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Supplementary Data

Comparison of xMAP and ELISA Assays for Detecting Cerebrospinal Fluid Biomarkers of Alzheimer's Disease

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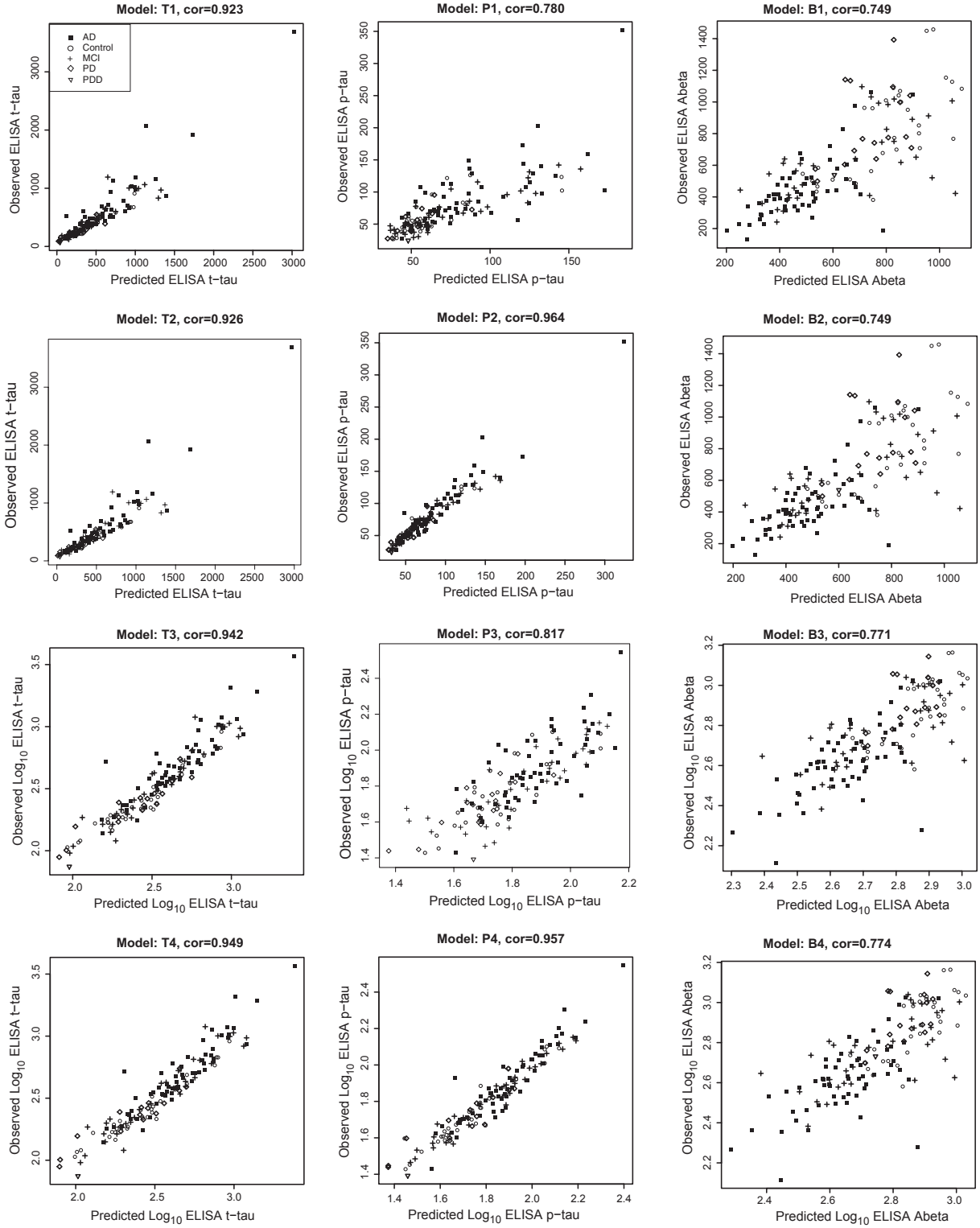
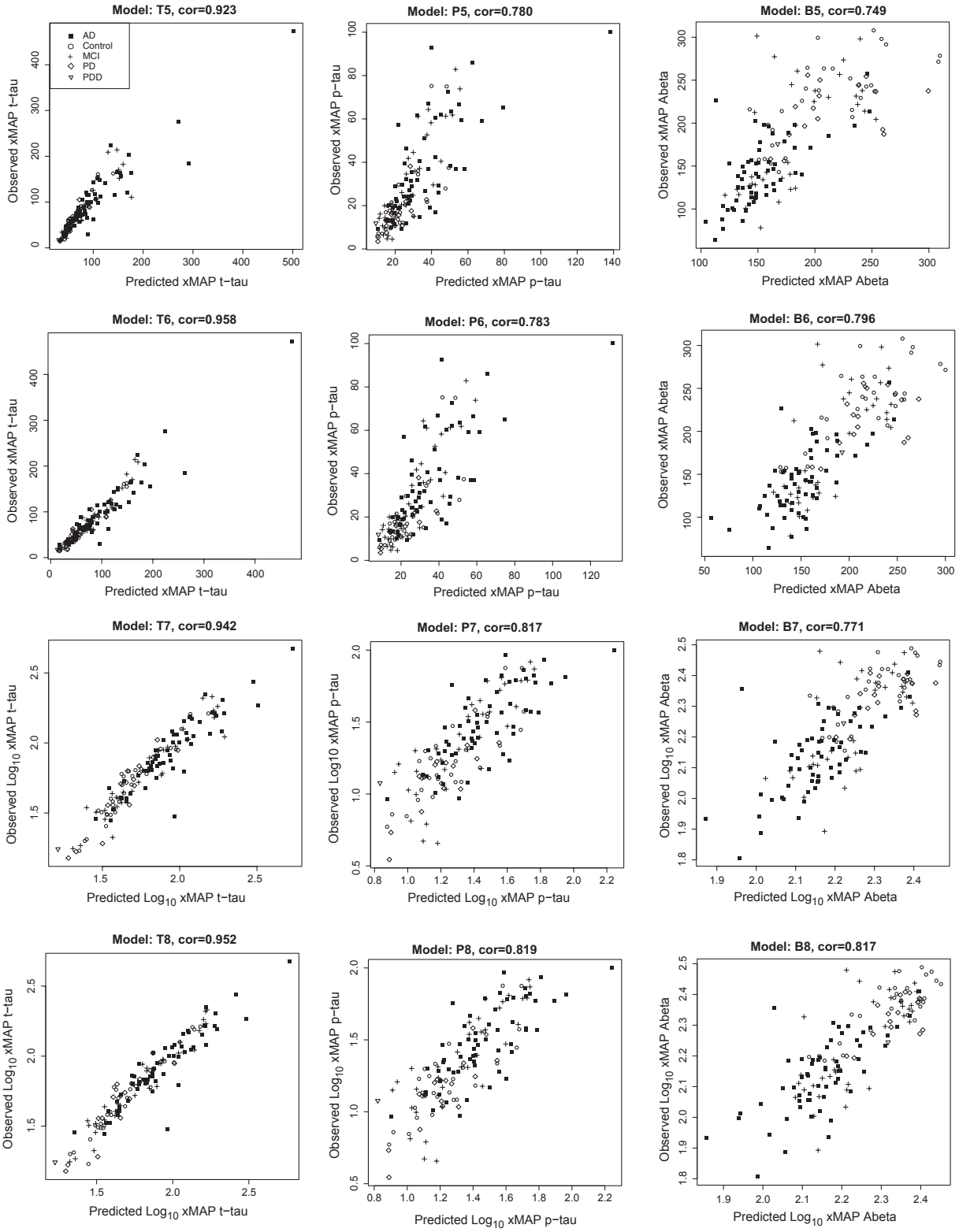


Supplementary Figure 1. Scatter plots of ELISA measurements and corresponding estimated levels by xMAP regression model on Left: t-tau; Middle: p-tau$_{181}$ and Right: A$\beta_{1\text{-}42}$.



Supplementary Figure 2. Scatter plots of xMAP measurements and corresponding estimated levels by ELISA regression model on Left: t-tau; Middle: p-tau$_{181}$ and Right: A$\beta_{1\text{-}42}$.

Supplementary Table 1
Coefficients of linear regression predicting ELISA measurements by xMAP measurements

Model	Dependent variable (ElISA)	Independent variable (xMAP)	Coefficient				Significance				Cor.	LOOCV COV
			Intercept	t-tau	p-tau$_{181}$	A$\beta_{1\text{-}42}$	Intercept	t-tau	p-tau$_{181}$	A$\beta_{1\text{-}42}$		
T1	t-tau	t-tau	−74.68	6.55	–	–	1.71×10^{-03}**	$<2 \times 10^{-16}$***	–	–	0.923	0.0306
T2	t-tau	t-tau, p-tau$_{181}$	−90.72	6.05	1.94	–	2.99×10^{-04}***	$<2 \times 10^{-16}$***	4.77×10^{-02}*	–	0.926	0.0303
T3	log$_{10}$ t-tau	log$_{10}$ t-tau	0.75	0.99	–	–	$<2 \times 10^{-16}$***	$<2 \times 10^{-16}$***	–	–	0.942	0.0034
T4	log$_{10}$ t-tau	log$_{10}$ t-tau, log$_{10}$ p-tau$_{181}$	0.78	0.84	0.18	–	$<2 \times 10^{-16}$***	$<2 \times 10^{-16}$***	2.56×10^{-05}***	–	0.949	0.0032
P1	p-tau$_{181}$	p-tau$_{181}$	29.59	–	1.54	–	1.09×10^{-12}***	–	$<2 \times 10^{-16}$***	–	0.78	0.0297
P2	p-tau$_{181}$	t-tau, p-tau$_{181}$	18.27	0.58	0.32	–	$<2 \times 10^{-16}$***	$<2 \times 10^{-16}$***	3.05×10^{-06}***	–	0.964	0.0127
P3	log$_{10}$ p-tau$_{181}$	log$_{10}$ p-tau$_{181}$	1.08	–	0.55	–	$<2 \times 10^{-16}$***	–	$<2 \times 10^{-16}$***	–	0.817	0.0056
P4	log$_{10}$ p-tau$_{181}$	log$_{10}$ t-tau, log$_{10}$ p-tau$_{181}$	0.61	0.57	0.14	–	$<2 \times 10^{-16}$***	$<2 \times 10^{-16}$***	4.27×10^{-07}***	–	0.957	0.0028
B1	A$\beta_{1\text{-}42}$	A$\beta_{1\text{-}42}$	−30.7	–	–	3.62	5.52×10^{-01}	–	–	$<2 \times 10^{-16}$***	0.749	0.0259
B2	A$\beta_{1\text{-}42}$	A$\beta_{1\text{-}42}$, t-tau, p-tau$_{181}$	−49.19	0.03	0.38	3.67	5.31×10^{-01}	9.32×10^{-01}	7.53×10^{-01}	$<2 \times 10^{-16}$***	0.749	0.0261
B3	log$_{10}$ A$\beta_{1\text{-}42}$	log$_{10}$ A$\beta_{1\text{-}42}$	0.41	–	–	1.05	1.34×10^{-02}*	–	–	$<2 \times 10^{-16}$***	0.771	0.0040
B4	log$_{10}$ A$\beta_{1\text{-}42}$	log$_{10}$ A$\beta_{1\text{-}42}$, log$_{10}$ t-tau, log$_{10}$ p-tau$_{181}$	0.21	0.01	0.04	1.1	3.85×10^{-01}	8.57×10^{-01}	4.63×10^{-01}	$<2 \times 10^{-16}$***	0.774	0.0040

Significance: '***': $P \leq 0.001$; '**': $0.001 < P \leq 0.01$; '*': $0.01 < P \leq 0.05$; '.': $0.05 < P \leq 0.1$.

Supplementary Table 2
Coefficients of linear regression predicting xMAP measurements by ELISA measurements

Model	Dependent variable (xMAP)	Independent variable (ELISA)	Coefficient				Significance				Cor.	LOOCV COV
			Intercept	t-tau	p-tau$_{181}$	A$\beta_{1\text{-}42}$	Intercept	t-tau	p-tau $_{181}$	A$\beta_{1\text{-}42}$		
T5	t-tau	t-tau	21.62	0.13	–	–	5.80×10^{-12}***	$<2 \times 10^{-16}$***	–	–	0.923	0.0243
T6	t-tau	t-tau, p-tau$_{181}$	−18.83	0.01	1.26	–	4.16×10^{-05}***	2.83×10^{-01}	$<2 \times 10^{-16}$***	–	0.958	0.0182
T7	log$_{10}$ t-tau	log$_{10}$ t-tau	−0.47	0.9	–	–	5.26×10^{-10}***	$<2 \times 10^{-16}$***	–	–	0.942	0.0045
T8	log$_{10}$ t-tau	log$_{10}$ t-tau, log$_{10}$ p-tau$_{181}$	−0.57	0.36	0.8	–	2.30×10^{-14}***	6.20×10^{-04}***	4.75×10^{-07}***	–	0.952	0.0042
P5	p-tau$_{181}$	p-tau$_{181}$	−0.29	–	0.39	–	9.00×10^{-01}	–	$<2 \times 10^{-16}$***	–	0.78	0.0385
P6	p-tau$_{181}$	t-tau, p-tau$_{181}$	−3.81	−0.01	0.52	–	2.58×10^{-01}	1.55×10^{-01}	8.32×10^{-08}***	–	0.783	0.0384
P7	log$_{10}$ p-tau$_{181}$	log$_{10}$ p-tau$_{181}$	−0.87	–	1.22	–	1.44×10^{-09}***	–	$<2 \times 10^{-16}$***	–	0.817	0.0112
P8	log$_{10}$ p-tau$_{181}$	log$_{10}$ t-tau, log$_{10}$ p-tau$_{181}$	−0.87	0.18	0.97	–	2.05×10^{-09}***	3.94×10^{-01}	1.90×10^{-03}**	–	0.819	0.0112
B5	A$\beta_{1\text{-}42}$	A$\beta_{1\text{-}42}$	83.72	–	–	0.15	$<2 \times 10^{-16}$***	–	–	$<2 \times 10^{-16}$***	0.749	0.0185
B6	A$\beta_{1\text{-}42}$	A$\beta_{1\text{-}42}$, t-tau, p-tau$_{181}$	136.33	0.05	−0.87	0.14	$<2 \times 10^{-16}$***	4.12×10^{-02}*	7.54×10^{-04}***	$<2 \times 10^{-16}$***	0.796	0.0170
B7	log$_{10}$ A$\beta_{1\text{-}42}$	log$_{10}$ A$\beta_{1\text{-}42}$	0.67	–	–	0.57	9.95×10^{-09}***	–	–	$<2 \times 10^{-16}$***	0.771	0.0036
B8	log$_{10}$ A$\beta_{1\text{-}42}$	log$_{10}$ A$\beta_{1\text{-}42}$, log$_{10}$ t-tau, log$_{10}$ p-tau$_{181}$	1.26	−0.08	−0.1	0.49	1.70×10^{-14}***	4.60×10^{-01}	4.99×10^{-01}	$<2 \times 10^{-16}$***	0.817	0.0033

Significance: '***': $P \leq 0.001$; '**': $0.001 < P \leq 0.01$; '*': $0.01 < P \leq 0.05$; '.': $0.05 < P \leq 0.1$.

Supplementary Table 3
Optimal error and area under roc curve (AUC) for disease status classification. Best classifiers are highlighted

Classification criterion	Number of subjects	Scoring function	Class with higher score	AUC	Error
AD versus Control	63 AD 32 Control	ELISA t-tau	AD	0.778	0.225
		ELISA p-tau$_{181}$	AD	0.737	0.225
		ELISA A$\beta_{1\text{-}42}$	Control	0.868	0.169
		xMAP t-tau	AD	0.728	0.258
		xMAP p-tau	AD	0.744	0.247
		xMAP A$\beta_{1\text{-}42}$	**Control**	**0.921**	**0.124**
		(ELISA p-tau)/(ELISA t-tau)	Control	0.838	0.180
		(ELISA A$\beta_{1\text{-}42}$)/(ELISA t-tau)	Control	0.866	0.135
		(ELISA A$\beta_{1\text{-}42}$)/(ELISA p-tau)	Control	0.855	0.169
		(xMAP p-tau)/(xMAP t-tau)	Control	0.666	0.270
		(xMAP A$\beta_{1\text{-}42}$)/(xMAP t-tau)	Control	0.828	0.169
		(xMAP A$\beta_{1\text{-}42}$)/(xMAP p-tau)	Control	0.840	0.146