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**EVOLIUCINĖ MEDICINA:
ŽMOGAUS RAIDOS PERSPEKTYVOS IR SVEIKATA
BESIKEIČIANČIOJE APLINKOJE**

**EVOLUTIONARY MEDICINE:
PERSPECTIVES ON HUMAN DEVELOPMENT AND HEALTH
CONSEQUENCES IN A CHANGING ENVIRONMENT**

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Vilniaus universiteto Medicinos ir sveikatos mokslų
Doktorantūros mokykla, VU Medicinos fakultetas

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EARLY AND DELAYED SERUM BIOMARKERS FOR PREDICTING BRAIN DEATH AFTER ACUTE BRAIN INJURY: NEURON-SPECIFIC ENOLASE AND S100 CALCIUM-BINDING PROTEIN B

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Background and Aim: Early neuroprognostication after severe acute brain injury remains challenging because clinical assessment may be affected by sedation, metabolic disturbances, and hemodynamic instability. This study aimed to evaluate the prognostic value of neuron-specific enolase (NSE) and S100 calcium-binding protein B (S100b) for predicting brain death (BD) and compare their performance with conventional clinical severity scores.

Materials and Methods: This ongoing observational study included 108 adult patients admitted to a tertiary intensive care unit between September 2024 and May 2026 with severe acute brain injury. Clinical severity was assessed using the Glasgow Coma Scale (GCS) and Acute Physiology and Chronic Health Evaluation II (APACHE II). Serum NSE and S100b concentrations were measured within the first 24 hours after ictus (early measurement) and repeated at 72 hours (delayed measurement). Receiver operating characteristic (ROC) analysis and multivariable logistic regression were performed to identify predictors of BD.

Results: Delayed biomarker measurements showed superior prognostic performance compared with early measurements and clinical severity scores. Delayed S100b demonstrated the highest predictive accuracy for BD, with an area under the curve (AUC) of 0.975 (95% confidence interval [CI] 0.946–1.000), sensitivity of 87.9%, and specificity of 98.3%. Delayed NSE also showed excellent discrimination (AUC 0.939, 95% CI 0.885–0.994). GCS and APACHE II demonstrated lower predictive performance (AUC 0.833 and 0.781, respectively). After adjustment for age, GCS, APACHE II, and NSE, delayed S100b remained independently associated with BD (adjusted odds ratio 2.301, 95% CI 1.326–3.993; $p = 0.003$).

Conclusions: Serum NSE and S100b are promising biomarkers for neuroprognostication after severe acute brain injury. Delayed S100b showed the strongest independent association with brain death and outperformed conventional clinical severity scores. Serial biomarker assessment may improve multimodal prognostication in critically ill neurological patients.

Keywords: acute brain injury, brain death, neuroprognostication, NSE, S100b