INPLASY PROTOCOL

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Support: None.

Review Stage at time of this submission: Formal screening of search results against eligibility criteria.

Conflicts of interest: None.

Cerebrospinal fluid and blood levels of neurofilament light chain in traumatic brain injury: a systematic review and meta-analysis

Karantali, E[1]; Kazis, D[2]; Chatzikonstantinou, S[3]; McKenna, J[4]; Petridis, F[5]; Mavroudis, I[6].

Review question / Objective: Can neurofilament light chain levels in blood or CSF discriminate patients suffering from a traumatic brain injury from healthy controls?

Condition being studied: Traumatic brain injury (TBI) is one of the leading causes of disability in the United States and contributes approximately one-third of all injury-related deaths. Various biomarkers are currently studied for their efficacy in the early identification of patients with TBI and predicting the prognosis. Neurofilament light chain (NfL) is a protein, highly expressed in large myelinated axons. Increased levels are indicative of axonal damage and neuronal degeneration, and have been reported in various diseases, including traumatic brain injury. Nonetheless, the results have been inconsistent.

INTRODUCTION

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METHODS

Search strategy: ((concussion OR traumatic brain injury OR TBI OR head trauma) AND (neurofilament light chain OR NFL)).

Participant or population: We will include studies with adult patients (18 years or older) suffering from TBI.

Intervention: Evaluation of NfL levels in blood and CSF.

Comparator: Healthy controls or the same patients at different time-points (ex. pre- and post-concussion).

Study designs to be included: All studies excluding case reports JC case series (number of participantsЁн10).

Eligibility criteria: Inclusion criteria: 1.Original article, 2.All studies excluding case reports JC case series, 3.Participants: adults Ён 18years old, diagnosis of TBI (any severity), 4.Examining the role of NfL in discriminating between patients and healthy controls or the same patients at different time-points, 5.Examining the correlation of NfL with other potential TBI biomarkers or the correlation of NfL between serum and CSF; Exclusion criteria: 1.Study of NfL in biological specimens except for blood or CSF, 2.non-human studies, 3.Overlaping patient sample between studies, 4.Systematic reviews or meta-analyses.

Information sources: Pubmed, Web of Science, and Cochrane databases will be sought by using the search strategy: ((concussion OR traumatic brain injury OR TBI OR head trauma) AND (neurofilament light chain OR NFL)) up to 15 September 2020 with no language and publication status restrictions.

Main outcome(s): The difference of NfL levels between patients suffering from TBI and healthy controls.

Additional outcome(s): 1.The correlation between NfL as a potential biomarker and other biomarkers, 2.The role of NfL in discriminating between TBI of different severity, 3.The role of NfL as a potential predictor of outcome, 4.Contribution of other factors.

Data management: The extracted information will include: 1.Title, 2.First Author, 3.Year of publication, 4.Assessment of methodological quality, 5.Patient characteristics (age, type of TBI, number of patients in each group, initial GCS, clinical outcome scale, and results), 6.Specimen type, assay used, timing of collection, and NfL levels.

Quality assessment / Risk of bias analysis: Two authors will independently assess the risk of bias of each included study. Based on the Cochrane Handbook of Systematic Reviews, 7 aspects will be examined and they will be rated as High, Low, or Unclear risk of bias. Any arising disagreements between the two authors will be solved through discussion with the help of a third author.

Strategy of data synthesis: R studio, libraries meta, and mada software will be used to perform the final data combination and meta-analysis. Additional analyses will be performed, such as sensitivity analysis, subgroup analysis, analysis for the detection of potential publication bias, in order to assess the robustness of our results.

Subgroup analysis: Patients will be further categorized based on TBI severity and the NfL levels of each group will be compared to NfL levels of healthy controls.

Sensibility analysis: Sensitivity analysis will be conducted to assess the robustness of our results.

Country(ies) involved: Greece.

Keywords: traumatic brain injury; concussion; neurofilament light chain; biomarker.

Contributions of each author:
Author 1 - Eleni Karantali.
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