**Supplementary file 3: Supplementary tables of data**

**Table 1.** Descriptive statistics of acute and chronic seizure parameters in juvenile-adults (10-day-old) and old-adults (22-day-old) bang-sensitive mutant *Drosophila* models of epilepsy (*parabss1*) of 0 g/mL. n= 50.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Statistical measurement** | **CONVULSION TIME (S)** | | **PARALYTIC TIME (S)** | | **RECOVRY TIME (S)** | |
| Acute | Chronic | Acute | Chronic | Acute | Chronic |
| Number of values | 50 | 50 | 50 | 50 | 50 | 50 |
|  |  |  |  |  |  |  |
| Minimum | 15 | 17 | 15 | 30 | 49 | 47 |
| 25% Percentile | 18 | 19.75 | 40 | 40 | 59 | 50 |
| Median | **20** | **21** | **44** | **45** | **62** | **57** |
| 75% Percentile | 23 | 22 | 50 | 50 | 69 | 65 |
| Maximum | 30 | 24 | 56 | 72 | 80 | 82 |
|  |  |  |  |  |  |  |
| 5% Percentile | 16 | 18 | 17.75 | 33.3 | 52.2 | 48 |
| 95% Percentile | 25.45 | 24 | 54.45 | 60 | 77.8 | 80 |
|  |  |  |  |  |  |  |
| Mean | **20.46** | **20.74** | **42.26** | **45.24** | **63.6** | **58.98** |
| Std. Deviation | 2.943 | 1.759 | 9.676 | 7.336 | 7.323 | 9.993 |
| Std. Error of Mean | 0.4162 | 0.2488 | 1.368 | 1.037 | 1.036 | 1.413 |
|  |  |  |  |  |  |  |
| Lower 95% CI of mean | 19.62 | 20.24 | 39.51 | 43.16 | 61.52 | 56.14 |
| Upper 95% CI of mean | 21.3 | 21.24 | 45.01 | 47.32 | 65.68 | 61.82 |
|  |  |  |  |  |  |  |
| Lower 95% CI of median | 19 | 20 | 41 | 42 | 60 | 52 |
| Upper 95% CI of median | 21 | 21 | 46 | 47 | 65 | 60 |

Abbreviations: BSS = bang-senseless, Para = Paralytic.

**Table 2.** Acute and chronic effect of methanol *I. cylindrica* root extract on acute and chronic seizure parameters respectively in juvenile-adults (10-day-old) and old-adults (22-day-old) bang-sensitive mutant *Drosophila* models of epilepsy (*parabss1*), n= 50.

|  |  |  |  |
| --- | --- | --- | --- |
| **Concentrations**  **(g/mL)**  Acute treatment  (2hr) | **Mean ± SD time (seconds)**  **n = 50** | | |
| Convulsion | Paralytic | Recovery |
| **0.0** | 20.46 ± 2.94***b*** | 42.26 ± 4.72***b*** | 63.60 ± 7.32***b*** |
| **0.6** | 20.16 ± 5.41***b*** | 40.42 ± 9.12***b*** | 58.04 ± 13.14**aa*b*** |
| **0.8** | 12.50 ± 7.56**a** | 33.22 ± 1.48**a** | 49.22 ± 6.09**a** |
| **1.0** | 9.20 ± 3.55**a** | 31.08 ± 9.16**a** | 47.74 ± 5.96**a** |
| **NaV (0.3 mg/mL)** | 11.76 ± 6.95**a** | 32.24 ± 8.88**a** | 46.14 ± 6.256**a** |
| Chronic treatment (day 12) |  | | |
| **0.0** | 20.74 ± 1.76***b*** | 45.24 ± 7.34***b*** | 58.98 ± 9.99***b*** |
| **0.0125** | 20.16 ± 5.41***b*** | 42.26 ± 9.68***b*** | 58.04 ± 13.14***b*** |
| **0.025** | 14.78 ± 2.85**aa** | 23.10 ± 8.62**a** | 48.30 ± 5.35**a** |
| **0.050** | 11.68 ± 2.69**a** | 18.28 ± 4.80**a** | 39.84 ± 4.93**a** |
| **NaV (0.15 mg/mL)** | 11.68 ± 4.01**a** | 20.50 ± 8.29**a** | 43.08 ± 6.85**a** |

Tukey's multiple comparisons tests, p-value < 0.05; against the negative control (0.0 g/mL); ap-value < 0.0001, aap-value < 0.05; against the standard control (0.3 mg/mL); bp-value < 0.0001, bbp-value < 0.05. Abbreviations: BSS = bang-senseless, NaV = Sodium valproate, Para = Paralytic, SD = Standard deviation.

**Table 3.** Acute effect of methanol *I. cylindrica* root extract on acute learning and memory deficits in juvenile-adults (10-day-old) bang-sensitive mutant *Drosophila* (*parabss1*) and wild-type control *Drosophila* (*OrR* and *CS*). n = 100.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Mean ± SD** **Learning and Memory pass rates (x10%)**  **n= 100** | | | | | | | | |
|  | 0.0 g/mL | | | 0.8g/mL | | | NaV (0.3 mg/mL) | | |
| **Learning** | 1h | 2h | 3h | 1h | 2h | 3h | 1h | 2h | 3h |
| *CS* | 7.7 ± 0.2 | 7.8 ± 0.2 | 7.9 ± 0.3 | 7.7 ±0.2 | 8.0 ±0.5 | 7.9 ±0.5 | 7.9 ±0.1 | 7.9 ±0.3 | 7.6 ±0.3 |
| *OrR* | 7.9 ± 0.1 | 7.7 ± 0.2 | 7.9 ± 0.2 | 7.6 ±0.1 | 7.8±.0.1 | 7.7 ±0.3 | 7.7 ±0.1 | 7.6 ±0.1 | 7.8 ±0.3 |
| *parabss1* | 3.9±0.1**\*#g** | 4.1±0.2**\*#g** | 3.9 ± 0.2**\*#g** | 6.9 ±0.2 | 7.0 ±0.1 | 7.0 ±0.1 | 6.9 ±0.1 | 7.1 ±0.0 | 7.3 ±0.2 |

**Memory**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CS* | 7.2±0.1cc | 7.1 ± 0.1c | 7.1 ± 0.1c | 7.1 ±0.1 | 7.1 ±0.1 | 7.1 ±0.1 | 7.0 ±0.1 | 7.1 ±0.1 | 7.1 ±0.1 |
| *OrR* | 7.1 ±0.1c | 7.1 ± 0.1c | 7.1 ± 0.1c | 7.1 ±0.1 | 7.1 ±0.2 | 7.1 ±0.1 | 7.1 ±0.1 | 7.1 ±0.1 | 7.1 ±0.1 |
| *parabss1* | 3.5±0.1**\*#**gcc | 3.5±0.0**\*#g** cc | 3.5 ± 0.0**\*#g** | 6.6 ± 0.1 | 6.7 ± 0.2 | 6.6 ± 0.1 | 6.6 ± 0.1 | 6.7 ± 0.1 | 6.8 ± 0.1 |

Tukey's multiple comparisons tests, p-value < 0.05; for learning and memory pass rates in-comparisons against NaV (0.3 mg/mL); \*p-value < 0.05; learning and memory pass in comparisons against 0.8 g/mL; #p-value < 0.05; *parabss1*against the wild-type control flies; **g**p-value < 0.05. In-comparison of memory pass against the learning pass; cp-value < 0.0001, ccp-value < 0.05. *OrR* and *CS* = wild-type control *Drosophila*; *parabss1*= mutant (test) *Drosophil*a. Abbreviations: BSS = bang-senseless, CS = Canton-Special, NaV = Sodium valproate,OrR = Oregon R, Para = Paralytic,

SD = Standard deviation.

**Table 4.** Chronic effect of methanol *I. cylindrica* root extract on chronic learning and memory deficits in old-adults (16-28-day-old) bang-sensitive mutant *Drosophila* (*parabss1*) and wild-type control *Drosophila* (*OrR* and *CS*). n = 100

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Mean ± SD** **Learning and Memory pass rates (x10%)** | | | | | | | | | |
| 0.0 g/mL 0.025 g/mL NaV (0.15 mg/mL) | | | | | | | | | |
| **Learning** | day 6 | day 12 | day 18 | day 6 | day 12 | day 18 | day 6 | day 12 | day 18 |
| *CS* | 7.6 ± 0.5 | 8.1 ± 0.1 | 8.2 ± 0.0 | 7.9 ±0.1 | 8.0 ± 0.1 | 7.9 ± 0.1 | 7.8 ± 0.1 | 7.9 ± 0.2 | 7.9 ±0.1 |
| *OrR* | 7.8 ± 0.1 | 8.0 ± 0.4 | 7.8 ± 0.1 | 7.9 ±0.1 | 7.8 ± 0.2 | 8.0 ±0.1 | 7.9 ±0.1 | 7.8 ±0.2 | 7.9 ±0.1 |
| *parabss1* | 3.6±0.1**\*#g** | 3.5±0.0**\*#g** | 3.5 ± 0.1**\*#g** | 6.5 ±0.1 | 6.3 ±0.1 | 6.7 ±0.1 | 6.7 ±0.1 | 6.7 ±0.3 | 6.5 ±0.1 |

**Memory**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CS* | 7.2 ± 0.2 | 7.1 ± 0.1c | 7.2 ± 0.2c | 7.2 ±0.1 | 7.1 ±0.1 | 71 ± 0.1 | 7.1 ±0.1 | 7.1 ±0.1 | 7.0 ±0.1 |
| *OrR* | 7.1±0.1  cc | 7.0 ± 0.0c | 7.1 ± 0.1c | 7.0 ±0.1 | 7.1 ±0.1 | 71 ± 0.1 | 7.1 ±0.1 | 7.0 ±0.1 | 7.1 ±0.1 |
| *parabss1* | 3.2±0.1**\*#g** | 3.3±0.1**\*#g** | 3.3 ± 0.1**\*#g** | 6.4 ±0.0 | 6.5 ±0.1 | 6.5 ±0.1 | 6.5 ±0.1 | 6.6 ±0.1 | 6.5 ±0.1 |

Tukey's multiple comparisons tests, p-value < 0.05; for learning and memory pass rate in-comparisons against NaV (0.15 mg/mL); \*p-value < 0.05; learning and memory pass in-comparisons against 0.025 g/mL; #p-value < 0.05; *parabss1*against the wild-type control flies; **g**p-value < 0.05. In-comparison of memory pass against the learning pass; cp-value < 0.0001, ccp-value < 0.05. *OrR* and *CS* = wild-type control *Drosophila*; *parabss1*= mutant (test) *Drosophil*a. Abbreviations: BSS = bang-senseless, CS = Canton-Special, NaV = Sodium valproate,OrR = Oregon R, Para = Paralytic, SD = Standard deviation.

**Table 5.** Acute effect of methanol *I. cylindrica* root extract on acute brain morphology in juvenile-adults (10-day-old) bang-sensitive mutant *Drosophila* (*parabss1*) and wild-type control *Drosophila* (*OrR* and *CS*). n = 100

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Total number of flies with a particular brain histological characteristic**  **n= 100** | | | | | | | | |
|  | 0.0 g/mL | | | 0.8 g/mL | | | NaV (0.3 mg/mL) | | |
| **Morphology** | 1h  N M S | 2h  N M S | 3h  N M S | 1h  N M S | 2h  N M S | 3h  N M S | 1h  N M S | 2h  N M S | 3h  N M S |
| *CS* | 100 0 0 | 100 0 0 | 100 0 0 | 100 0 0 | 100 0 0 | 100 0 0 | 100 0 0 | 100 0 0 | 100 0 0 |
| *OrR* | 100 0 0 | 100 0 0 | 100 0 0 | 100 0 0 | 100 0 0 | 100 0 0 | 100 0 0 | 100 0 0 | 100 0 0 |
| *parabss* | 0 100 0 | 0 100 0 | 0 100 0 | 0 100 0 | 0 100 0 | 0 100 0 | 0 100 0 | 0 100 0 | 47 53 0 |

**Myelin Sheath** y D y D y D y D y D y D y D y D y D

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CS* | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 |
| *OrR* | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 |
| *parabss* | 0 100 | 0 100 | 0 100 | 0 100 | 0 100 | 0 100 | 0 100 | 0 100 | 0 100 |

**Nissl substance** n A n A n A n A n A n A n A n A n A

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CS* | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 |
| *OrR* | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 |
| *parabss* | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 |

*OrR* and *CS* = wild-type control *Drosophila*; *parabss1*= mutant (test) *Drosophil*a. Abbreviations: A = abnormal brain Nissl substance, BSS = bang-senseless, CS = Canton-Special, D = degenerated axons, M= moderate brain neurodegeneration, n = normal brain Nissl substance, N = normal brain morphology, NaV = Sodium valproate, OrR = Oregon R, Para = Paralytic, S = severe brain neurodegeneration, y = normal axonal morphology.

**Table 6.** Chronic effect of methanol *I. cylindrica* root extract on chronic brain morphology in old-adults (16-28-day-old) bang-sensitive mutant *Drosophila* (*parabss1*) and wild-type control *Drosophila* (*OrR* and *CS*). n = 100.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Total number of flies with a particular brain histological characteristic**  **n= 100** | | | | | | | | |
|  | 0.0 g/mL | | | 0.025 g/mL | | | NaV (0.15 mg/mL) | | |
| **Morphology** | day 6  N M S | day 12  N M S | day 18  N M S | day 6  N M S | day 12  N M S | day 18  N M S | day 6  N M S | day 12  N M S | day 18  N M S |
| *CS* | 100 0 0 | 100 0 0 | 100 0 0 | 100 0 0 | 100 0 0 | 100 0 0 | 100 0 0 | 100 0 0 | 100 0 0 |
| *OrR* | 100 0 0 | 100 0 0 | 100 0 0 | 100 0 0 | 100 0 0 | 100 0 0 | 100 0 0 | 100 0 0 | 100 0 0 |
| *parabss1* | 0 45 55 | 0 40 60 | 0 0 100 | 70 30 0 | 90 10 0 | 100 0 0 | 80 20 0 | 100 0 0 | 80 10 10 |

**Myelin Sheath** y D y D y D y D y D y D y D y D y D

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CS* | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 |
| *OrR* | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 |
| *parabss1* | 0 100 | 0 100 | 0 100 | 0 100 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 |

**Nissl substance** n A n A n A n A n A n A n A n A n A

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CS* | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 |
| *OrR* | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 |
| *parabss1* | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 |

*OrR* and *CS* = wild-type control *Drosophila*; *parabss1*= mutant (test) *Drosophil*a. Abbreviations: A = abnormal brain Nissl substance, BSS = bang-senseless, CS = Canton-Special, D = degenerated axons, M= moderate brain neurodegeneration, n = normal brain Nissl substance, N = normal brain morphology, NaV = Sodium valproate, OrR = Oregon R, Para = Paralytic, S = severe brain neurodegeneration, y = normal axonal morphology.