

Applying Data Mining Methods To the Study Of Blast-related Mild Traumatic Brain Injury



melissamemorial.org

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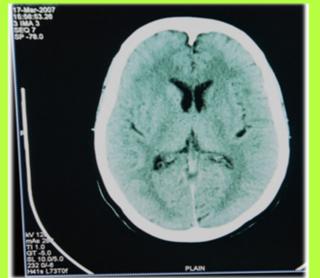
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http://wiki.ornl.gov/sites/rams09/j_gauld/Pages/default.aspx

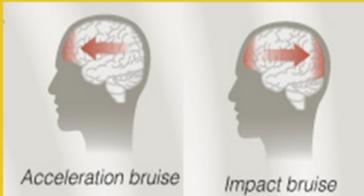


metroskans.in

Why mTBI?

- Mild traumatic brain injury, or mTBI, is one of the most common forms of injury sustained in Operation Iraqi Freedom
- Initial symptoms may appear mild, but patients often have lifelong, debilitating complications
- Misdiagnosis is common
- Symptoms may appear up to a year after initial injury
- No standard treatment or diagnosis exists
- Focus on blast-related mTBI

nytimes.com



Mechanism of blast mTBI



Mechanism of impact mTBI

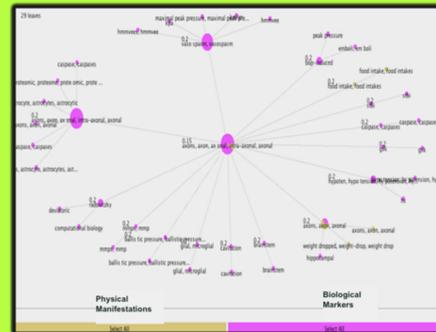
Research Goals

- Collect literature from various academic sources
- Analyze sources using the data mining software PIRANHA
- Integrate and display results to provide a clearer representation on the manifestations and biological processes related to mTBI

Approach to Data Mining

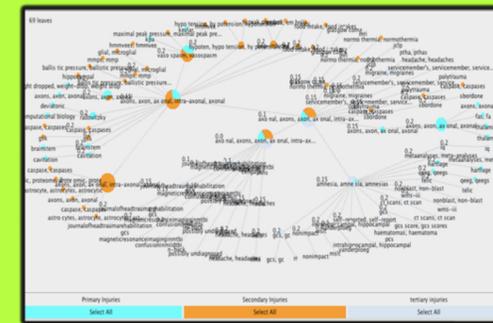


PIRANHA Visual Analysis



Cluster analysis of mild traumatic brain injury by physical and biological manifestations

Cluster analysis divided into primary, secondary, and tertiary injuries



Categorical Word Analysis

- Specific words repeated in mTBI literature
- Key words analyzed and integrated into separate PIRANHA categories

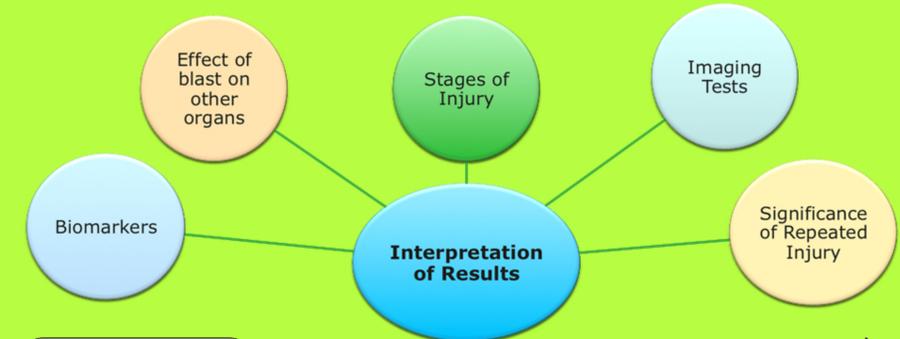


Primary Injury- axonal shearing, grey matter, thalamus, reduced blood flow

Secondary injury- inflammatory response, microglial cells, cerebral and cortex, astrocytes, GFAP, caspase upregulation

Tertiary injury- memory, headache, amnesia, depression, sleeping disorders

Results



Primary Injuries

- Physical damage after blast injury
- Imaging insignificant unless immediately after
- Axonal shearing, thalamus damage

Secondary Injuries

- Inflammatory and other molecular responses after brain injury
- Biomarkers: Microglial cells, astrocytic activation, caspase upregulation, GFAP

Tertiary Injuries

- Mental/mood changes, even with no sign of brain damage
- APP (amyloid precursor protein) in white matter

Conclusions

- Clearer interpretation of causes and manifestations
- Biomarkers for future studies
- Analysis and integration facilitated by PIRANHA

Future Research

- Exact role of the thalamus
- Significance of repeated blast injury
- Blast injury's effect on other organs
- Biomarkers such as microglial cells, astrocytes, caspases, and APP