

INTERLEUKIN 10 AND HEART FATTY-ACID BINDING PROTEIN AS EARLY OUTCOME PREDICTORS IN PATIENTS WITH TRAUMATIC BRAIN INJURY

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BACKGROUND

Patients having experienced a traumatic brain injury (TBI) may later suffer from cognitive, behavioral, emotional and physical impairments. Several proteins have been investigated as biomarkers to guide clinicians’ decision-making in order to optimize patients’ care taking. Single proteins such as S100 calcium-binding protein β (S100 β), glial fibrillary acidic protein (GFAP) and neurofilament light (NF-L) have been widely studied for this purpose. More recently, combinations of biomarkers with clinical parameters have gained in interest to enhance the diagnostic accuracy.

MATERIALS AND METHODS

The aim was to evaluate the individual and combined outcome prediction capacity of two proteins – interleukin 10 (IL-10) and heart fatty-acid binding protein (H-FABP) – and to compare them to the more studied proteins S100B, GFAP and NF-L. Patients diagnosed with an acute mild-to-severe TBI were recruited from the Turku University Hospital, Finland. A blood sample was collected <24h post trauma and a follow-up performed after 6-months. The outcome was measured using the Glasgow Outcome Scale Extended (GOSE) score. Patients were dichotomized into i) favorable (GOSE \geq 5) and unfavorable outcome (GOSE \leq 4) and ii) complete (GOSE 8) and incomplete (GOSE \leq 7) recovery groups for statistical analyses.

DIFFERENTIATION BETWEEN GOSE FAVORABLE AND UNFAVORABLE OUTCOME

	Mann U	% pAUC (95% CI)	Threshold	%SP (95% CI)	95-100 %SE (95% CI)
IL-10	<0.001	1.4 (0.7-3.0)	0.39	50.0 (36.7-63.3)	96.4 (89.3-100)
H-FABP	<0.001	1.1 (0.6-2.7)	4.31	30.0 (18.3-41.7)	96.4 (89.3-100)
GFAP	<0.001	0.8 (0.3-2.3)	415.00	28.3 (16.7-40.0)	96.4 (89.3-100)
NF-L	<0.001	0.5 (0.2-4.4)	5.47	10.0 (3.3-18.3)	100 (100-100)
S100 β	0.001	0.1 (0-1.4)	23.17	6.7 (1.7-13.3)	96.4 (89.3-100)

RESULTS

The levels of all five proteins were significantly different in both outcome analyses (p < 0.05). The best performing protein to correctly classify favorable vs. unfavorable outcome was IL-10 with a sensitivity of 96% (95% CI 89–100) and specificity reaching 50% (95% CI 37–63). A panel combining IL-10 with patient’s age and TBI severity increased the prediction sensitivity to 96% (95% CI 89–100) with a specificity of 80% (95% CI 69.5-89.8). H-FABP was the best performing protein for detection of complete recovery, reaching a sensitivity of 97% (95% CI 92–100) and a specificity of 28% (95% CI 12–44). Again, when combined with patient’s age and TBI severity, the performance enhanced to 95% (95% CI 89–100) sensitivity and 52% (95% CI 32-72) specificity.

CONCLUSIONS

These results indicate that the proteins IL-10 and H-FABP could individually be used to predict outcome in patients with TBI. Furthermore, panels of biomarkers with clinical parameters together could greatly increase the accuracy in predicting the outcome after a TBI.



DIFFERENTIATION BETWEEN COMPLETE AND INCOMPLETE OUTCOME

	Mann U	% pAUC (95% CI)	Threshold	%SP (95% CI)	95-100 %SE (95% CI)
H-FABP	0.009	0.8 (0.1-1.9)	3.47	28.0 (12.0-44.0)	96.8 (92.1-100)
NF-L	<0.001	0.4 (0.0-1.2)	4.85	12.0 (0.0-24.1)	98.4 (95.2-100)
S100 β	0.012	0.3 (0.0-1.2)	23.17	28.3 (0.0-28.0)	96.8 (92.1-100)
IL-10	0.002	0.2 (0.0-1.1)	0.19	10.0 (0.0-24.0)	95.2 (88.9-100)
GFAP	<0.001	0.0 (0.0-1.4)	145.14	6.7 (0.0-28.0)	95.2 (88.9-100)

Biomarkers are shown in order according to their specificity obtained at 95-100% sensitivity. Mann U: Mann-Whitney U-test; pAUC: partial area under the curve; SP: specificity; SE: sensitivity; IL-10: interleukin 10; H-FABP: heart fatty-acid binding protein; GFAP: glial fibrillary acidic protein; NF-L: neurofilament light; S100B: S100 calcium-binding protein B. All threshold concentrations are in pg/mL except for H-FABP which is in ng/mL.