Table 1. Summary of the quantified parameters in the study.

| Parameters                                      | WT_mPFC  | 5xFAD_mPFC | WT_V1  | 5xFAD_V1 |
|------------------------------------------------|----------|------------|--------|----------|
|                                                 | Mean±SEM | n          | Mean±SEM | n        | Mean±SEM | n        | Mean±SEM | n        |
| Immunostaining using anti-6E10                  |          |            |        |          |          |          |          |          |
| Average size of puncta (µm²)                    | 15.62 ± 4.89 | 5          | 209.36 ± 37.13 | 5 | 45.10 ± 20.17 | 5 | 55.59 ± 15.28 | 5 |
| L1                                             | 0.00 ± 0.00 | 5          | 215.37 ± 28.32 | 5 | 17.85 ± 5.14 | 5 | 41.27 ± 10.09 | 5 |
| L2-3                                           | 0.00 ± 0.00 | 5          | 20.87 ± 3.00 | 5 | 0.53 ± 0.17 | 5 | 2.52 ± 0.51 | 5 |
| Synapse density (# / 10µm)                      | 14.57 ± 1.14 | 12         | 10.96 ± 0.59 | 12 | 14.28 ± 1.09 | 9 | 13.00 ± 1.02 | 9 |
| Synapse density (# / 10µm)                      | 8.99 ± 1.05 | 12         | 6.17 ± 0.44 | 12 | 9.59 ± 0.66 | 9 | 8.94 ± 0.76 | 9 |
| Synapse density with multiple mitochondria (#/10µm) | 5.30 ± 0.44 | 12         | 4.74 ± 0.50 | 12 | 4.69 ± 0.68 | 9 | 4.06 ± 0.41 | 9 |
| Mitochondria # / bouton                         | 1.44 ± 0.07 | 96         | 1.23 ± 0.06 | 87 | 1.14 ± 0.07 | 65 | 1.18 ± 0.07 | 61 |
| Mitochondrial volume (µm³)                      | 0.04 ± 0.0002 | 138      | 0.05 ± 0.0002 | 106 | 0.05 ± 0.0004 | 74 | 0.05 ± 0.0005 | 71 |
| Spine volume (µm³)                              | 0.09 ± 0.0003 | 289      | 0.10 ± 0.0005 | 228 | 0.09 ± 0.0003 | 239 | 0.09 ± 0.0004 | 238 |
| Spine volume without presynaptic mitochondrria | 0.06 ± 0.0003 | 154      | 0.06 ± 0.0005 | 104 | 0.08 ± 0.0005 | 134 | 0.08 ± 0.0005 | 132 |
| Spine volume with presynaptic mitochondria      | 0.15 ± 0.0014 | 97      | 0.18 ± 0.0016 | 85 | 0.14 ± 0.0014 | 65 | 0.17 ± 0.0021 | 61 |
| Axon-spine interface (ASI) area (µm²)           | 0.14 ± 0.0008 | 251      | 0.15 ± 0.0010 | 188 | 0.18 ± 0.0011 | 189 | 0.23 ± 0.0015 | 185 |
| ASI area with presynaptic mitochondria          | 0.08 ± 0.0007 | 154      | 0.07 ± 0.0009 | 100 | 0.12 ± 0.0010 | 126 | 0.15 ± 0.0013 | 123 |
| Spine neck diameter (µm)                        | 0.22 ± 0.0003 | 274      | 0.21 ± 0.0004 | 215 | 0.26 ± 0.0004 | 238 | 0.25 ± 0.0004 | 236 |
| Neck diameter (total)                           | 0.21 ± 0.0006 | 146      | 0.21 ± 0.0007 | 101 | 0.26 ± 0.0007 | 133 | 0.25 ± 0.0006 | 131 |
| Neck diameter with presynaptic mitochondria     | 0.24 ± 0.0009 | 93       | 0.24 ± 0.0013 | 76 | 0.29 ± 0.0015 | 65 | 0.29 ± 0.0018 | 61 |
| Spine head diameter (µm)                        | 0.44 ± 0.0007 | 274      | 0.46 ± 0.0011 | 215 | 0.46 ± 0.0008 | 238 | 0.47 ± 0.0009 | 236 |
| Head diameter (total)                           | 0.40 ± 0.0010 | 146      | 0.40 ± 0.0012 | 101 | 0.45 ± 0.0013 | 133 | 0.46 ± 0.0014 | 131 |
| Head diameter with presynaptic mitochondria     | 0.57 ± 0.0026 | 93       | 0.66 ± 0.0035 | 76 | 0.59 ± 0.0027 | 65 | 0.63 ± 0.0038 | 61 |
| Spine shape classification                      | 7.50 ± 0.83 | 12         | 5.00 ± 0.72 | 12 | 9.91 ± 0.69 | 9 | 8.52 ± 0.63 | 9 |
| Thin type (# / 10µm)                            | 7.01 ± 0.77 | 12         | 6.28 ± 0.45 | 12 | 6.07 ± 0.93 | 9 | 6.20 ± 0.95 | 9 |
| Mushroom type (# / 10µm)                        | 0.44 ± 0.22 | 12         | 0.38 ± 0.13 | 12 | 1.23 ± 0.28 | 9 | 1.12 ± 0.44 | 9 |
| Stubby type (# / 10µm)                          | 0.88 ± 0.23 | 12         | 0.71 ± 0.23 | 12 | 0.14 ± 0.09 | 9 | 0.15 ± 0.10 | 9 |
| Branch type (# / 10µm)                          | 0.06 ± 0.06 | 12         | 0.05 ± 0.05 | 12 | 0.00 ± 0.00 | 9 | 0.07 ± 0.07 | 9 |
| Filopodia type (# / 10µm)                       | 0.69 ± 0.02 | 12         | 0.63 ± 0.03 | 12 | 0.78 ± 0.01 | 9 | 0.81 ± 0.01 | 9 |
| Relative distribution of presynaptic partner    | 0.31 ± 0.02 | 12         | 0.37 ± 0.03 | 12 | 0.22 ± 0.01 | 9 | 0.19 ± 0.01 | 9 |
| Thin spine-contacting boutons with mitochondria | 0.48 ± 0.02 | 12         | 0.45 ± 0.01 | 12 | 0.54 ± 0.02 | 9 | 0.52 ± 0.02 | 9 |
| Mushroom-contacting boutons with mitochondria   | 0.52 ± 0.02 | 12         | 0.55 ± 0.01 | 12 | 0.46 ± 0.02 | 9 | 0.48 ± 0.02 | 9 |