Supplementary Information

Title: Amyloid Probability in Alzheimer Disease From Plasma, Cerebrospinal Fluid, and Amyloid Imaging

This PDF contains Supplementary Figures 1–8 and the titles/legends for Supplementary Data 1–12. No supplementary methods are provided; all methods are reported in the main manuscript.

Contents

1. Supplementary Fig. 1–8

2. Supplementary Data 1–12 (titles/legends only; CSV files provided separately)

Supplementary figures

Supplementary Fig. 1: Face validity by biomarker pattern

Pattern-level face validity summaries in the primary CSF Aβ42/40 analysis. a) Plasma Aβ42/40 ratio: median Centiloids (IQR) by pattern vs posterior mean P(A=1) (95% credible interval). b) Plasma %p-tau217: median Centiloids (IQR) by pattern vs posterior mean P(A=1). c) Plasma Aβ42/40 ratio: median CSF Aβ42/40 (IQR) by pattern vs posterior mean P(A=1). d) Plasma %p-tau217: median CSF Aβ42/40 (IQR) by pattern vs posterior mean P(A=1). Horizontal error bars indicate 95% credible intervals for P(A*=1); vertical error bars indicate IQRs for Centiloids or CSF Aβ42/40. Point size is proportional to the pattern sample size.

Face validity by pattern (aggregated): higher posterior aligns with higher Centiloids and more abnormal CSF
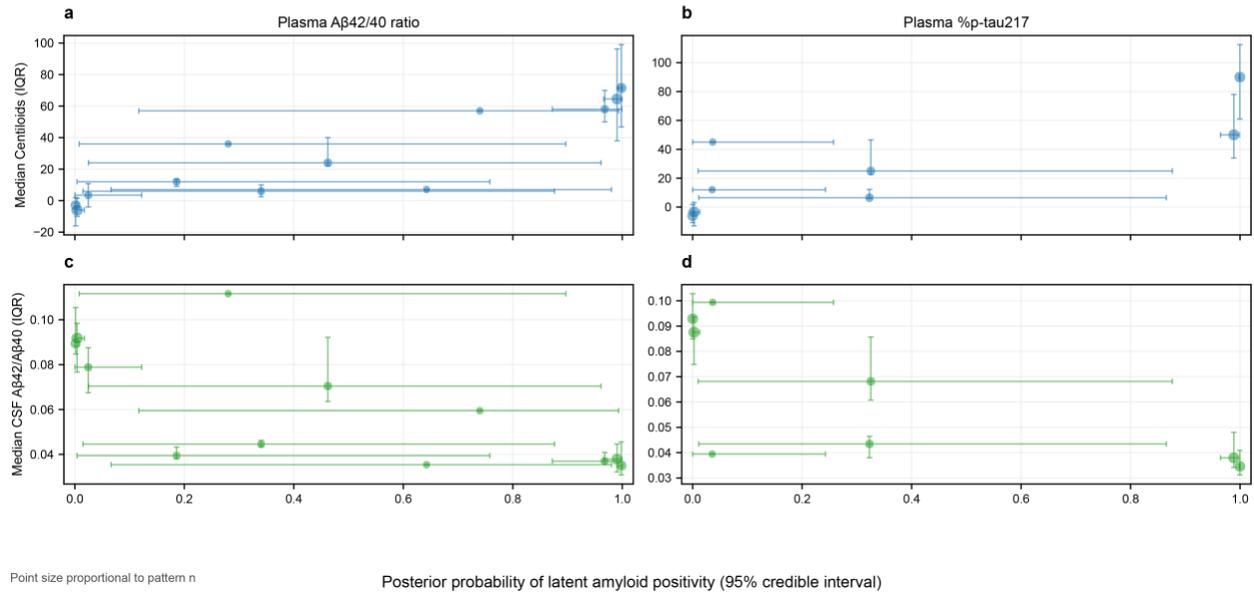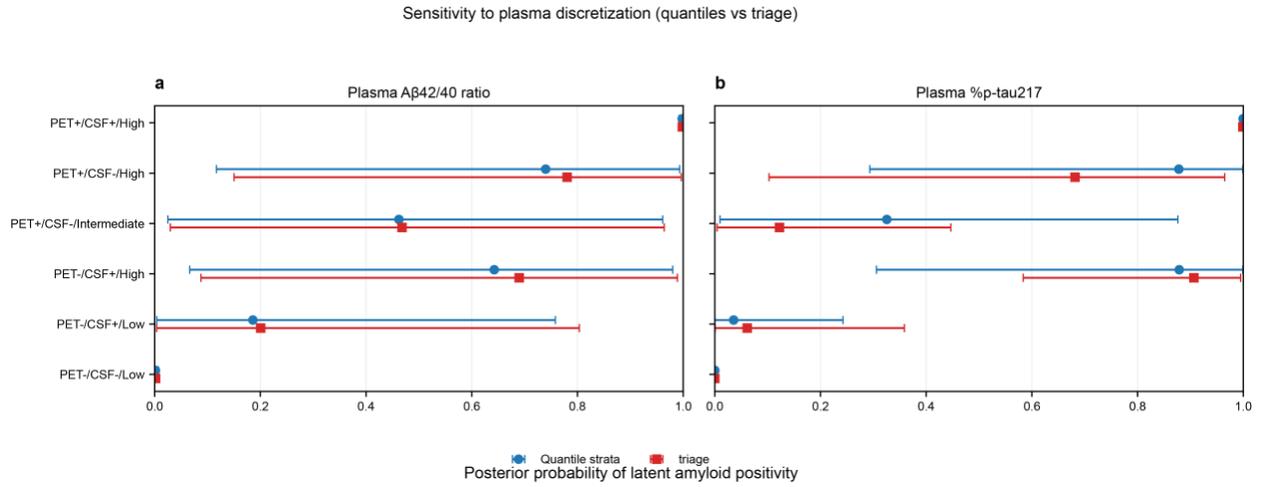
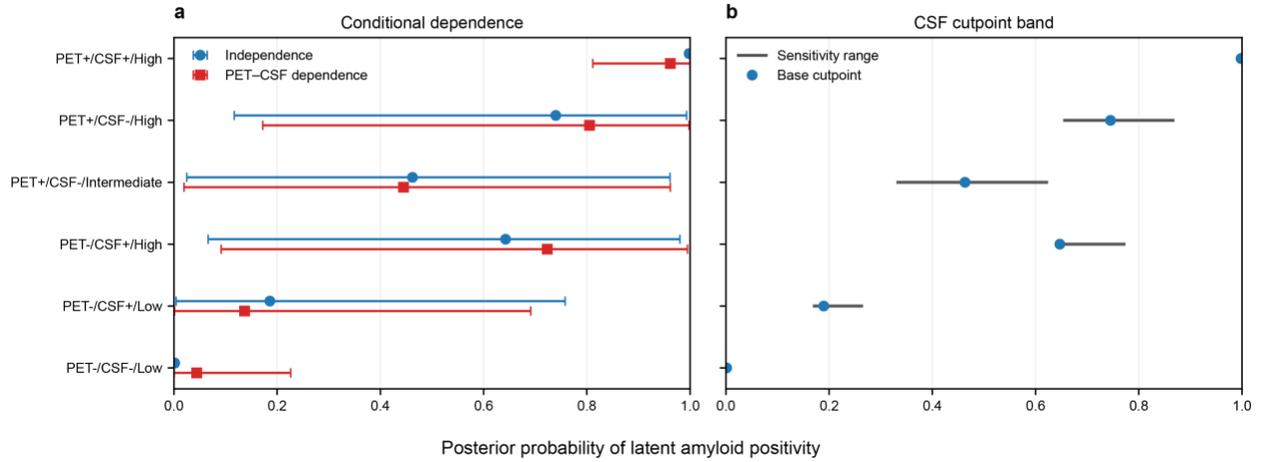**Supplementary Fig. 2: Sensitivity to plasma discretization**

Sensitivity of pattern-level posterior probabilities to plasma discretization. Posterior means (points) and 95% credible intervals (horizontal bars) are shown for key PET–CSF–plasma patterns under the primary quantile-based plasma strata (blue circles) and under Paper A triage thresholds (red squares). a) Plasma Aβ42/40 ratio. b) Plasma %p-tau217. Values are shown for the primary CSF Aβ42/40 analysis.

Sensitivity to plasma discretization (quantiles vs triage)

## Supplementary Fig. 3: Sensitivity analyses for plasma Aβ42/40 ratio

Sensitivity analyses for key patterns in the primary CSF Aβ42/40 analysis with plasma Aβ42/40 ratio strata. a) Conditional-dependence sensitivity comparing the baseline conditional-independence model (blue circles) with the prespecified PET–CSF dependence model (red squares). b) CSF cutpoint-band sensitivity showing posterior probability ranges (gray horizontal segments) across prespecified CSF Aβ42/40 cutpoints; base-cutpoint posteriors are shown as blue circles.

Sensitivity analyses (key patterns; CSF=Aβ42/Aβ40) — Plasma Aβ42/40 ratio

Supplementary Fig. 4: Sensitivity analyses for plasma %p-tau217

Same format as Supplementary Fig. 3, but with plasma strata defined by plasma %p-tau217. a) Conditional-dependence sensitivity comparing conditional-independence (blue circles) vs PET–CSF dependence (red squares). b) CSF cutpoint-band sensitivity (gray segments) with base-cutpoint posteriors (blue circles). Values are shown for the primary CSF Aβ42/40 analysis.

Sensitivity analyses (key patterns; CSF=Aβ42/Aβ40) — Plasma %p-tau217
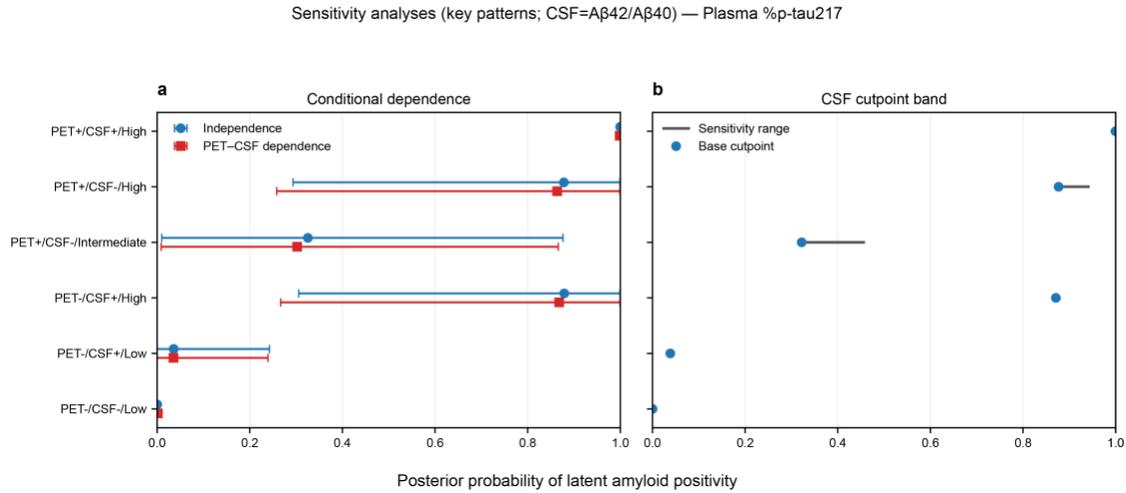
Supplementary Fig. 5: Pattern posteriors under PET–CSF conditional dependence

Posterior mean probability of latent amyloid positivity (A*) by PET–CSF–plasma pattern under the prespecified PET–CSF dependence model (primary CSF Aβ42/40 analysis). a) Plasma Aβ42/40 ratio strata. b) Plasma %p-tau217 strata. Each cell shows the posterior mean and observed cell count (n); light-gray cells indicate unobserved patterns (n=0).

Posterior probability of latent amyloid positivity by pattern (dependence model; CSF=Aβ42/Aβ40)
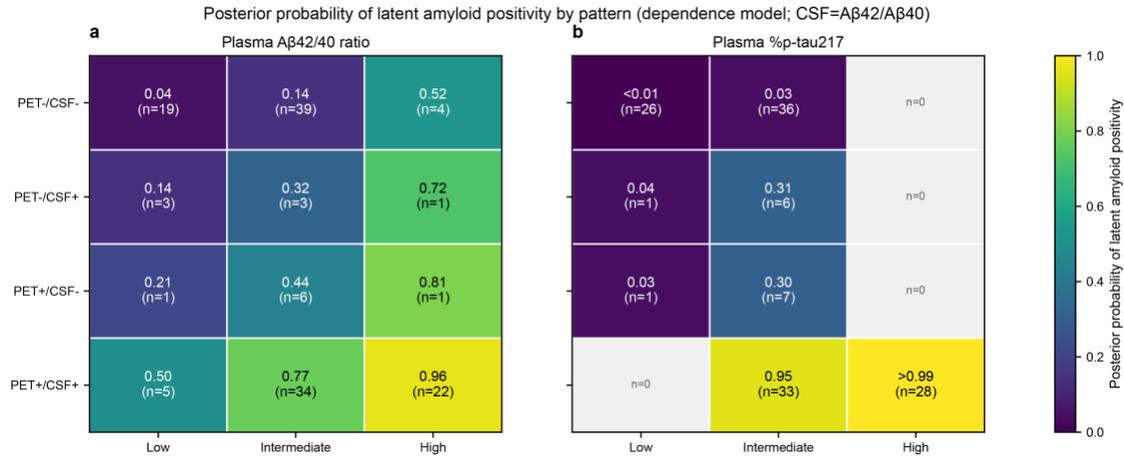
Supplementary Fig. 6: Coverage analysis heatmaps (CSF Aβ42)

Posterior mean probability of latent amyloid positivity (A*) by PET–CSF–plasma pattern in the prespecified coverage analysis using CSF Aβ42 (n=320). a) Plasma Aβ42/40 ratio strata. b) Plasma %p-tau217 strata. Each cell shows the posterior mean and observed cell count (n); light-gray cells indicate unobserved patterns (n=0).
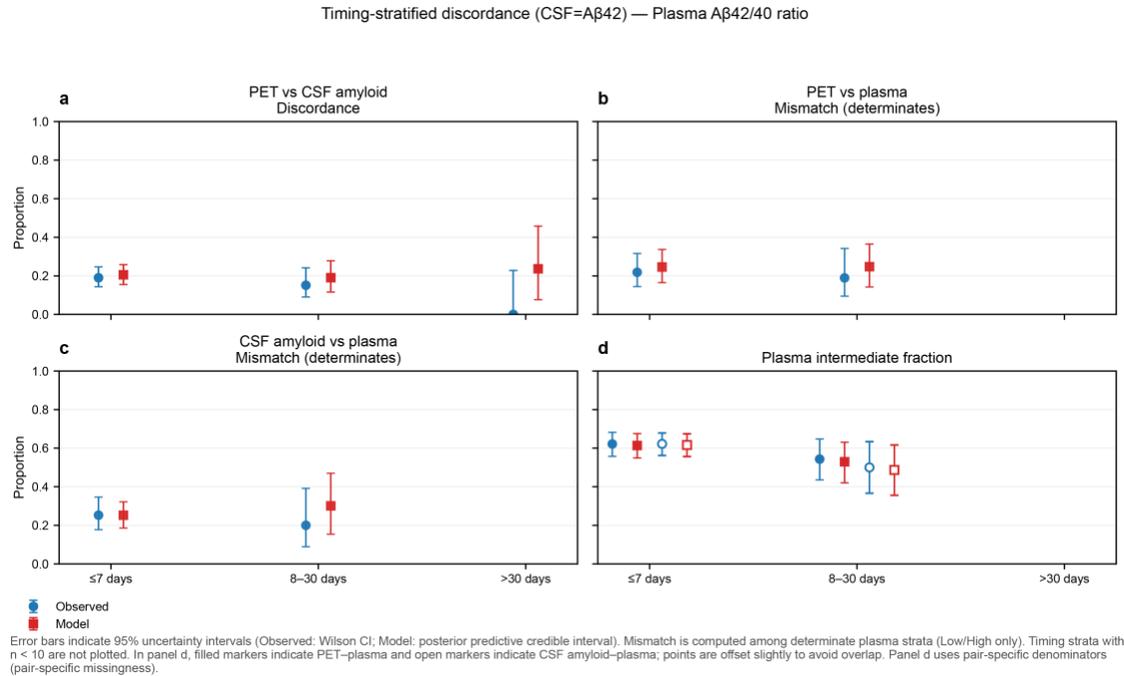

Posterior probability of latent amyloid positivity by pattern (CSF=Aβ42)

Cells shaded light gray indicate unobserved patterns (n=0). Values are posterior means.
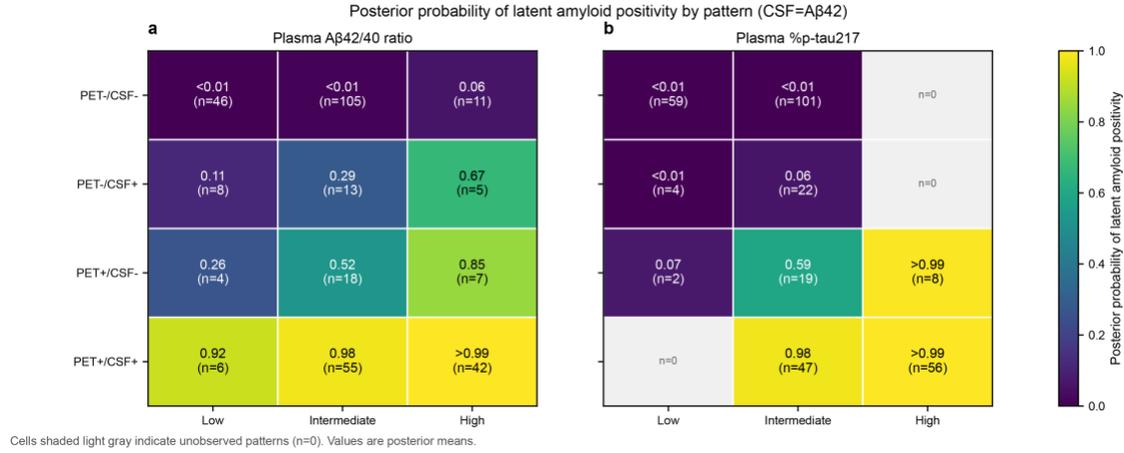
**Supplementary Fig. 7: Coverage timing-stratified discordance (plasma Aβ42/40 ratio)**

Timing-stratified discordance and mismatch summaries for plasma Aβ42/40 ratio in the prespecified coverage analysis using CSF Aβ42. a) PET vs CSF amyloid discordance by |ΔPET–CSF|. b) PET vs plasma mismatch among determinate plasma strata (low vs high) by |ΔPET–plasma|. c) CSF amyloid vs plasma mismatch among determinate strata by |ΔCSF–plasma|. d) Plasma intermediate fraction shown for PET–plasma (filled markers) and CSF amyloid–plasma (open markers). Observed estimates are shown as blue circles with 95% Wilson confidence intervals; model estimates are shown as red squares with 95% posterior predictive credible intervals. Timing strata with fewer than 10 determinate observations are not plotted.

Timing-stratified discordance (CSF=Aβ42) — Plasma Aβ42/40 ratio

Error bars indicate 95% uncertainty intervals (Observed: Wilson CI; Model: posterior predictive credible interval). Mismatch is computed among determinate plasma strata (Low/High only). Timing strata with n < 10 are not plotted. In panel d, filled markers indicate PET–plasma and open markers indicate CSF amyloid–plasma; points are offset slightly to avoid overlap. Panel d uses pair-specific denominators (pair-specific missingness).

Supplementary Fig. 8: Coverage timing-stratified discordance (plasma %p-tau217)

Same format as Supplementary Fig. 7, but with plasma strata defined by plasma %p-tau217 (coverage analysis using CSF Aβ42).

Timing-stratified discordance (CSF=Aβ42) — Plasma %p-tau217
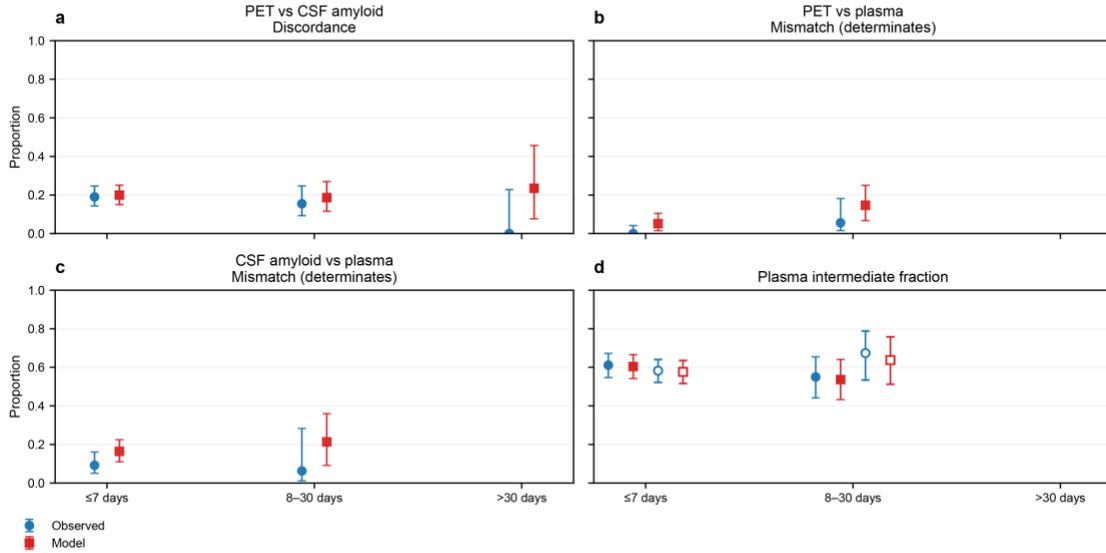
Error bars indicate 95% uncertainty intervals (Observed: Wilson CI; Model: posterior predictive credible interval). Mismatch is computed among determinate plasma strata (Low/High only). Timing strata with n < 10 are not plotted. In panel d, filled markers indicate PET–plasma and open markers indicate CSF amyloid–plasma; points are offset slightly to avoid overlap. Panel d uses pair-specific denominators (pair-specific missingness).

Supplementary data (titles/legends only)

Supplementary Data files are provided separately as CSVs in supplement/data/.

Supplementary Data 1: Pattern posterior table (primary CSF Aβ42/40)

Posterior summaries by PET–CSF–plasma pattern in the primary CSF Aβ42/40 analysis (posterior mean and 95% credible interval) with observed pattern counts.

Supplementary Data 2: Plasma quantile cutpoints (primary)

Quantile cutpoints used to define low/intermediate/high plasma strata for plasma Aβ42/40 ratio and plasma %p-tau217 in the primary analysis.

Supplementary Data 3: Timing-stratified discordance (observed; primary CSF Aβ42/40)

Observed PET–CSF discordance, PET–plasma mismatch, CSF–plasma mismatch, and intermediate fractions stratified by prespecified timing gaps in the primary analysis.

Supplementary Data 4: Timing-stratified discordance (posterior predictive; primary CSF Aβ42/40)

Posterior predictive summaries (posterior mean and 95% credible interval) for timing-stratified discordance and mismatch quantities in the primary analysis.

Supplementary Data 5: Sensitivity key posteriors (primary)

Key pattern posterior probabilities across prespecified sensitivity analyses (PET–CSF dependence, CSF cutpoint band, and plasma discretization) for the primary analysis.

Supplementary Data 6: Plausibility summaries by pattern (primary)

Pattern-level summaries used for face validity checks (Centiloids and CSF Aβ42/40 distributions) paired with posterior probabilities in the primary analysis.

Supplementary Data 7: Model diagnostics (primary)

Model diagnostics for the primary analyses (including convergence summaries and posterior predictive checks).

Supplementary Data 8: Pattern posterior table (coverage CSF Aβ42)

Posterior summaries by PET–CSF–plasma pattern in the coverage analysis using CSF Aβ42 (posterior mean and 95% credible interval) with observed pattern counts.

Supplementary Data 9: Timing-stratified discordance (observed; coverage CSF Aβ42)

Observed timing-stratified discordance and mismatch quantities for the coverage analysis using CSF Aβ42.

Supplementary Data 10: Timing-stratified discordance (posterior predictive; coverage CSF Aβ42)

Posterior predictive summaries (posterior mean and 95% credible interval) for timing-stratified discordance and mismatch quantities in the CSF Aβ42 coverage analysis.

Supplementary Data 11: Plasma quantile cutpoints (coverage)

Quantile cutpoints used to define low/intermediate/high plasma strata for plasma Aβ42/40 ratio and plasma %p-tau217 in the coverage analysis.

Supplementary Data 12: Sensitivity key posteriors (coverage)

Key pattern posterior probabilities across prespecified sensitivity analyses for the coverage analysis using CSF Aβ42.