**Supplemental Material for**

**“****Retrospective Association Analysis of Longitudinal Binary Traits Identifies Important Loci and Pathways in Cocaine Use”**

Weimiao Wu,\* Zhong Wang,†  Ke Xu,‡,§ Xinyu Zhang,‡,§ Amei Amei,\*\* Joel Gelernter,‡,§ Hongyu Zhao,\* Amy C. Justice,§,†† and Zuoheng Wang\*

\*Department of Biostatistics, Yale School of Public Health, New Haven, CT 06520

†Baker Institute for Animal Health, Cornell University, Ithaca, NY 14850

‡Department of Psychiatry, Yale School of Medicine, New Haven, CT 06511

§VA Connecticut Healthcare System, West Haven, CT 06516

\*\*Department of Mathematical Sciences, University of Nevada, Las Vegas, NV 89154

††Department of Internal Medicine, Yale School of Medicine, New Haven, CT 06520

**Table S1.** Association results of the top twelve SNPs from Table 2 in the VACS African American (AA) population.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Chr** | **Gene Region** | **SNP** | **Position** | **MAF** | **GEE**  **(ind)** | **GEE**  **(AR1)** | **GMMAT** | **L-BRAT**  **(ind)** | **L-BRAT**  **(AR1)** | **RGMMAT** |
| 3 | *NIPA2P2* | rs551879660 | 75,146,492 | 0.016 | 4.81 × 10-4 | 1.63 × 10-3 | 1.45 × 10-3 | **4.04 × 10-7** | 4.16 × 10-5 | 1.35 × 10-4 |
| 5 | *EFNA5* | rs188222191 | 105,411,547 | 0.057 | 5.68 × 10-5 | 9.62 × 10-5 | 6.33 × 10-4 | **4.85 × 10-6** | 1.02 × 10-5 | 6.65 × 10-5 |
|  |  | rs1014278 | 105,471,506 | 0.077 | 1.05 × 10-4 | 9.38 × 10-5 | 1.40 × 10-3 | 1.64 × 10-5 | **1.43 × 10-5** | 2.03 × 10-4 |
|  |  | rs75132056 | 105,480,442 | 0.067 | 8.41 × 10-5 | 1.32 × 10-4 | 1.30 × 10-3 | **9.41** **× 10-6** | 1.67 × 10-5 | 1.73 × 10-4 |
| 8 | *PSD3* | rs114629793 | 18,403,754 | 0.016 | 5.75 × 10-4 | 6.95 × 10-4 | 3.09 × 10-4 | **7.19 × 10-7** | 1.79 × 10-6 | 1.83 × 10-5 |
| 9 | *OR1L4* | rs76386683 | 125,467,023 | 0.016 | 3.51 × 10-4 | 2.22 × 10-4 | 7.00 × 10-4 | 9.16 × 10-6 | **2.39 × 10-6** | 3.76 × 10-5 |
|  |  | rs114386843 | 125,469,425 | 0.016 | 3.45 × 10-4 | 2.19 × 10-4 | 6.86 × 10-4 | 8.91 × 10-6 | **2.32 × 10-6** | 3.65 × 10-5 |
|  |  | rs186274502 | 125,471,416 | 0.016 | 3.45 × 10-4 | 2.19 × 10-4 | 6.86 × 10-4 | 8.91 × 10-6 | **2.32 × 10-6** | 3.65 × 10-5 |
|  |  | rs376616438 | 125,472,267 | 0.016 | 3.39 × 10-4 | 2.16 × 10-4 | 6.72 × 10-4 | 8.63 × 10-6 | **2.27 × 10-6** | 3.54 × 10-5 |
|  |  | rs187855416 | 125,474,459 | 0.016 | 3.39 × 10-4 | 2.16 × 10-4 | 6.72 × 10-4 | 8.63 × 10-6 | **2.27 × 10-6** | 3.54 × 10-5 |
| 11 | *AP000851.1* | rs139780693 | 102,509,700 | 0.039 | 1.18 × 10-5 | 5.17 × 10-6 | 9.14 × 10-5 | 1.72 × 10-7 | **5.73 × 10-8** | 3.25 × 10-6 |
| 13 | *AL161616.2* | rs150191017 | 31,962,649 | 0.015 | 1.36 × 10-4 | 2.99 × 10-4 | 4.06 × 10-4 | **6.63 × 10-7** | 6.90 × 10-6 | 1.80 × 10-5 |



**Figure S1. Quantile-quantile plots of L-BRAT, RGMMAT, GEE, and GMMAT in the VACS cocaine use data.** Genomic control inflation factors are listed for each of the six tests.



**Figure S2. Manhattan plot in the VACS cocaine use data. Red line denotes genome-wide significance (P-value = 5 × 10 −8) and blue line denotes suggestive significance (P-value = 10 −5).** P-values are the minimum P-value among the six longitudinal tests.