Supplementary manuscript

Molecular Subtyping of Mild Cognitive Impairment based on Genetic Polymorphism and Gene Expression

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**Supplementary Figure**

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**Figure S1.** Illustrative example of SNF steps. (a) A similarity measure is used to construct a patient-by-patient similarity network for each genomic data type. Two patient-by-patient similarity networks are constructed, one for the expression similarity network (top figure in Fig.S1(a)) and the other for SNP similarity network (bottom figure in Fig.S1(a)). The nodes of the network for each data type represent patients and the weighted edges are equivalent to pairwise sample similarities. And then, network fusion iteratively updates every network using a nonlinear method named message-passing theory; (b) After many iterations, these two networks converge to a fused patient network; (c) The fused patient network is clustered into several subtypes based on the spectral clustering method; (d) Some patients (005\_S\_0546, 002\_S\_0729, 027\_S\_1045, 037\_S\_0150, 010\_S\_0161 and 011\_S\_1282) are used as examples to explain the clustering process of the SNF method.

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**Figure S2.** Heat map visualization of the patient-by-patient similarity matrix and the generated dendrogram using the hierarchical clustering method. It is clearly shown that most AD patients (green) are clustered with MCI cluster-1 patients (red).

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**Figure S3.** Changes in AD cognitive scales (MMSE, CDR, FAQ) in two years for two AD subtypes in ADNI. X axis represents time past after AD patients participating the study, while Y axis represents Alzheimer’s Disease cognitive scales score. Cognitive decline in cluster-1 AD patients (red) is tend to be more remarkable than that of cluster-2 (blue) over 24 months.

**Supplementary Table**

**Table S1.** Demographic information and total number of MCI participants involved in this study. Among these 310 MCI patients, 125 subjects were in ADNI-1 and 185 subjects were in ADNI-2.

|  |  |  |
| --- | --- | --- |
| Category | ADNI MCI patients(310) | |
| **ADNI-1** | **ADNI-2** |
| Number of subjects | 125 | 185 |
| Gender(M/F) | 90/35 | 103/82 |
| Baseline age (years; mean±sd) | 74.30±7.17 | 71.00±6.79 |
| Education (years; mean±sd) | 15.83±3.14 | 16.17±2.52 |
| Baseline MMSE (score; mean±sd) | 27.38±1.65 | 28.20±1.61 |
| Baseline CDR-SB (score; mean±sd) | 1.52±0.86 | 1.35±0.90 |
| Baseline FAQ (score; mean±sd) | 3.79±4.49 | 2.45±3.75 |

**Table S2.** The subtype labels of these AD patients

|  |  |  |  |
| --- | --- | --- | --- |
| Patient\_ID | Subtype | Patient\_ID | Subtype |
| 037\_S\_4001 | Cluster-1 | 098\_S\_4215 | Cluster-2 |
| 016\_S\_4009 | Cluster-2 | 024\_S\_4223 | Cluster-1 |
| 031\_S\_4024 | Cluster-2 | 019\_S\_4252 | Cluster-1 |
| 014\_S\_4039 | Cluster-1 | 137\_S\_4258 | Cluster-2 |
| 094\_S\_4089 | Cluster-1 | 024\_S\_4280 | Cluster-2 |
| 098\_S\_4095 | Cluster-1 | 094\_S\_4282 | Cluster-1 |
| 003\_S\_4136 | Cluster-1 | 029\_S\_4307 | Cluster-2 |
| 003\_S\_4152 | Cluster-1 | 116\_S\_4338 | Cluster-2 |
| 006\_S\_4153 | Cluster-2 | 016\_S\_4353 | Cluster-1 |
| 006\_S\_4192 | Cluster-2 | 003\_S\_4373 | Cluster-1 |
| 098\_S\_4201 | Cluster-2 | 019\_S\_4477 | Cluster-2 |
| 116\_S\_4209 | Cluster-1 | 126\_S\_4494 | Cluster-1 |
| 137\_S\_4211 | Cluster-2 |  |  |