

Category : **Brain: head trauma**

A108 - Role of UCH-L1/GFAP and t-Tau/GFAP ratios in predicting neuronal and glial injury following systemic insults in traumatic brain injury

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Introduction:

The aim of this study is to assess if early Systemic Insults (SIs) have a different impact on neuronal and glial cells, and consequently on three brain injury biomarkers (GFAP, t-Tau and UCH-L1) and their ratios (UCH-L1/GFAP and t-Tau/GFAP).

SIs, specifically hypoxemia and hypotension, aggravate brain damage following traumatic brain injury (TBI) and are associated with injury severity, treatment intensity in the Intensive Care Unit (ICU), and patient outcomes.

Methods:

We extracted data from ICU patients recruited for the CENTER-TBI study and divided them into four groups according to the occurrence of SIs in the prehospital setting: hypoxemia (SpO₂ < 90 %), hypotension (SBP < 90 mmHg), both, no SIs.

We then compared neuronal (expressed by the release of UCH-L1 and t-Tau) and glial (expressed by the release of GFAP) injury and the biomarker ratios among the groups.

Results:

A total of 1695 patients were included in the analysis. The impact of SIs on neuronal and glial injury showed significant differences among the four groups (Table 1).

UCH-L1 and t-Tau levels were higher in the presence of hypotension and both SIs compared to the no-SIs group, whereas they showed only a slight increase in the case of hypoxemia alone. Conversely, GFAP values did not differ significantly among the four groups.

Additionally, the UCHL-1/GFAP and t-Tau/GFAP ratios displayed higher values in hypotension and both SIs groups and minimum values in patients without SIs or with hypoxemia only.

Conclusion:

Early SIs led to the release of brain injury biomarkers, with a more significant increase in biomarkers of cell body and axonal injury than of glial injury. Moreover, there was a clear hierarchy among the four groups, with patients affected by hypotension and both SIs showing the highest values. This was further confirmed by the rise in the two ratios.

These findings could have potential implications for the management of hypotension and hypoxemia in the prehospital setting.

Table:

	No SIs	Hypoxemia	Hypotension	Both
N (%)	1280 (75.5)	158 (9.3)	142 (8.4)	115 (6.8)
UCH-L1***	245.90 (108.8, 531.7)	344.50 (182.5, 717.9)	362.71 (177.8, 849.4)	449.03 (240.1, 887.9)
t-Tau***	6.29 (3.0, 13.4)	7.90 (4.1, 18.6)	9.43 (4.6, 20.7)	10.43 (5.5, 19.3)
GFAP ^o	14.66 (4.8, 36.7)	17.63 (7.5, 41.2)	15.92 (5.7, 42.7)	17.18 (6.0, 50.8)
Ratios				

UCH-L1/GFAP***	16.86 (11.9, 26.7)	17.44 (11.95, 33.3)	20.38 (14.4, 30.4)	23.19 (15.2, 53.1)
t-Tau/GFAP*	0.47 (0.3, 0.8)	0.43 (0.3, 0.96)	0.56 (0.3, 1.1)	0.62 (0.4, 1.4)

Data are median (IQR); first value; Abbreviations: GFAP = glial fibrillary acidic protein (mcg/L), UCH-L1 = ubiquitin C-terminal hydrolase L1 (pg/mL), t-Tau = total Tau (pg/mL). Kruskal-Wallis test for the comparison of SIs groups. P-value signif. codes: <0.001 “***”; 0.001 “**”; 0.01 “*”; 0.05 “ ”; 0.1 “o”