**Supplementary file 2. Detailed statistical results**

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|  |  | **Description** | **Comment** | **Test** |  |  |  |
| **Figure 1** | d | Peak freq over age | per experiment - all | Mann-Kendall | n114 | p2.73E-08 | tau b3.61E-01 |
|  | d | Peak ampl over age | per experiment - all | Mann-Kendall | n114 | p3.93E-22 | tau b0.625 |
|  | d | Peak freq over age | per experiment - anesthetized | Mann-Kendall | n80 | p2.30E-07 | tau b0.404 |
|  | d | Peak ampl over age | per experiment - anesthetized | Mann-Kendall | n80 | p1.77E-13 | tau b0.571 |
|  | d | Peak freq over age | per experiment - non anesthetized | Mann-Kendall | n34 | p0.020 | tau b0.288 |
|  | d | Peak ampl over age | per experiment - non anesthetized | Mann-Kendall | n34 | p6.13E-08 | tau b0.671 |
|  | d | Linear regression model baseline LFP features to age | per recordingANOVApeak freqpeak ampl | n,df114,112 | R20.55df1,1111,111 | F67.9F17.87874.421 | p5.48E-20p4.86E-055.05E-14 |
| **Figure 2** | a | PV over age | per experiment | Mann-Kendall | n38 | p1.29E-07 | tau b0.623 |
|  | b | SOM over age | per experiment | Mann-Kendall | n39 | p0.990 | tau b-0.002 |
|  | h | FS proportion over age | per experiment | Mann-Kendall | n66 | p1.44E-07 | tau b0.457 |
|  | i | half width over age - RS | per unit | Mann-Kendall | n3172 | p1.61E-28 | tau b-0.133 |
|  | i | half width over age - FS | per unit | Mann-Kendall | n382 | p5.17E-17 | tau b-0.295 |
|  | i | trough to peak over age - RS | per unit | Mann-Kendall | n3172 | p4.57E-05 | tau b-0.051 |
|  | i | trough to peak over age - FS | per unit | Mann-Kendall | n382 | p9.23E-11 | tau b-0.236 |
|  | i | amplitude over age - RS | per unit | Mann-Kendall | n3172 | p4.45E-22 | tau b-0.116 |
|  | i | amplitude over age - FS | per unit | Mann-Kendall | n382 | p3.82E-06 | tau b-0.162 |
|  | i | Linear regression model baseline unit features to age | per recordingANOVAratio FShalf width RShalf width FStrough peak RStrough peak FSampl RSampl FS | n,df52,44 | R20.551df1,441,441,441,441,441,441,44 | F9.92F1.6740.15416.2253.8700.5621.0461.780 | p2.31E-07p0.2020.6962.01E-040.0550.4570.3110.188 |
| **Figure 3** | d | Peak freq over age 473nm | per experiment - all | Mann-Kendall | n115 | p7.69E-06 | tau b0.2886 |
|  | d | Peak MI over age 473nm | per experiment - all | Mann-Kendall | n115 | p1.04E-09 | tau b0.392 |
|  | d | Peak freq over age 473nm | per experiment - anesthetized | Mann-Kendall | n80 | p0.001 | tau b0.251 |
|  | d | Peak MI over age 473nm | per experiment - anesthetized | Mann-Kendall | n80 | p6.06E-06 | tau b0.351 |
|  | d | Peak freq over age 473nm | per experiment - non anesthetized | Mann-Kendall | n35 | p0.007 | tau b0.333 |
|  | d | Peak MI over age 473nm | per experiment - non anesthetized | Mann-Kendall | n35 | p1.26E-04 | tau b0.475 |
|  | d | Linear regression ramp features LFP model to age | per recordingANOVApeak freqpeak ampl | n,df115,113 | R20.364df1,1121,112 | F33.6F13.96243.897 | p3.72E-12p2.95E-041.26E-09 |
| **Figure 3 - supplement 1** | c | Peak freq over age 594nm | per experiment - all | Mann-Kendall | n111 | p0.092 | tau b0.110 |
|  | c | Peak MI over age 594nm | per experiment - all | Mann-Kendall | n111 | p0.741 | tau b0.021 |
|  | c | Peak freq over age 594nm | per experiment - anesthetized | Mann-Kendall | n76 | p0.096 | tau b0.133 |
|  | c | Peak MI over age 594nm | per experiment - anesthetized | Mann-Kendall | n76 | p0.811 | tau b0.019 |
|  | c | Peak freq over age 594nm | per experiment - non anesthetized | Mann-Kendall | n35 | p0.520 | tau b0.081 |
|  | c | Peak MI over age 594nm | per experiment - non anesthetized | Mann-Kendall | n35 | p0.988 | tau b-0.003 |
| **Figure 4** | d | RS rate change over age | per age group | Mann-Kendall | n7 | p0.071 | tau b0.619 |
|  | d | FS rate change over age | per age group | Mann-Kendall | n7 | p0.880 | tau b0.047 |
|  | e | RS MI hist over age | per unit | Mann-Kendall | n1821 | p1.52E-14 | tau b-0.122 |
|  | e | FS MI hist over age | per unit | Mann-Kendall | n225 | p0.906 | tau b0.005 |
| **Figure 5** | b | Autocorrelation(stimulation) | Main factorRS / FS | 3x3 ANOVA | df1153093 | F1.563 | p0.211 |
|  | b | Autocorrelation(stimulation) | Main factorAge group | 3x3 ANOVA | df6153093 | F25.440 | p2.21E-30 |
|  | b | Autocorrelation(stimulation) | Main factorFrequency | 3x3 ANOVA | df99153093 | F492.798 | p0.000 |
|  | c | spike-triggered LFP (stimulation) | Main factorRS / FS | 3x3 ANOVA | df1815232 | F277.206 | p3.12E-62 |
|  | c | spike-triggered LFP (stimulation) | Main factorAge group | 3x3 ANOVA | df6815232 | F847.458 | p0.000 |
|  | c | spike-triggered LFP (stimulation) | Main factorFrequency | 3x3 ANOVA | df400815232 | F614.590 | p0.000 |
| **Figure 5 - supplement 1** | b | Autocorrelation(spontaneous) | Main factorRS / FS | 3x3 ANOVA | df1153093 | F1.883 | p0.169 |
|  | b | Autocorrelation(spontaneous) | Main factorAge group | 3x3 ANOVA | df6153093 | F41.863 | p2.53E-51 |
|  | b | Autocorrelation(spontaneous) | Main factorFrequency | 3x3 ANOVA | df99153093 | F663.540 | p0.000 |
|  | c | spike-triggered LFP (spontaneous) | Main factorRS / FS | 3x3 ANOVA | df1805201 | F248.426 | p5.83E-56 |
|  | c | spike-triggered LFP (spontaneous) | Main factorAge group | 3x3 ANOVA | df6805201 | F1413.266 | p0.000 |
|  | c | spike-triggered LFP (spontaneous) | Main factorFrequency | 3x3 ANOVA | df400805201 | F747.008 | p0.000 |
| **Figure 5 - supplement 2** | a | RS CV over age (spontaneous) | per age group | Mann-Kendall | n7 | p0.763 | tau b0.142 |
|  | a | FS CV over age (spontaneous) | per age group | Mann-Kendall | n7 | p0.880 | tau b0.047 |
|  | a | RS CV over age (stimulation) | per age group | Mann-Kendall | n7 | p0.880 | tau b0.047 |
|  | a | FS CV over age (stimulation) | per age group | Mann-Kendall | n7 | p0.367 | tau b-0.333 |
|  | b | RS CV2 over age (spontaneous) | per age group | Mann-Kendall | n7 | p0.763 | tau b-0.142 |
|  | b | FS CV2 over age (spontaneous) | per age group | Mann-Kendall | n7 | p0.880 | tau b0.047 |
|  | b | RS CV2 over age (stimulation) | per age group | Mann-Kendall | n7 | p0.367 | tau b-0.333 |
|  | b | FS CV2 over age (stimulation) | per age group | Mann-Kendall | n7 | p0.367 | tau b-0.333 |
|  | c | inter-spike interval(spontaneous) | Main factorRS / FS | 3x3 ANOVA | df1204893 | F5.245 | p0.022 |
|  | c | inter-spike interval(spontaneous) | Main factorAge group | 3x3 ANOVA | df6204893 | F3519.858 | p0.000 |
|  | c | inter-spike interval(spontaneous) | Main factorFrequency | 3x3 ANOVA | df99204893 | F583.282 | p0.000 |
|  | d | inter-spike interval(stimulation) | Main factorRS / FS | 3x3 ANOVA | df1204893 | F146.645 | p9.64E-34 |
|  | d | inter-spike interval(stimulation) | Main factorAge group | 3x3 ANOVA | df6204893 | F2745.028 | p0.000 |
|  | d | inter-spike interval(stimulation) | Main factorFrequency | 3x3 ANOVA | df99204893 | F447.1624 | p0.000 |
|  | e | pairwise phase consistency(spontaneous) | Main factorRS / FS | 3x3 ANOVA | df120262 | F1.149 | p0.283 |
|  | e | pairwise phase consistency(spontaneous) | Main factorAge group | 3x3 ANOVA | df620262 | F6.835 | p2.93E-07 |
|  | e | pairwise phase consistency(spontaneous) | Main factorFrequency | 3x3 ANOVA | df920262 | F164.038 | p2.67E-301 |
|  | f | pairwise phase consistency(stimulation) | Main factorRS / FS | 3x3 ANOVA | df120385 | F3.619 | p0.057 |
|  | f | pairwise phase consistency(stimulation) | Main factorAge group | 3x3 ANOVA | df620385 | F13.580 | p1.90E-15 |
|  | f | pairwise phase consistency(stimulation) | Main factorFrequency | 3x3 ANOVA | df920385 | F124.882 | p8.13E-230 |
| **Figure 6** | b | 10 to 1 ratio | Main factorRS / FS | 3x3 ANOVA | df17698 | F0.394 | p0.530 |
|  | b | 10 to 1 ratio | Main factorAge group | 3x3 ANOVA | df67698 | F18.708 | p1.00E-21 |
|  | b | 10 to 1 ratio | Main factorStimulation frequency | 3x3 ANOVA | df47698 | F36.090 | p6.29E-30 |
|  | d | RS rate change over age | per age group | Mann-Kendall | n7 | p0.035 | tau b0.714 |
|  | d | FS rate change over age | per age group | Mann-Kendall | n7 | p0.071 | tau b0.619 |
|  | f | RS rate change over age | per age group | Mann-Kendall | n7 | p0.006 | tau b-0.904 |
|  | f | FS rate change over age | per age group | Mann-Kendall | n7 | p0.071 | tau b-0.619 |
| **Other** |  |  |  |  |  |  |  |
|  |  | Linear regression peak freq baseline to ramp | per recording | n,df114,112 | R20.16 | F22.6 | p6.00E-06 |
|  |  | Linear regression ampl baseline to ramp | per recording | n,df114,112 | R20.206 | F30.4 | p2.30E-07 |
|  |  | Stepwise linear regression model unit features all to LFP peak freq ramp | per recordingANOVAhalf width FSacorr peak RSacorr peak FS | n,df42,38 | R20.136df1,381,381,38 | F3.15F5.7210.2140.012 | p0.036p0.0210.6460.912 |
|  |  | Stepwise linear regression model unit features all to LFP ampl ramp | per recordingANOVArate ramp RSstLFP peak RSpulse early RSpulse late FS | n,df48,43 | R20.716df1,431,431,431,43 | F30.6F6.39811.23835.7021.02E-05 | p4.35E-12p0.0151.67E-033.97E-070.997 |