

**Supplementary table 1.** Detailed cognitive trajectories according to each AT(N) biomarker in the V– and V+ groups

	Attention		Language		Visuospatial		Memory		Frontal/executive function											
	V–	V+	V–	V+	V–	V+	V–	V+	V–	V+										
	coefficient (standard error)	<i>p</i> - value <sup>a</sup>	coefficient (standard error)	<i>p</i> - value <sup>a</sup>	coefficient (standard error)	<i>p</i> - value <sup>a</sup>	coefficient (standard error)	<i>p</i> - value <sup>a</sup>	coefficient (standard error)	<i>p</i> - value <sup>a</sup>	coefficient (standard error)	<i>p</i> - value <sup>a</sup>	coefficient (standard error)	<i>p</i> - value <sup>a</sup>	coefficient (standard error)	<i>p</i> - value <sup>a</sup>	coefficient (standard error)	<i>p</i> - value <sup>a</sup>	coefficient (standard error)	<i>p</i> - value <sup>a</sup>
<b>A</b>	-0.071 (0.059)	0.233	0.033 (0.060)	0.582	-1.050 (0.279)	< 0.001	-0.770 (0.230)	0.002	-0.489 (0.225)	0.03	-0.532 (0.253)	0.035	-0.763 (0.169)	< 0.001	-0.447 (0.186)	0.016	-2.537 (0.959)	0.008	-2.485 (0.965)	0.01
<b>T</b>	-0.348 (0.075)	< 0.001	-0.261 (0.112)	0.02	-2.241 (0.356)	< 0.001	-2.652 (0.427)	< 0.001	-2.057 (0.278)	< 0.001	-1.598 (0.493)	0.001	-1.225 (0.216)	< 0.001	-1.068 (0.359)	0.003	-6.945 (1.217)	< 0.001	-6.175 (1.857)	0.001
<b>N</b>	0.013 (0.059)	0.818	-0.035 (0.053)	0.518	-0.829 (0.278)	0.003	-0.621 (0.207)	0.003	-0.209 (0.225)	0.352	-0.720 (0.221)	0.001	-1.068 (0.164)	< 0.001	-0.718 (0.160)	< 0.001	-1.482 (0.960)	0.123	-2.081 (0.864)	0.016

<sup>a</sup>Effects of each pathologic burden (presence of A, T, or N biomarkers) on longitudinal cognitive changes obtained from linear mixed effects models

Abbreviations: A,  $\beta$ -amyloid; T, tau; N, neurodegeneration; V, cerebral small vessel disease

**Supplementary table 2.** Effects of V biomarker on detailed cognitive trajectories in each AT(N) framework category

	Normal AD biomarker		Non-AD pathologic change		Alzheimer's pathologic change		Alzheimer's disease	
	coefficient (standard error)	<i>p</i> -value <sup>a</sup>	coefficient (standard error)	<i>p</i> -value <sup>a</sup>	coefficient (standard error)	<i>p</i> -value <sup>a</sup>	coefficient (standard error)	<i>p</i> -value <sup>a</sup>
<b>Attention</b>	-0.093 (0.046)	0.043	-0.156 (0.066)	0.018	-0.042 (0.064)	0.511	-0.260 (0.192)	0.174
<b>Language</b>	-0.280 (0.157)	0.075	-0.204 (0.254)	0.422	-0.546 (0.211)	0.010	-0.542 (1.068)	0.612
<b>Visuospatial</b>	0.067 (0.215)	0.755	-0.655 (0.278)	0.018	-0.490 (0.204)	0.016	0.158 (1.006)	0.875
<b>Memory</b>	-0.013 (0.203)	0.948	-0.432 (0.192)	0.025	-0.708 (0.241)	0.003	1.096 (0.415)	0.008
<b>Frontal/executive function</b>	-1.126 (0.856)	0.188	-1.284 (1.071)	0.231	-2.986 (0.973)	0.002	1.611 (3.214)	0.616

<sup>a</sup>Effects of the presence of V biomarker on longitudinal cognitive changes obtained from linear mixed effects models

Abbreviations: A,  $\beta$ -amyloid; T, tau; N, neurodegeneration; V, cerebral small vessel disease

**Supplementary table 3.** Effects of different CSVD markers on CDR-SOB changes in each AT(N) category

	Normal AD biomarker		Non-AD pathologic change		Alzheimer's pathologic change		Alzheimer's disease	
	coefficient (standard error)	<i>p</i> -value <sup>a</sup>	coefficient (standard error)	<i>p</i> -value <sup>a</sup>	coefficient (standard error)	<i>p</i> -value <sup>a</sup>	coefficient (standard error)	<i>p</i> -value <sup>a</sup>
<b>WMH_volume (mm<sup>3</sup>)</b>	< 0.001 (< 0.001)	0.156	< 0.001 (< 0.001)	0.047	< 0.001 (< 0.001)	< 0.001	< 0.001 (< 0.001)	0.370
<b>Numbers of lacunes</b>	0.010 (0.008)	0.203	0.045 (0.023)	0.504	-0.006 (0.009)	0.541	-0.025 (0.038)	0.504
<b>Numbers of microbleeds</b>	0.003 (0.002)	0.142	0.009 (0.003)	0.072	0.002 (0.002)	0.250	0.004 (0.002)	0.072

<sup>a</sup>Effects of the presence of V biomarker on longitudinal cognitive changes obtained from linear mixed effects models

Abbreviations: AD, Alzheimer's Disease; WMH, white matter hyperintensities