

Portland State University

PDXScholar

Student Research Symposium

Student Research Symposium 2024

May 8th, 11:00 AM - 1:00 PM

S100B as a Protein Marker for Intracranial Hemorrhages

Anthony Phan
Portland State University

Follow this and additional works at: <https://pdxscholar.library.pdx.edu/studentsymposium>



Part of the [Medicine and Health Sciences Commons](#)

Let us know how access to this document benefits you.

Phan, Anthony, "S100B as a Protein Marker for Intracranial Hemorrhages" (2024). *Student Research Symposium*. 65.

<https://pdxscholar.library.pdx.edu/studentsymposium/2024/posters/65>

This Poster is brought to you for free and open access. It has been accepted for inclusion in Student Research Symposium by an authorized administrator of PDXScholar. Please contact us if we can make this document more accessible: pdxscholar@pdx.edu.

Background Information

Traumatic brain injuries (TBIs) are one of the leading causes of death and disability for people who are between 1 to 44 years old (Berwick, 2016). Each year, approximately 50,000 TBIs result in death, and approximately 80,000 TBIs result in a permanent disability (Brain Trauma Foundation, n.d). When a patient comes in with a moderate to severe TBI, they often will receive a head CT scan to determine presence of an intracranial hemorrhage (ICH) or concussion. Performing these scans is not a clear indicator of an ICH or concussion. In rural areas, some lack the access to a CT scanner which will result in transferring patients to hospitals that are more equipped further away. This results in a greater delay in the immediate care a patient can receive. A more feasible option would be collecting blood samples to conduct a test. Including an examination of the S100B and GFAP protein markers concentration, which may be critical to the medical decisioning making process. S100B is an astrocytic protein that is released in higher concentrations for neurodegenerative diseases, circulatory arrest, strokes, and traumatic brain injuries. GFAP is also an astrocytic protein that indicates neurological deficits. It is released within 3-4 hours following hemorrhagic stroke, while its release is delayed to 24-48 h post injury in ischemic stroke. Currently, there is active research on the potential relationship between protein markers and ICH, but there is not enough research to solidify a cohesive relationship.

Aims

Perform an enzyme-linked immunoglobulin assay (ELISA) to measure the level of S100B protein within the blood serum sample of patients and determine if there is a stronger relevance between intracranial hemorrhage and S100B levels compared to GFAP levels.

Study Design

Participants

- Data from a 2015-2017 multicenter randomized clinical trial evaluating the use of TXA initiated in a prehospital setting and continued in the hospital setting across North America
- This project only includes subjects that received the placebo arm

Groups:

- Patients that were clinically diagnosed with an ICH by a CT Image
- Patients that were not clinically diagnosed with an ICH by a CT Image

Study Design

Study Enrollment Criteria

- GCS 3 – 12
- Age of 15 years or older
- Patients with a potential Traumatic Brain Injury; Blunt or Penetrating
- Known or estimated time of injury of less than three hours

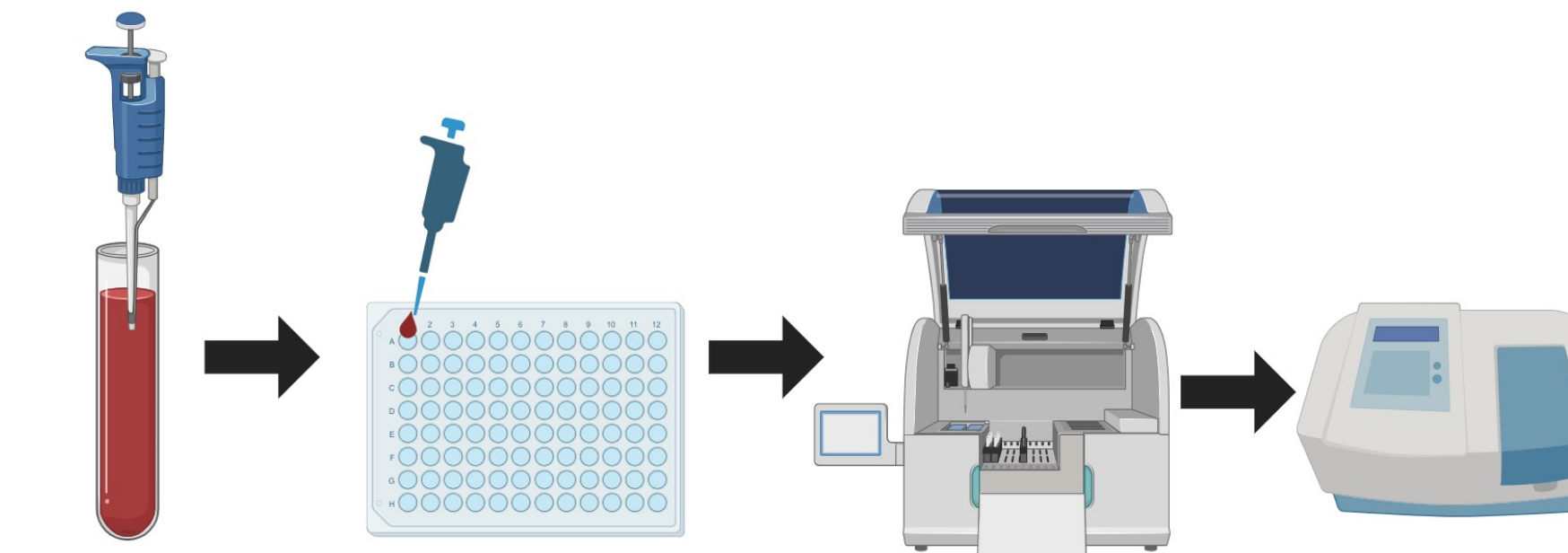


Figure 1. ELISA Protocol

Planned Analysis and Data Collection

- Measuring S100B levels by an ELISA on the blood serum samples
- Comparing S100B levels of patients with and without an ICH
- Compare S100B levels and GFAP levels of patients with and without an ICH

Table 1. Baseline Characteristics

Baseline Characteristics	ICH (N=171)	No (N=128)	P value
Age	35 (26, 56)	36 (23, 52)	0.116
Male	136	89	
Female	35	39	0.047
Initial GCS on Scene	6 (4, 9)	8 (6,11)	<0.001
1st documented GCS in hospital	6 (3, 8)	6 (3, 10)	0.106
ISS	22 (17, 30)	8.5 (2, 17)	0.00

** GCS – Glasgow Coma Scale
** ISS- Injury Severity Scale

Table 2. Mechanism of Injury of Patients

Mechanism of Injury	ICH	No ICH
MVC occupant	58 (39.9%)	54 (42.5%)
MVC pedestrian	19 (11.1%)	22 (17.3%)
MVC bicyclist	10 (5.8%)	2 (1.6%)
MVC motorcyclists or off-road	19 (11.1%)	9 (7.1%)
Suicide	9 (5.3%)	0 (0.0%)
Assault	15 (8.8%)	9 (7.1%)
GLF	17 (9.9%)	19 (15.0%)
Fall from height (>1m)	21 (12.3%)	11 (8.7%)
Other Causes	3 (1.8%)	1 (.08%)

Table 3. Hospital Outcomes

	ICH	No ICH	P - Value
ICU-free days	18 (0, 25)	26 (24, 28)	0.00
Hospital-free days	5 (0, 18.5)	24 (18, 26)	0.000
Ventilator-free days	23 (0, 26)	27 (26, 18)	0.000
Number of CT Scan within Hospital	2 (2, 3)	1 (1, 1)	<0.001
Mortality at discharge	45	0	<0.001

Expected Results, Conclusion, and Impact

This project is ongoing and is still collecting preliminary data on the S100B levels of participants.

Anticipated Results: We hypothesize that participants diagnosed with an ICH will have a greater S100B concentration within their blood serum compared to those who were not diagnosed with ICH.

The mechanism of injury for the patients with an ICH and without ICH were relatively similar besides fall from height having a larger number of patients with an ICH. There were more male patients enrolled in the ICH and no ICH group than female patients. Patients with an ICH had longer ICU and Hospital stays than patients without an ICH. The initial GCS of patients with an ICH were lower than those without an ICH and the ISS of patients with an ICH is higher than those without an ICH.

- Understanding the importance of protein markers
- Possibly guidelines on approach to suspected moderate to severe TBI
- Expose patients to less radiation if possible

Literature Citations

Berwick, D., Downey, A., Cornett, E., Committee on Military Trauma Care's Learning Health System and Its Translation to the Civilian Sector, Board on Health Sciences Policy, Board on the Health of Select Populations, Health and Medicine Division, & National Academies of Sciences, Engineering, and Medicine (Eds.). (2016). A National Trauma Care System: Integrating Military and Civilian Trauma Systems to Achieve Zero Preventable Deaths After Injury. National Academies Press (US).

Brito, A. M. P., Schreiber, M. A., El Haddi, J., Meier, E. N., & Rowell, S. E. (2023). The effects of timing of prehospital tranexamic acid on outcomes after traumatic brain injury: Subanalysis of a randomized controlled trial. The journal of trauma and acute care surgery, 94(1), 86–92. <https://doi.org/10.1097/TA.0000000000003767>

Frequently asked questions (FAQ). Brain Trauma Foundation. (n.d.). <https://braintrauma.org/info/faq>

Acknowledgements

- Funded by NIH Build EXITO: UL1GM118964, RL5GM118963, TL4GM118965,
- NIH DOD: 5U01HL077863-11, 1R01HL126585
- Laura Nguyen, Samantha Underwood M.S., Martin Schreiber M.D., OHSU Trunkey Center, PSU Build EXITO