

**- Supplementary Online Material -**

**Latent Neurovascular Dyssynchrony Identified through Single Trial  
Hemodynamic Profiling across the Alzheimer Disease Continuum**

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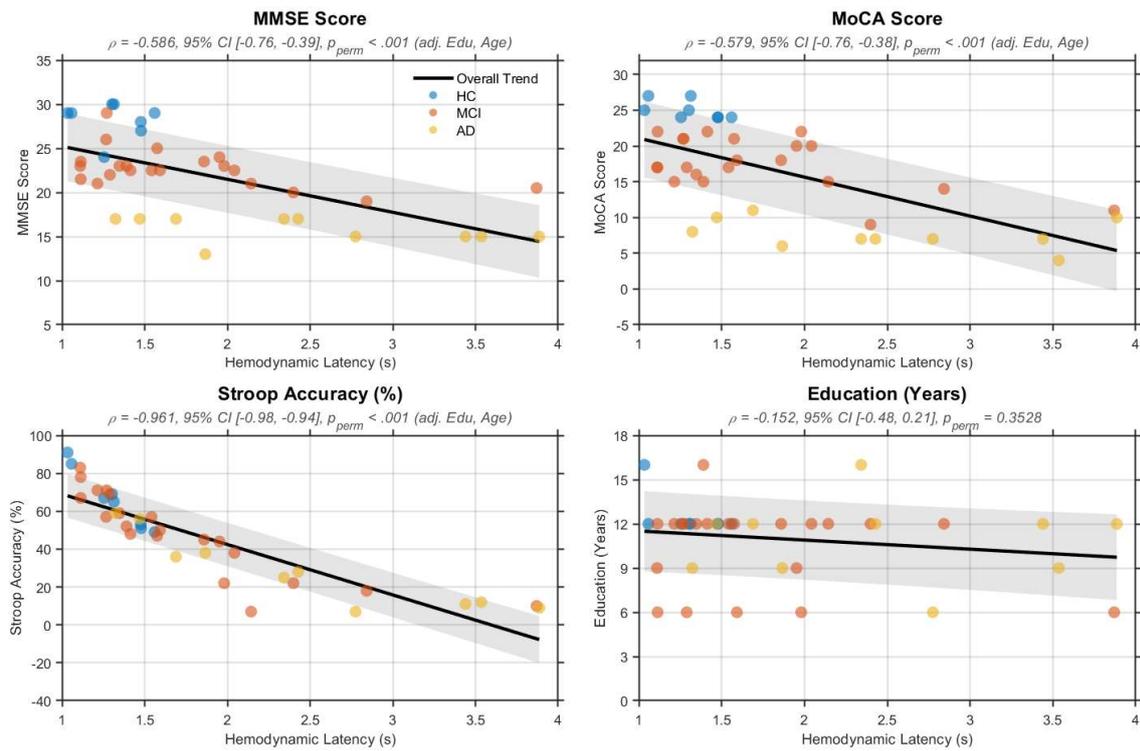
## Supplementary Figures and Tables S1-S5

**Table. S1 | . Demographic and Clinical Characteristics of Age-Matched Participants**

| Characteristics   | Healthy Control (n=16) | MCI (n=23)  | Alzheimer's Disease (n=21) | p-value   |
|-------------------|------------------------|-------------|----------------------------|-----------|
| Age (years)       | 69.8±2.86              | 73.2±3.68   | 73.3±5.66                  | 0.1       |
| Gender (M/F)      | 3 / 6                  | 10 / 11     | 5 / 5                      | 0.721     |
| Education (years) | 11.4±3.43              | 10.5±2.87   | 10.9±2.73                  | 0.712     |
| MMSE              | 28.2±1.86              | 22.6±2.16   | 15.8±1.40                  | < .001*** |
| MoCA              | 25.2±1.39              | 17.5±3.60   | 7.7±2.11                   | < .001*** |
| CDR               | 0.27±0.26              | 0.5±0.47    | 1.15±0.63                  | < .001*** |
| GDS               | 1.55±0.88              | 3.0±0.89    | 4.4±0.52                   | < .001*** |
| SVFT              | 53.11±11.04            | 44.67±11.98 | 22.60±13.07                | < .001*** |

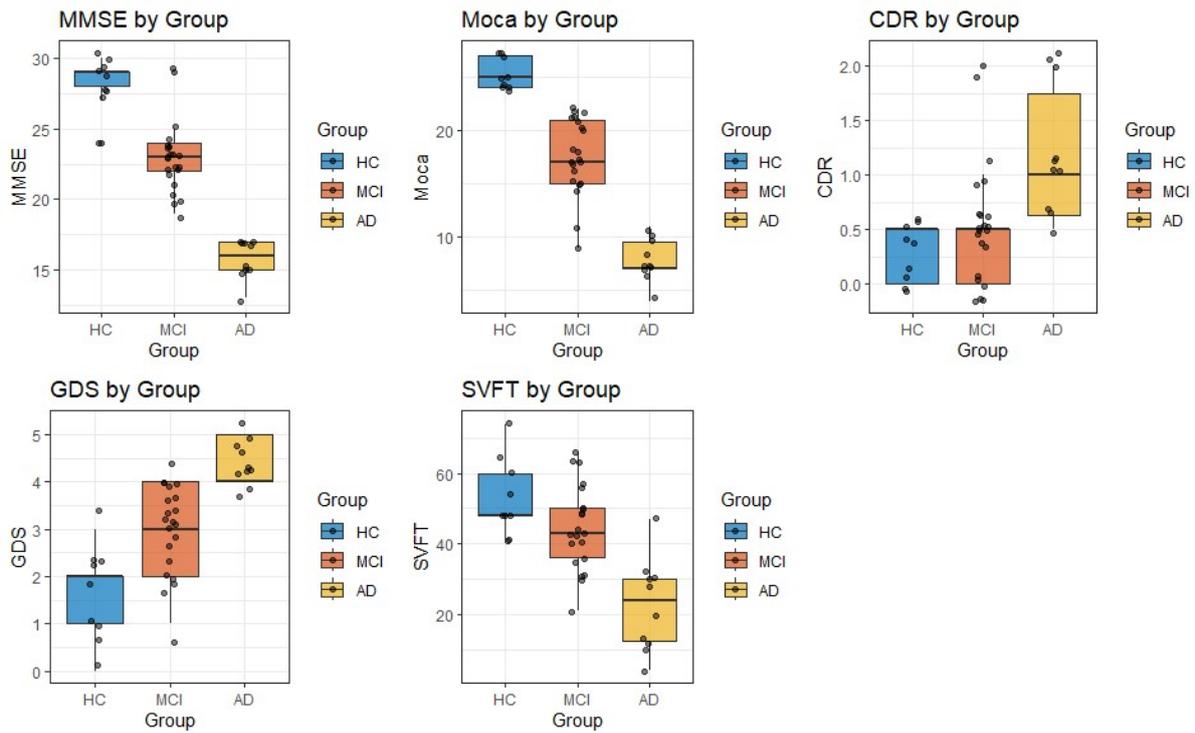
*Note: Data are presented as mean ± standard deviation. p-values were calculated using one-way ANOVA for continuous variables and Chi-square test for gender.*

### Brain-Behavior Coupling: Hemodynamic Lag vs. Clinical Scores (Age Matched)

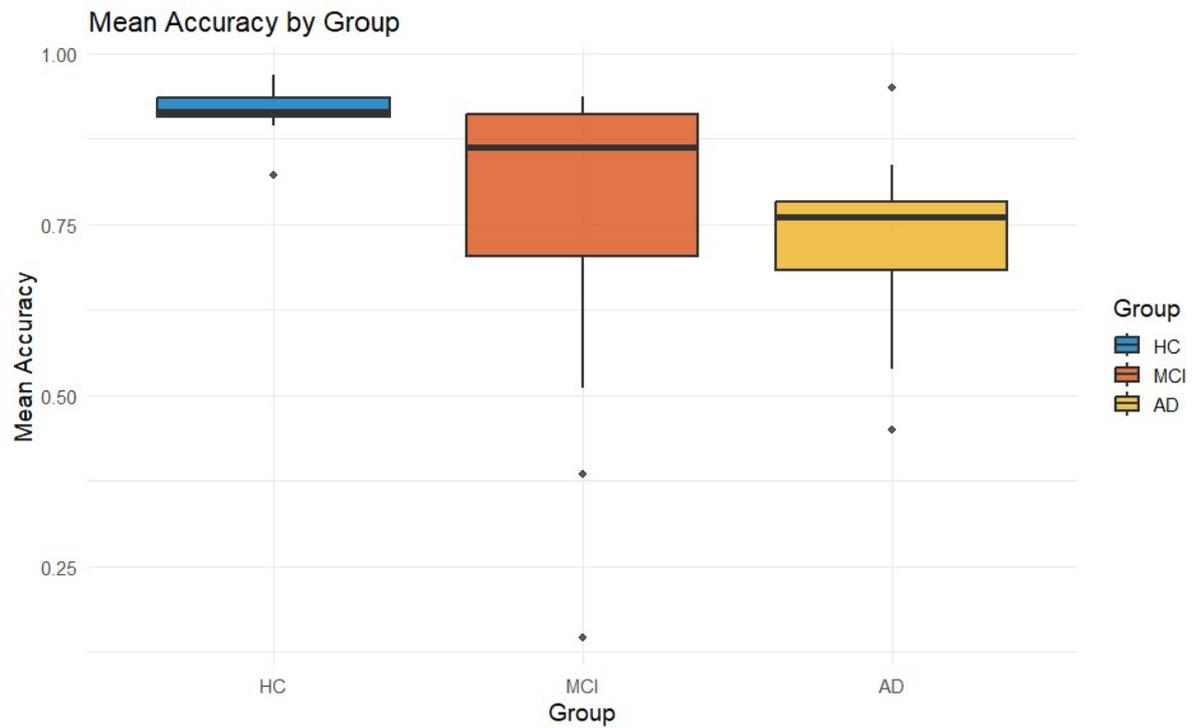


**Fig. S2 | Correlations between Hemodynamic Latency and Clinical Scores for the Age-Matched Groups.**

Scatter plots showing the relationship between mean latency and MMSE (Top Left), MoCA (Top Right), K-CWST scores (Bottom Left) and Years of Education (Bottom Right), demonstrating the clinical relevance of the hemodynamic lag.

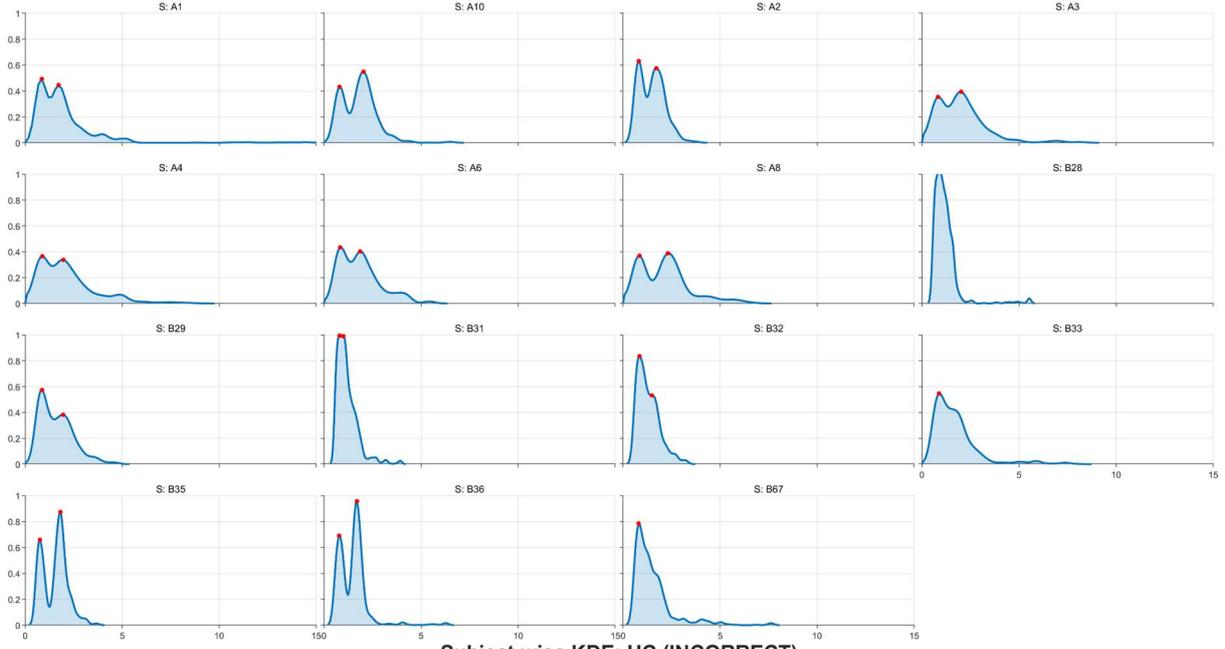


**Fig. S3 | Boxplots showing the distribution of MMSE, MoCA, CDR, GDS, and SVFT scores across the three age-matched study groups: Healthy Controls (HC), Mild Cognitive Impairment (MCI), and Alzheimer's Disease (AD). Individual data points are overlaid with jitter for visualization of within-group variability.**

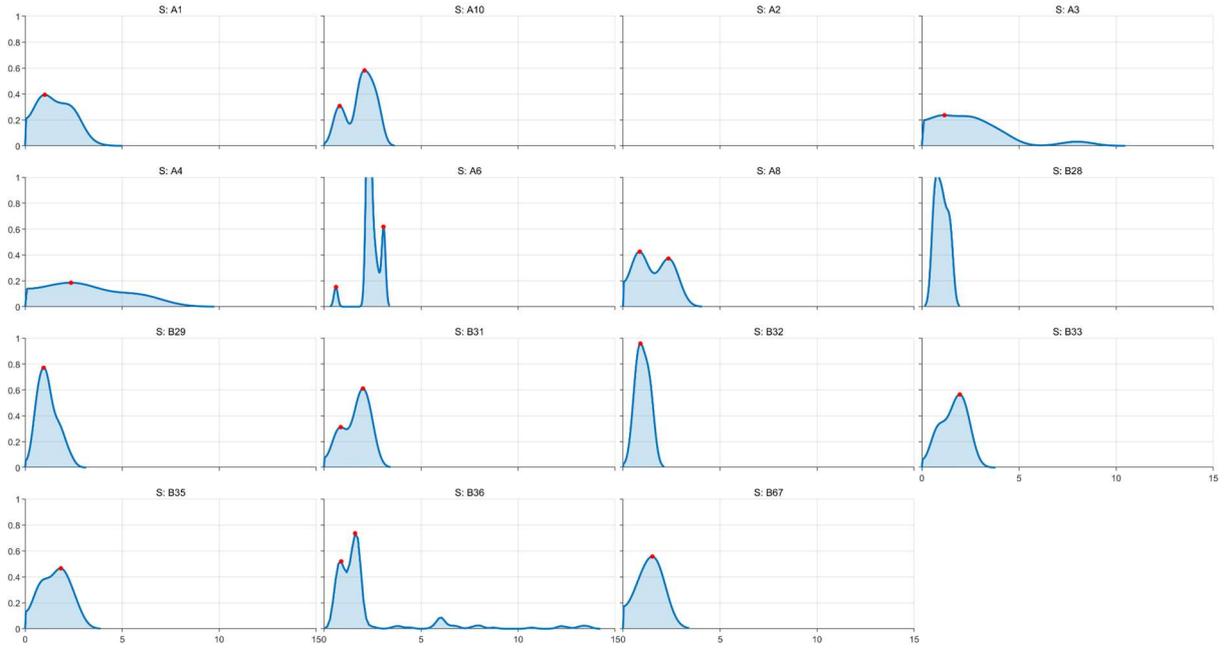


**Fig. S4. | Boxplots showing the distribution of Stroop accuracy scores across the three study groups: Healthy Controls (HC), Mild Cognitive Impairment (MCI), and Alzheimer's Disease (AD).** Individual data points are overlaid with jitter for visualization of within-group variability. A one-way ANOVA revealed a significant effect of group on Stroop accuracy,  $F(2, 37) = 3.32, p = .047$ .

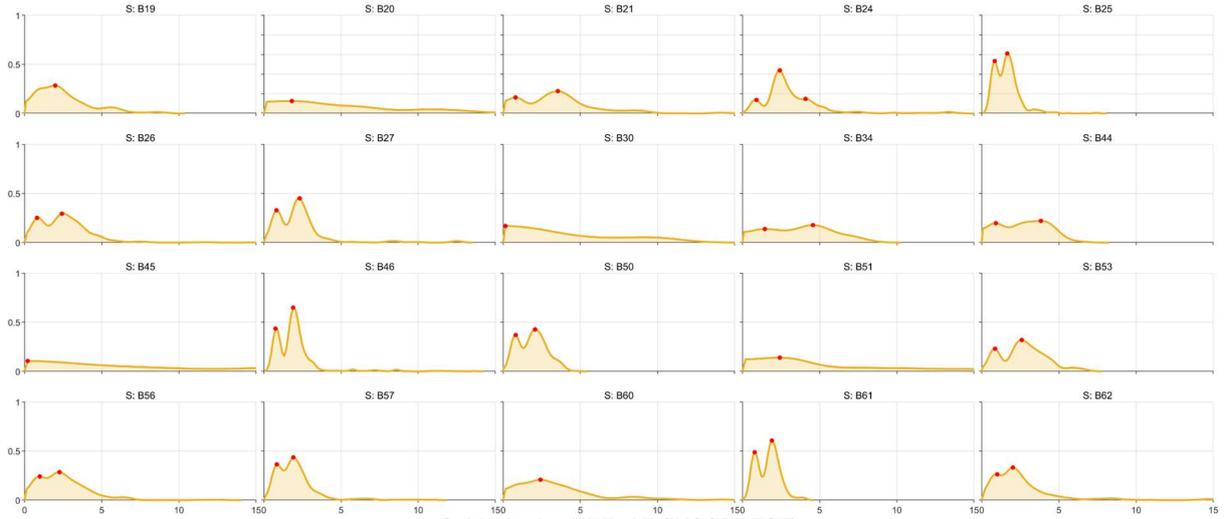
### Subject-wise KDE: HC (CORRECT)



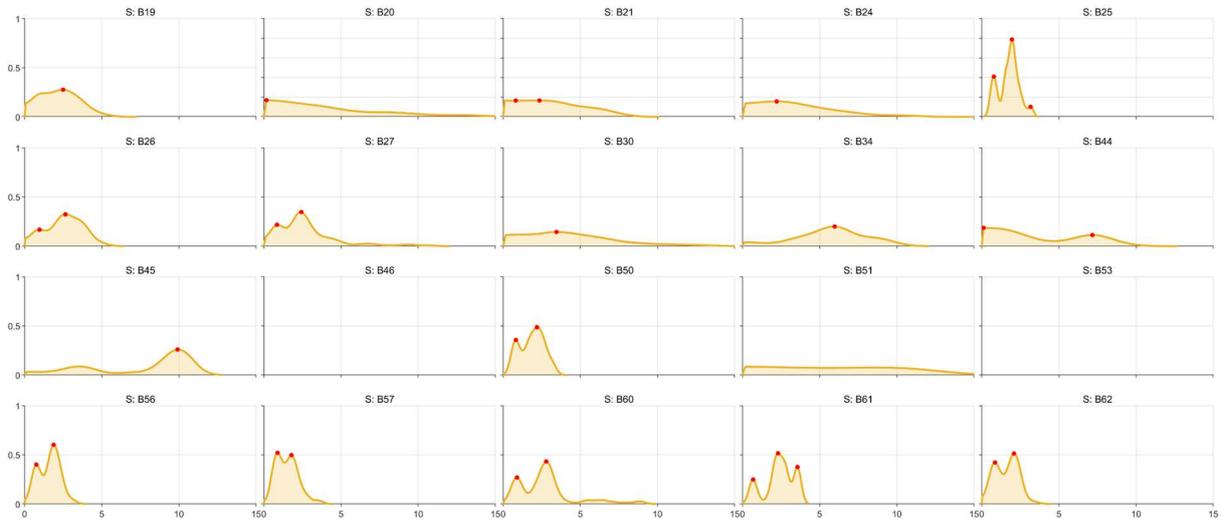
### Subject-wise KDE: HC (INCORRECT)

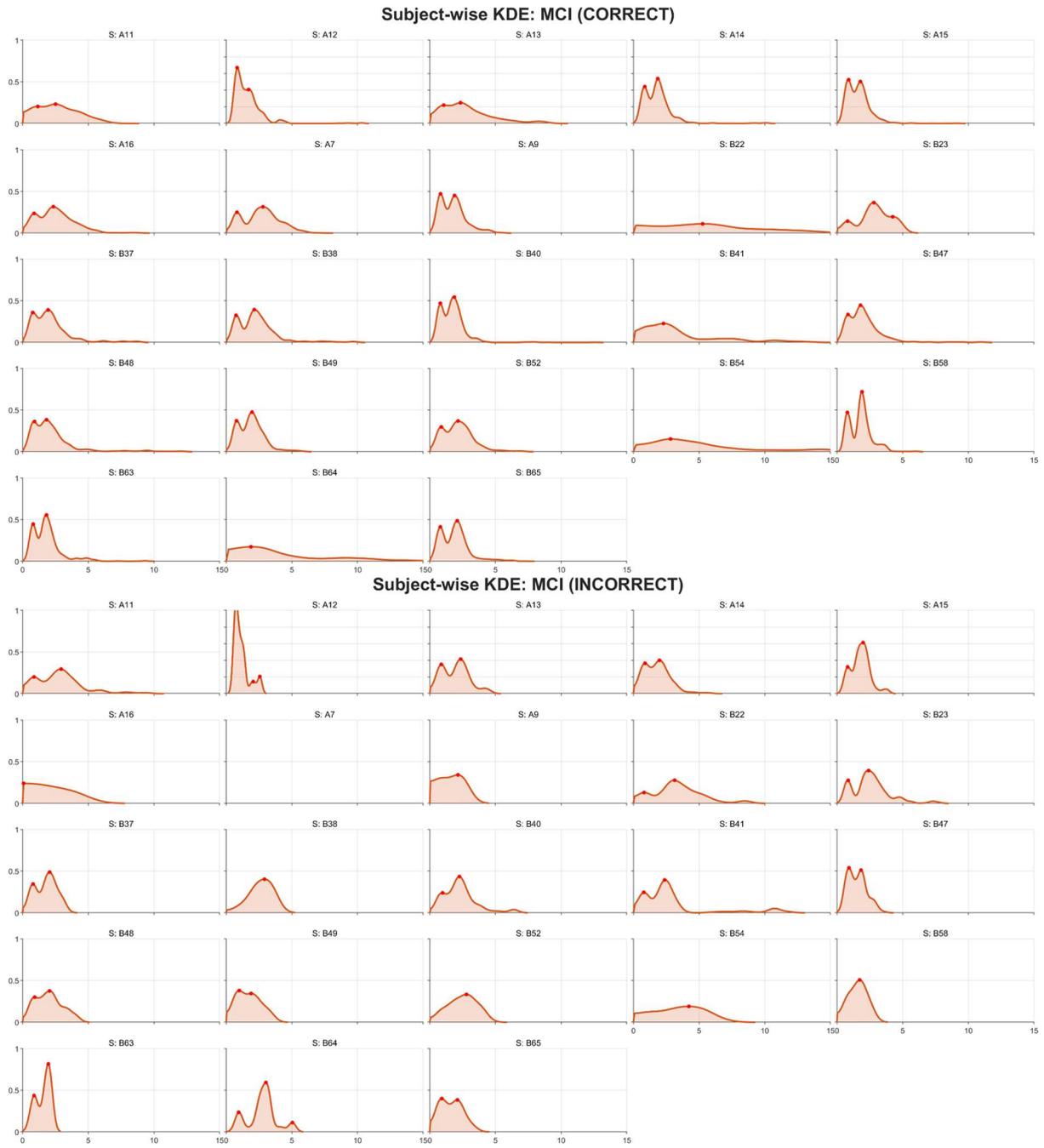


### Subject-wise KDE: AD (CORRECT)



### Subject-wise KDE: AD (INCORRECT)





**Fig. S5 | Single Subject KDE Plots for Correct and Incorrect Trials.**