**Supplementary Materials 2**

**Table S1 Positional information of each channel in the fNIRS device (mm)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Channel | | MNI coordinate mapping | | | Brodmann area | Percentage of overlap |
|  | X | | Y | Z |
| CH1 | -60 | | 18 | 19 | 44-pars opercularis, Broca's area\_Left | 0.56 |
| CH2 | -54 | | 22 | 32 | 44-pars opercularis, Broca's area\_Left | 0.70 |
| CH3 | -56 | | 30 | 0 | 45-pars triangularis，Broca area\_Left | 0.68 |
| CH4 | -52 | | 43 | -7 | 46-DLPFC\_Left | 0.44 |
| CH5 | -55 | | 34 | 12 | 45-pars triangularis，Broca area\_Left | 1 |
| CH6 | -49 | | 38 | 16 | 45-pars triangularis，Broca area\_Left | 0.98 |
| CH7 | -50 | | 47 | 4 | 46-DLPFC\_Left | 0.64 |
| CH8 | -43 | | 53 | 18 | 46-DLPFC\_Left | 0.82 |
| CH9 | -41 | | 40 | 38 | 46-DLPFC\_Left | 0.41 |
| CH10 | -34 | | 53 | 30 | 46-DLPFC\_Left | 0.97 |
| CH11 | -21 | | 51 | 43 | 9-DLPFC\_Left | 0.97 |
| CH12 | -42 | | 59 | -3 | 46-DLPFC\_Left | 0.51 |
| CH13 | -35 | | 63 | 10 | 10-FPA\_Left | 0.80 |
| CH14 | -23 | | 70 | 1 | 11-OA\_Left | 0.51 |
| CH15 | -24 | | 66 | 23 | 10-FPA\_Left | 0.81 |
| CH16 | -12 | | 62 | 35 | 9-DLPFC\_Left | 0.54 |
| CH17 | -14 | | 72 | 14 | 10-FPA\_Left | 1 |
| CH18 | 1 | | 65 | 24 | 10-FPA\_Left | 1 |
| CH19 | 0 | | 53 | 43 | 9-DLPFC\_Left | 1 |
| CH20 | 13 | | 63 | 35 | 9-DLPFC\_Right | 0.51 |
| CH21 | 23 | | 52 | 44 | 9-DLPFC\_Right | 0.99 |
| CH22 | 0 | | 69 | 3 | 10-FPA\_Left | 1 |
| CH23 | 15 | | 73 | 14 | 10-FPA\_Right | 1 |
| CH24 | 25 | | 71 | 1 | 10-OA\_Right | 0.51 |
| CH25 | 24 | | 67 | 23 | 10-FPA\_Right | 0.90 |
| CH26 | 34 | | 54 | 31 | 46-DLPFC\_Right | 0.89 |
| CH27 | 36 | | 65 | 10 | 10-FPA\_Right | 0.90 |
| CH28 | 45 | | 54 | 19 | 46-DLPFC\_Right | 0.83 |
| CH29 | 43 | | 40 | 39 | 9-DLPFC\_Right | 0.40 |
| CH30 | 52 | | 39 | 26 | 45-pars triangularis，Broca area\_Right | 0.98 |
| CH31 | 56 | | 24 | 33 | 44-pars opercularis, Broca's area\_Right | 0.63 |
| CH32 | 43 | | 61 | -3 | 46-DLPFC\_Right | 0.45 |
| CH33 | 51 | | 49 | 5 | 46-DLPFC\_Right | 0.77 |
| CH34 | 54 | | 44 | -8 | 46-DLPFC\_Right | 0.48 |
| CH35 | 58 | | 35 | 13 | 45-pars triangularis，Broca area\_Right | 1 |
| CH36 | 62 | | 19 | 19 | 44-pars opercularis, Broca's area\_Right | 0.51 |
| CH37 | 59 | | 31 | 1 | 45-pars triangularis，Broca area\_Right | 0.77 |

Note: CH: Channel; DLPFC: Dorsolateral prefrontal cortex fNIRS: Functional near-infrared spectroscopy; FPA: Frontopolar area; MNI: The standard montreal neurological institute; OA: Orbitofrontal area.

**Table S2 The differences of *β* values in brain areas among among three groups**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Channel | Mean *β* value | | | Brodmann area | F value | *P* value |
| T2DM with MDD group | T2DM group | Healthy group |
| CH9 | -2.12×10-7±3×10-5 | 1.66×10-7±1×10-5 | 5.97×10-7±3×10-5 a | 46-DLPFC\_Left | 2.17 | 0.12 |
| CH10 | 1.16×10-7±7.14×10-7 | 4.42×10-7±8.82×10-7 a | 2.65×10-7±9.65×10-7 | 46-DLPFC\_Left | 3.62 | 0.03\* |
| CH11 | 2.61×10-7±8.97×10-7 | 4.43×10-7±1×10-5 b | 1.65×10-8±2×10-5 | 9-DLPFC\_Left | 2.77 | 0.06 |
| CH13 | 2.79×10-7±9.70×10-7 | 5.41×10-7±9.77×10-7 a | 3.82×10-7±7.03×10-7 | 10-FPA\_Left | 2.18 | 0.11 |
| CH14 | 2.82×10-7±6.45×10-7 | 4.08×10-7±9.35×10-7 a | 5.28×10-7±8.53×10-7 | 11-OA\_Left | 2.25 | 0.11 |
| CH15 | 3.39×10-7±5.12×10-7 | 5.14×10-8±6.56×10-7 a | 3.70×10-7±5.45×10-7 | 10-FPA\_Left | 2.63 | 0.07 |
| CH16 | 1.77×10-7±6×10-7 | 5×10-7±8.71×10-7 ab | 1.07×10-7±1×10-5 | 9-DLPFC\_Left | 5.92 | <0.01\* |
| CH17 | 1.42×10-7±9.63×10-7 | 4.49×10-7±1×10-5 a | 2.75×10-7±8.34×10-7 | 10-FPA\_Left | 2.29 | 0.10 |
| CH22 | 3.07×10-7±7.30×10-7 | 7.28×10-7±1×10-5 a | 4.99×10-7±1×10-5 | 10-FPA\_Left | 4.93 | <0.01\* |
| CH23 | 3.23×10-7±1×10-5 | 5.89×10-7±1×10-5 b | 1.39×10-7±1×10-5 | 10-FPA\_Right | 3.62 | 0.03\* |
| CH24 | 3.63×10-7±7.33×10-7 | 7.26×10-7±9.09×10-7 ab | 3.07×10-7±7.78×10-7 | 10-OA\_Right | 7.87 | <0.01\* |
| CH25 | 1.93×10-7±5.33×10-7 | 3.93×10-7±5.59×10-7 a | 2.58×10-7±5.39×10-7 | 10-FPA\_Right | 3.51 | 0.03\* |
| CH30 | 6.53×10-8±1×10-5 | 6.18×10-7±3×10-5 b | -5.54×10-7±4×10-5 | 45-pars triangularis，Broca area\_Right | 4.35 | 0.01\* |
| CH34 | 1.76×10-7±6.64×10-7 | 4.43×10-7±8.82×10-7 ab | 2.05×10-7±7.74×10-7 | 46-DLPFC\_Right | 3.56 | 0.03\* |

Note: \*: The differences in brain areas were statistically significant among three groups; a: The difference was statistically significant compared with T2DM with the MDD group; b: The difference was statistically significant compared with the healthy group; DLPFC: Dorsolateral prefrontal cortex; FPA: Frontopolar area; MDD: Major depressive disorder; OA: Orbitofrontal area; T2DM: Type 2 diabetes mellitus.

**Table S3 Prediction performance of the machine learning algorithms in classification analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Algorithms | Mean Repeated CV Score | 95%CI | |
| T2DM with MDD group vs. T2DM group | logistic regression | 0.62 | 0.61 | 0.63 |
| linear support vector classification | 0.63 | 0.61 | 0.64 |
| linear discriminant analysis | 0.66 | 0.66 | 0.67 |
| T2DM with MDD group vs. Healthy group | logistic regression | 0.65 | 0.63 | 0.66 |
| linear support vector classification | 0.65 | 0.64 | 0.67 |
| linear discriminant analysis | 0.67 | 0.66 | 0.67 |
| T2DM group vs. Healthy group | logistic regression | 0.60 | 0.59 | 0.61 |
| linear support vector classification | 0.61 | 0.61 | 0.62 |
| linear discriminant analysis | 0.57 | 0.57 | 0.58 |

Note: CV: Cross validation; CI: Confidence interval; MDD: Major depressive disorder; T2DM: Type 2 diabetes mellitus.

**Table S4 Nodes with reduced connections and their degree among the 3 groups in classification analysis.**

|  |  |  |
| --- | --- | --- |
|  | Node | Degree |
| T2DM with MDD group vs. T2DM group | DLPFC\_Right | 56 |
| Broca's area\_Right | 27 |
| DLPFC\_Left | 23 |
|  | FPA\_Left | 20 |
|  | FPA\_R | 11 |
|  | OA\_L | 3 |
| T2DM with MDD group vs. Healthy group | DLPFC\_R | 40 |
| Broca's area\_R | 14 |
| FPA\_R | 12 |
| FPA\_L | 9 |
| DLPFC\_L | 9 |
| OA\_L | 1 |
| Broca's area\_L | 1 |
| T2DM group vs. Healthy group | DLPFC\_L | 6 |
| DLPFC\_R | 4 |
| Broca's area\_L | 3 |
| Broca's area\_R | 3 |
| FPA\_R | 2 |
| FPA\_L | 2 |

Note: DLPFC: Dorsolateral prefrontal cortex; FPA: Frontopolar area; MDD: Major depressive disorder; OA: Orbitofrontal area; T2DM: Type 2 diabetes mellitus.

**Table S5 Prediction performance of the machine learning algorithms in regression analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Algorithms | Mean Repeated CV Score | 95%CI | |
| regression analysis of predicted and actual HAMD-24 scores | linear regression | -0.13 | -0.18 | -0.09 |
| linear support vector regression | -0.13 | -0.17 | -0.08 |

Note: CV: Cross validation; CI: Confidence interval; HAMD-24: Hamilton depression scale-24.

**Table S6 Nodes with reduced connections and their degree among the 3 groups in regression analysis.**

|  |  |  |
| --- | --- | --- |
|  | Node | Degree |
| Regression analysis of predicted and actual HAMD-24 scores | DLPFC\_Right | 38 |
| Broca's area\_Left | 29 |
| DLPFC\_Left | 20 |
| Broca's area\_Right | 12 |
| FPA\_Right | 10 |
| FPA\_Left | 10 |
| OA\_Left | 3 |

Note: DLPFC: Dorsolateral prefrontal cortex; FPA: Frontopolar area; HAMD-24: Hamilton depression scale-24; OA: Orbitofrontal area.



**Fig. S1 The ROC curve of *β* values among the 3 groups.**

Note: AUC: The area under the curve; MDD: Major depressive disorder; T2DM: Type 2 diabetes mellitus.