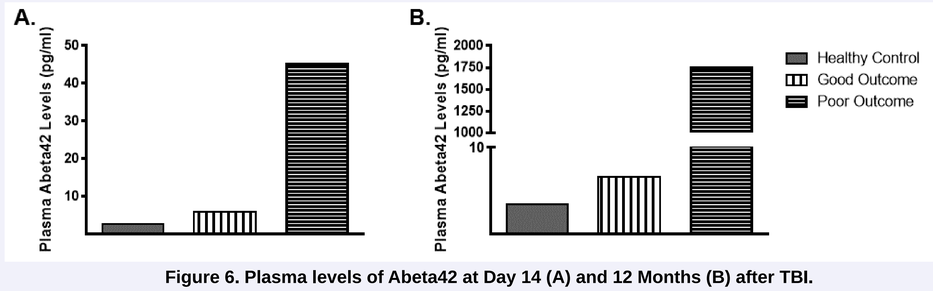

Figure 6. Plasma levels of Abeta42 at Day 14 (A) and 12 Months (B) after TBI.

CONCLUSION

- **Compared to healthy controls, a significant increase in amyloid production in the brain was observed in the mild TBI population. SUVRs were greater in the TBI subjects with poorer outcomes and correlated with poor cognitive performance and symptom worsening at 12 months after injury.**
- **Data presented here suggests that early florbetapir F18 PET imaging and detection of plasma abeta42 predicts outcomes in TBI survivors.**