

Analytical Validation of Minimally Invasive Capillary Blood Microsampling using Tasso+ for Multiplexed Neurological Biomarkers

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Background and aim

- Blood-based biomarkers are increasingly used to assess brain health, but venous sampling is difficult to deliver repeatedly in remote, field-based or participant-led settings.
- Tasso+ enables minimally invasive upper-arm capillary blood collection, with liquid whole blood collected in under 5 min and processed into plasma or serum.
- A 72 h room-temperature delay reflects the likely time between remote sample collection and laboratory processing.
- Validation is needed to determine whether Tasso+ agrees with matched venous samples and remains reliable after delayed processing.

Aim: To evaluate whether Tasso+ plasma and serum, processed immediately or after a 72 h room-temperature delay, provide reliable measurement of neurological biomarkers compared with venous blood.

Key results

- After a 72 h room-temperature delay, Simoa GFAP and NfL showed strong agreement with matched venous plasma and serum.**
- Alamar NULISeq showed protein-dependent agreement in plasma and serum, with GFAP and NPTX2 showing high agreement and NfL moderate agreement.**
- Multiplex proteomic agreement varied by analyte, supporting protein-specific validation before wider use.**

Tasso+ Device



- Tasso+ is a minimally invasive upper-arm capillary blood collection device.
- It uses a small lancet and gentle vacuum to collect liquid whole blood into a detachable tube.
- Samples can be collected in under 5 min, supporting rapid field-based or participant-led sampling.

Methods workflow

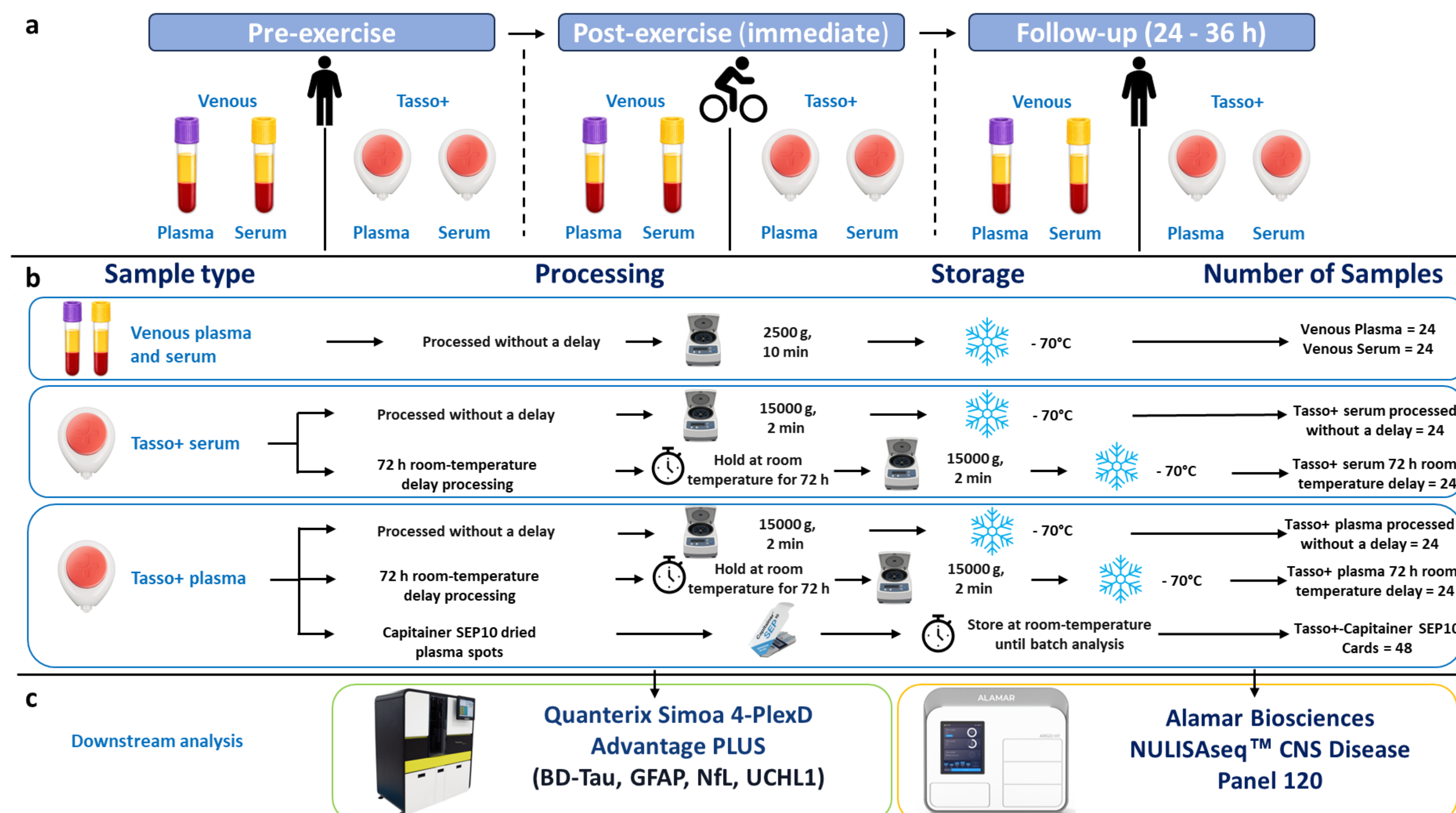


Figure 1. Study design and sample processing workflow. **a**, Blood was collected from eight healthy adults at pre-exercise, post-exercise and 24 to 36 h follow-up. **b**, Venous and Tasso+ plasma/serum were processed immediately or after a 72 h room-temperature delay. **c**, Samples were analysed using NULISeq CNS Disease Panel 120 and Simoa 4-PlexD+.

Results

Alamar NULISeq: Tasso+ 72 h vs Venous

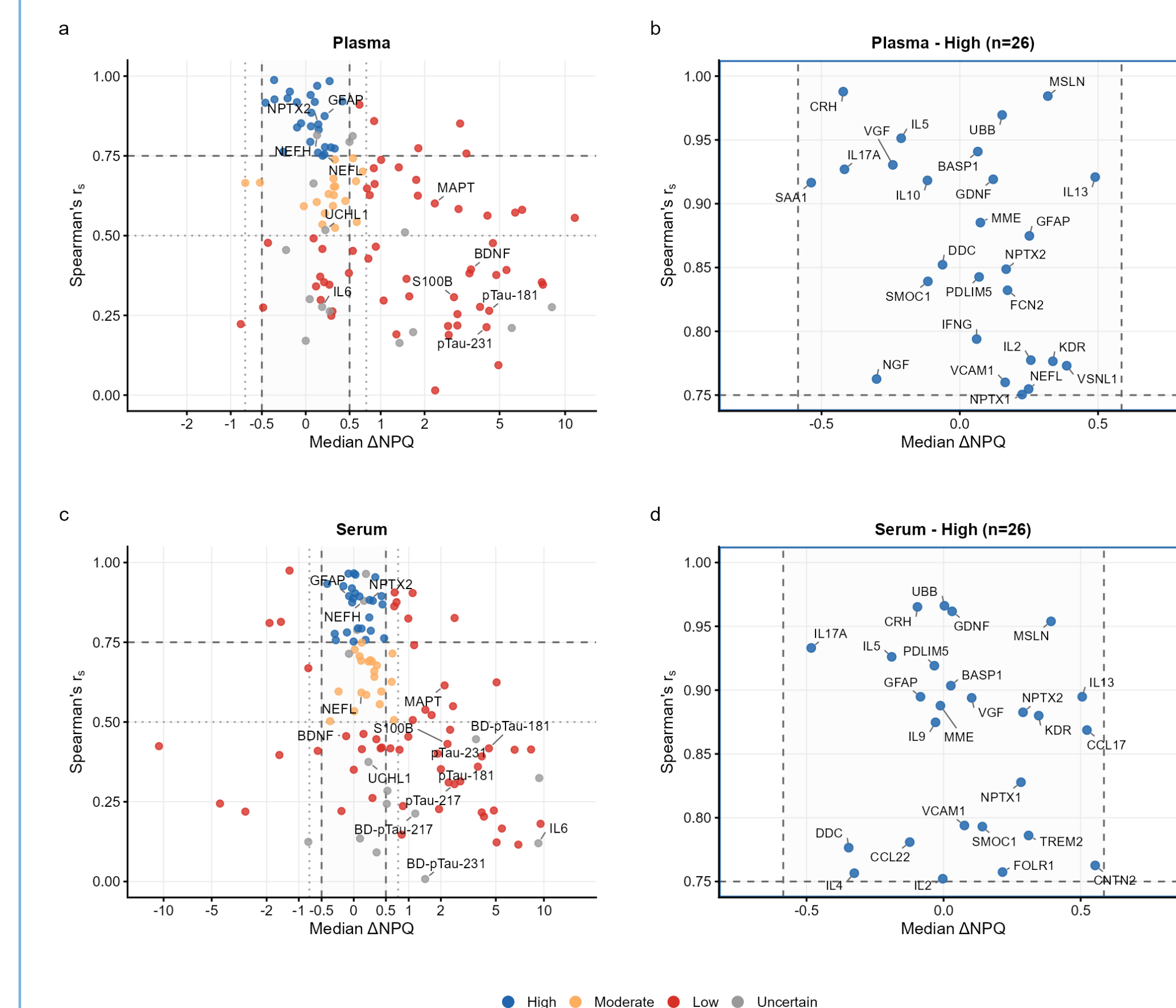


Figure 2. NULISeq agreement after 72 h delayed processing. **a, c**, Venous versus Tasso+ agreement across all measured proteins in plasma and serum. **b, d**, Zoomed views of high-performing proteins; dashed lines indicate agreement thresholds.

Simoa GFAP and NfL: Tasso+ 72 h plasma vs venous plasma

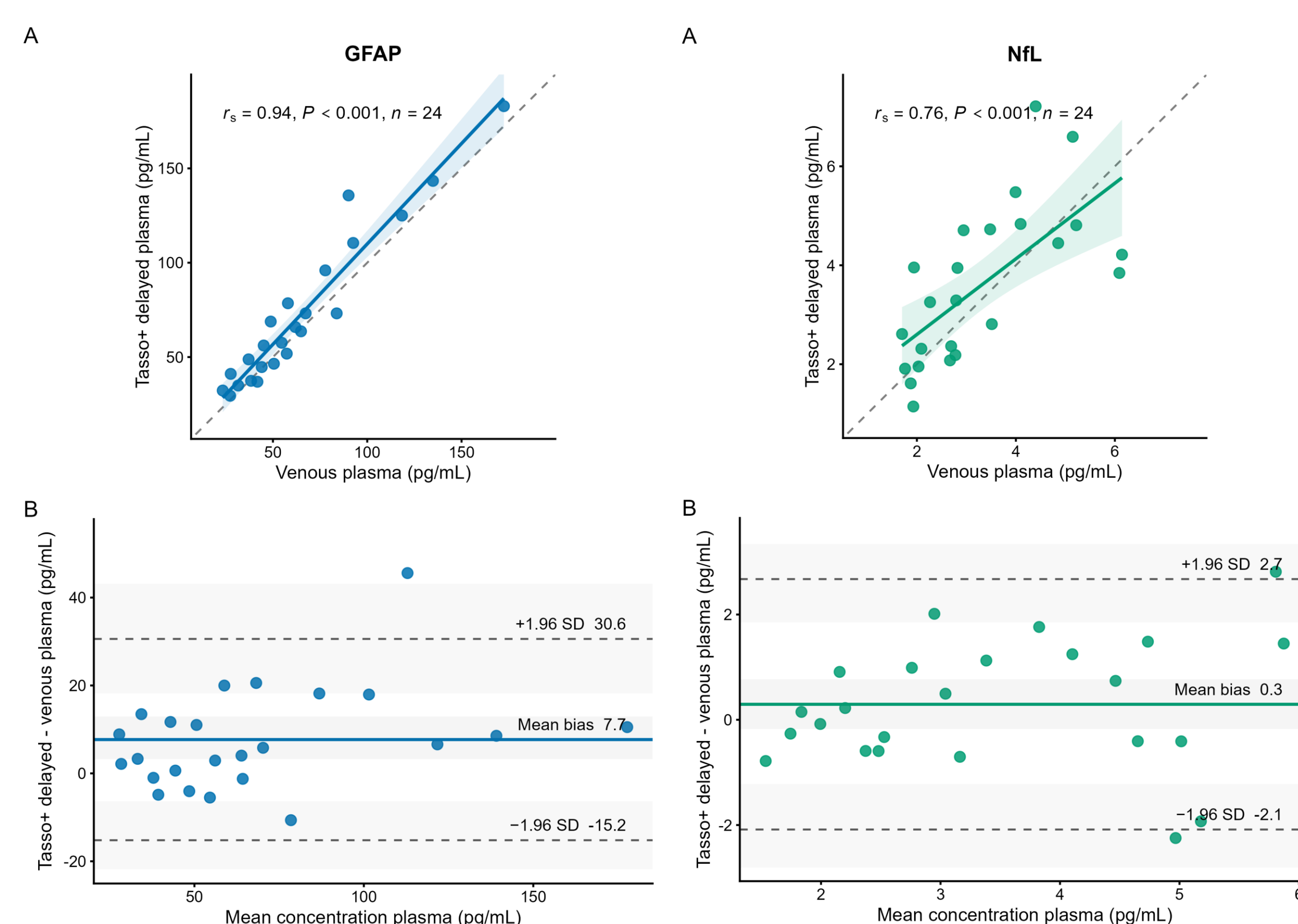
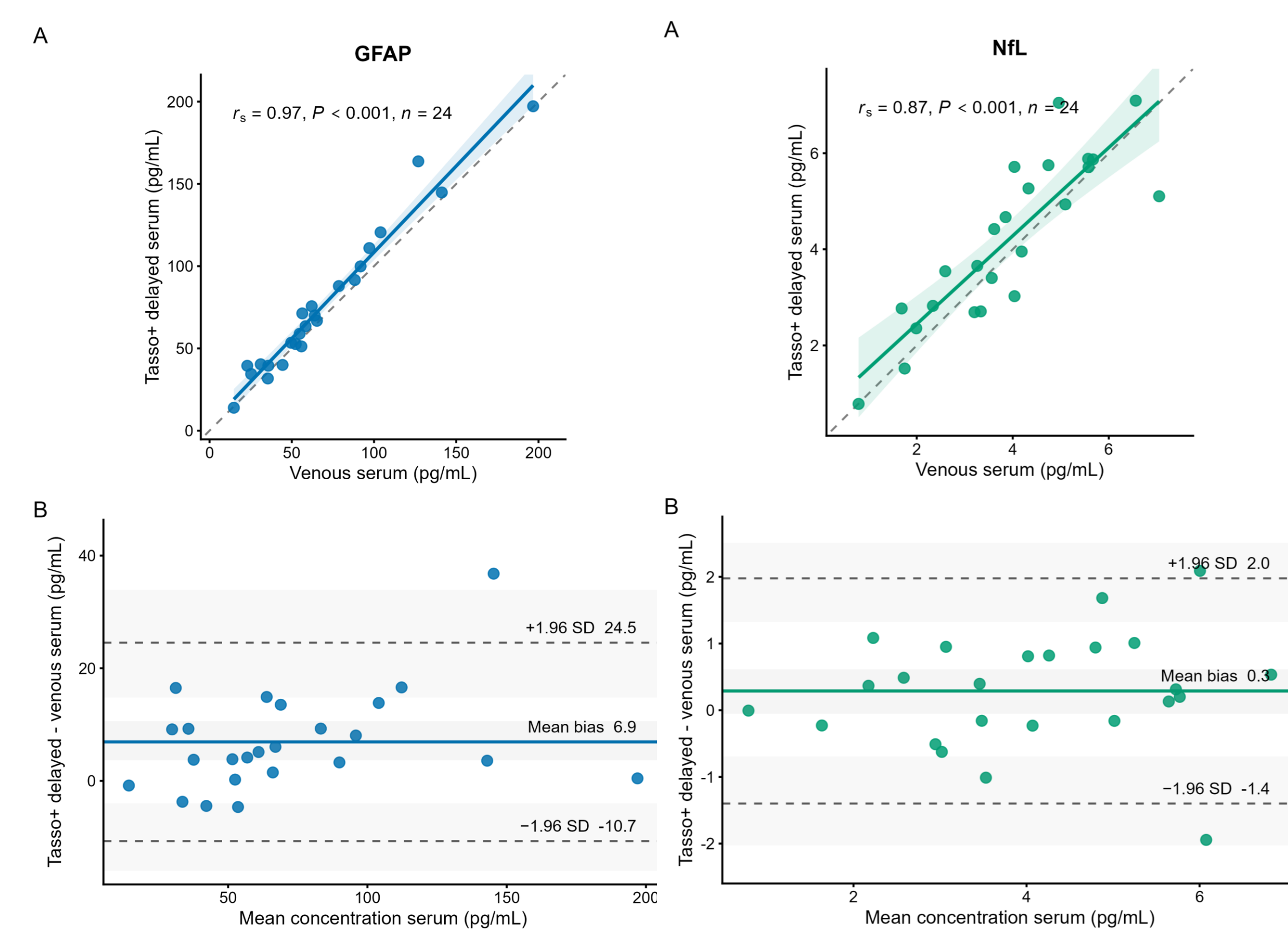


Figure 3. Simoa agreement after 72 h delayed processing. **A**, Spearman correlation plots comparing venous and Tasso+ 72 h plasma/serum GFAP and NfL concentrations. **B**, Bland-Altman plots showing bias between Tasso+ 72 h and matched venous samples

Simoa GFAP and NfL: Tasso+ 72 h serum vs venous serum



Alamar NULISeq protein classification system

High	$ \Delta\text{NPQ} \leq 0.5$ and $r_s \geq 0.75$
Moderate	$ \Delta\text{NPQ} \leq 0.75$ and $0.50 \leq r_s < 0.75$
Low	$ \Delta\text{NPQ} > 0.75$ or $r_s < 0.50$
Uncertain	$\geq 50\%$ of reference samples below LLOQ + 0.5 NPQ

Conclusions

- Tasso+ enables rapid, minimally invasive capillary blood collection for neurological biomarker studies outside traditional clinical settings.
- GFAP and NfL showed strong agreement with matched venous samples after a 72 h room-temperature delay, supporting delayed processing workflows.
- These findings support Tasso+ for remote, field-based and participant-led sampling, while highlighting the need for analyte-specific validation before broader implementation.
- These findings provide a validated sampling framework for the MRC-funded TBI-TS study, which will use Tasso+ to support scalable biomarker collection across 600 professional rugby players and investigate sport-related TBI as a risk factor for neurodegenerative disease and dementia.