Trauma brain injury: evaluation of accuracy of specific plasmatic proteins as support to CT scan

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Abstract

BACKGROUND: Head trauma is a common cause of admission in emergency departments (ED) and computerized tomography (CT) is the gold standard to diagnose trauma brain injury (TBI). The possibility of identifying other brain injury markers (such as optic nerve echograph and specific plasmatic biomarkers) is crucial for the early diagnosis of mild head trauma and for reducing the patient exposure to unnecessary radiation.

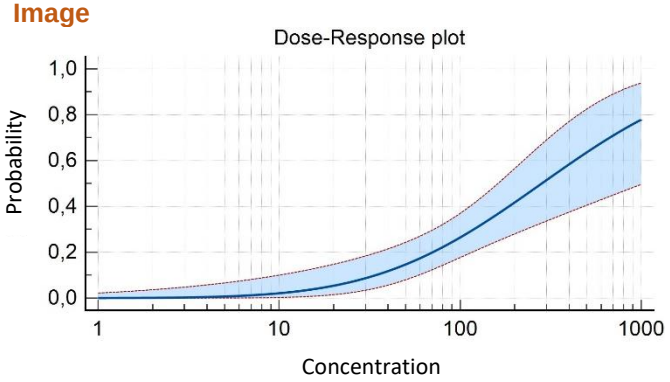
AIM: Assessment of the combination of different brain injury markers for TBI prediction.

METHOD: We verified the diagnostic accuracy of a new test for measurement of two specific proteins, glial fibrillary acidic protein (GFAP) and ubiquitin carboxy-terminal hydrolase L1 (UCHL1). These proteins are released into plasma after brain damage. The evaluation of optic nerve dilation was another parameter included in this study as sign of intracranial hypertension. We enrolled 98 patients with mild head trauma who arrived in ED. Each patient underwent a nerve optic echography, a head CT and a blood sample to measure GFAP and UCHL1.

RESULTS: Analysing the data, 76.53% of patients presented a normal value of GFAP and UCHL1 and a negative head CT (with a specificity and sensitivity equal to 72.21% and 40%). The remaining 23.47% had an increased of protein levels within 12 hours of the injury where a head CT confirmed a TBI in 8.8%. A possible correlation between proteins level and dilation of optic nerve is still under evaluation.

CONCLUSION: These statistics showed that the GFAP and UHCL1 plasmatic levels have a high negative predictive value and it can be a valid support for excluding the need of CT scan, especially if it matches with other parameters. Further studies are required to confirm the efficacy of these biomarkers.

Image



Recent Publications

1. Humaloja J, Ashton NJ, Skrifvars MB. Brain Injury Biomarkers for Predicting Outcome After Cardiac Arrest. Crit Care. 2022 Mar 22;26(1):81.
2. Bazarian JJ, Biberthaler P, Welch RD, et Al. Serum GFAP and UCH-L1 for prediction of absence of intracranial injuries on head CT (ALERT-TBI): a multicentre observational study. Lancet Neurol. 2018 Sep;17(9):782-789.
3. Amoo M, Henry J, O'Halloran PJ, Brennan P, Husien MB, Campbell M, Caird J, Javadpour M, Curley GF. S100B, GFAP, UCH-L1 and NSE as predictors of abnormalities on CT imaging following mild traumatic brain injury: a systematic review and meta-analysis of diagnostic test accuracy. Neurosurg Rev. 2022 Apr;45(2):1171-1193.
4. Capizzi A, Woo J, Verduzco-Gutierrez M. Traumatic Brain Injury: An Overview of Epidemiology, Pathophysiology, and Medical Management. Med Clin North Am. 2020 Mar;104(2):213-238.
5. Barbosa RR, Jawa R, Watters JM, et Al; Eastern Association for the Surgery of Trauma. Evaluation and management of mild traumatic brain injury: an Eastern Association for the Surgery of Trauma practice management guideline. J Trauma Acute Care Surg. 2012 Nov;73(5 Suppl 4):S307-14.
6. Czeiter E, Amrein K, Gravesteijn BY et Al; CENTER-TBI Participants and Investigators. Blood biomarkers on admission in acute traumatic brain injury: Relations to severity, CT findings and care path in the CENTER-TBI study. EBioMedicine. 2020

Jun;56:102785.

Biography

Dr Claudia Carelli is an Emergency Resident at University of Naples “Federico II” and she is training in the emergency department of C.T.O. Hospital of Naples. Dr Claudia Carelli has her expertise in hemodynamic monitoring and in the using of non-invasive device.

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Notes/Comments: