

Background and Aims

Glial fibrillary acidic protein (GFAP) in serum is a promising biomarker to differentiate between acute ischemic stroke (AIS) versus intracerebral hemorrhage (ICH). We evaluated its diagnostic value through a systematic review and individual patient data (IPD) meta-analysis.

Methods

We performed a systematic search in PubMed database until November 2018 for publications that evaluated GFAP to differentiate AIS-ICH within the first 4.5 hours from symptom onset. Due to different assays employed for GFAP measurement, we standardized levels by calculating the Z-score. We used standardized IPD to assess its association with patient and stroke characteristics and factors related with GFAP measurement.

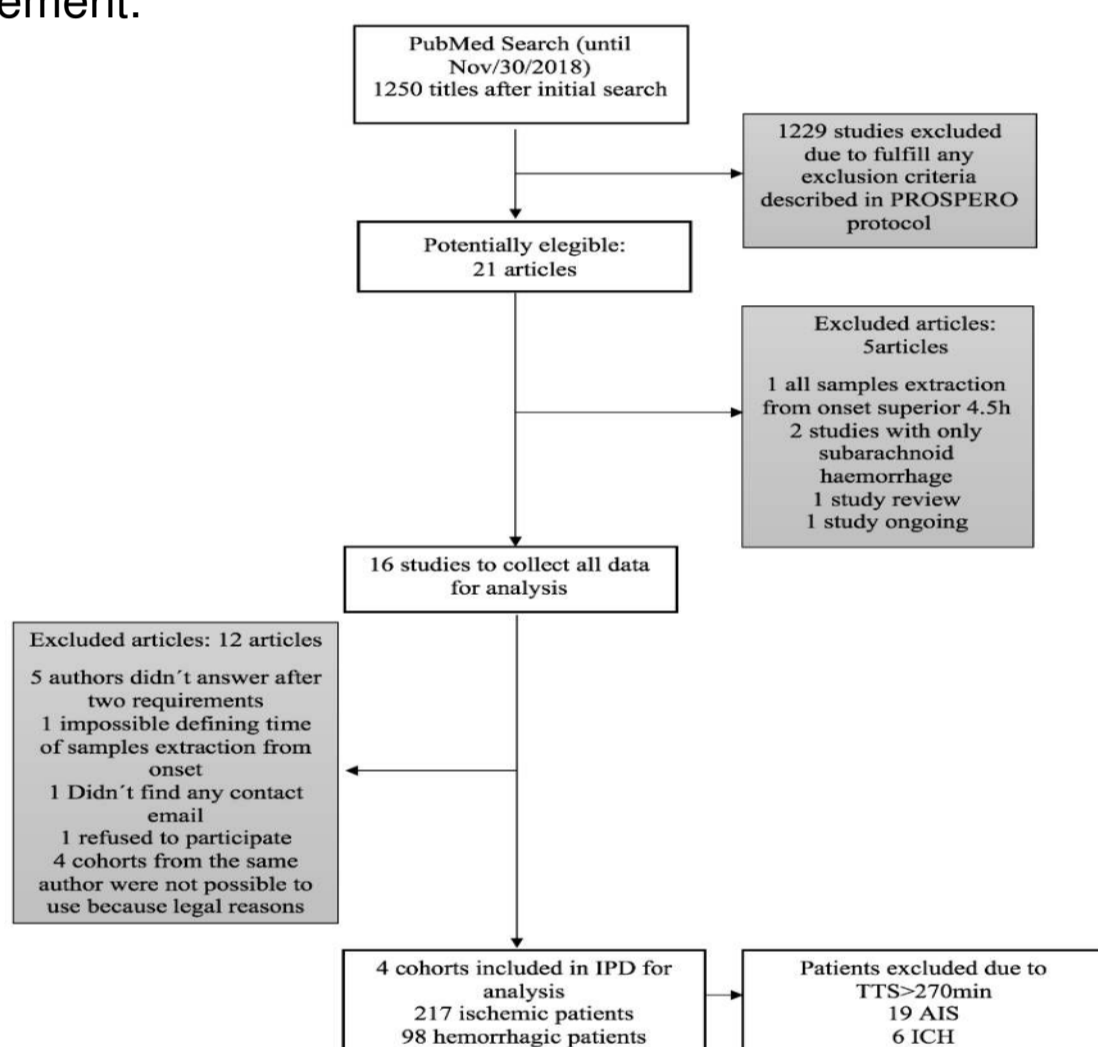


Figure 1: Flow chart diagram.

	Mondello	Rozanski	Tsivgoulis	Llombart	All
Environment	Hospital	Mobile Stroke Unit	Hospital	Hospital	-
Sample size	45	74	155	66	340
Rate ICH (%)	17 (37.8%)	25 (33.8%)	34 (21.9%)	28 (42.4%)	104 (30.6%)
Assay	Banyan	Roche-Cobas	Randox	AbNova	-
Female rate	14 (31.1%)	39 (52.7%)	79 (51.0%)	28 (42.4%)	160 (47.1%)
NIHSS	5 (2-13)	7.5 (4-15)	17 (8-23)	14 (9.5-18.5)	13 (5-20)
Age	58 (49-71)	73.5 (68-80)	77 (71-83)	78 (68-83.5)	75 (67.5-82)
Study GFAP	0.041 (0.02-0.41)	0.00 (0.00-0.01)	0.24 (0.00-0.36)	0.04 (0.04-0.04)	0.79 (0.78-0.82)
GFAP AIS	0.02 (0.00-0.05)	0.00 (0.00-0.00)	0.11 (0.00-0.27)	0.04 (0.04-0.04)	0.79 (0.75-0.81)
GFAP ICH	0.71 (0.17-2.44)	0.06 (0.00-1.37)	2.17 (0.55-10.12)	0.08 (0.04-0.68)	0.85 (0.78-1.25)
Outcome data	No	mRS 1 week	mRS 1 week	mRS 3 month AIS only	-

Table 1: Baseline features of studies. GFAP values are shown as standardized concentrations.

Results

IPD were provided from four studies (figure 1). Baseline of different studies are shown in table 1. GFAP blood levels were significantly elevated in ICH patients (figure 2 and figure 3). Both stroke types showed a positive correlation between baseline stroke severity and GFAP concentrations (correlation coefficient and p value: 0.267, $p < .0001$; 0.302, $p = 0.004$; for ischemic and ICH, respectively). No correlation was found between time to sampling (TTS) and GFAP levels (correlations coefficient and p value: 0,08, $p = 0,24$; 0,09, $p = 0,38$; for AIS and ICH, respectively). Others factors associated with GFAP levels were presence of dyslipidemia ($p = 0.017$) and hematoma volume ($r = 0,43$, $p = 0,004$), in AIS and ICH patients, respectively.

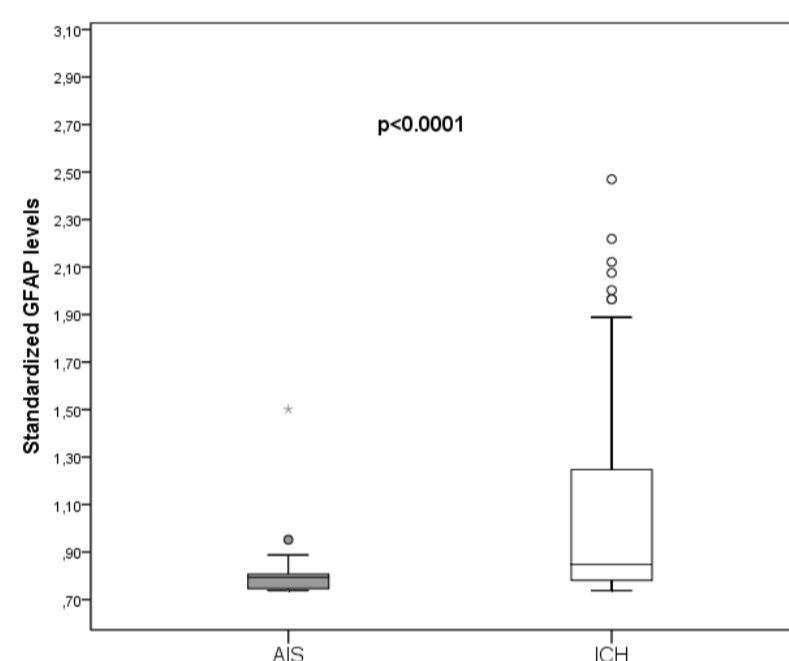


Figure 2: GFAP serum levels according stroke type. GFAP blood levels were significantly elevated in ICH patients [0.840 (0.781-1.239), 0.794 (0.741-0.806); median and interquartile range, for ICH and AIS, respectively.

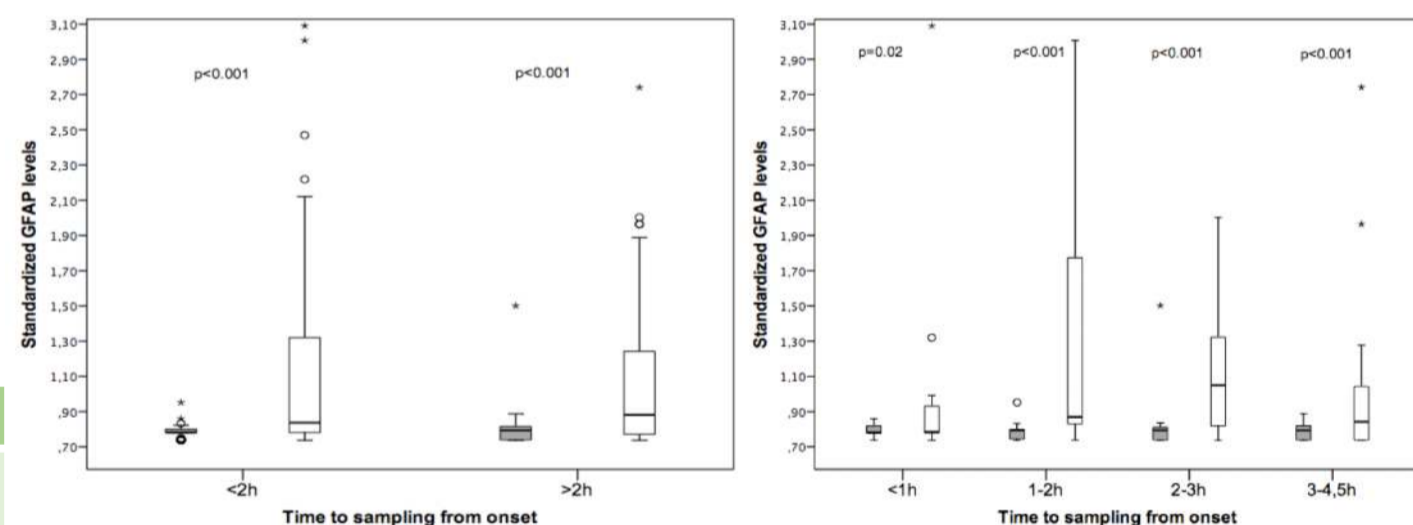


Figure 3: GFAP serum levels according stroke type. After dividing the sample into two and four groups depending on TTS, respectively. Both analysis show significant differences.

Conclusions

- ❑ The present IPD confirmed that GFAP serum levels were higher in ICH than AIS patients.
- ❑ Additionally, higher levels were associated with stroke severity regardless stroke subtypes.
- ❑ There was no association with TTS within first 4.5 hours, so GFAP could be a valuable tool in this framework.