

**Table S1.** Metabolic fluxes (in  $\mu\text{mol/g/min}$ ) estimated from  $^{13}\text{C}$  tracing experiments *in vivo* or *ex vivo* using mathematical models with 2 compartments (neurons and astroglia) or 3 compartments (GABAergic neurons, Glutamatergic neurons and astroglia). Fluxes in pink were calculated from reported values.

|            |                                      | <sup>13</sup> C tracer              | anesthesia         | fixed V <sub>TCA</sub> or V <sub>PC</sub>                                                                                                                        | model and experimental conditions                           | brain area            | V <sub>NT</sub> ** | V <sub>TCA</sub> <sup>n</sup> ** | V <sub>TCA</sub> <sup>g</sup> | V <sub>PC</sub> | CMR <sub>glc(ox)</sub> *** | V <sub>NT</sub> <sup>GABA</sup> | V <sub>NT</sub> <sup>Glu</sup> | V <sub>TCA</sub> <sup>GABA</sup> | V <sub>TCA</sub> <sup>Glu</sup> |
|------------|--------------------------------------|-------------------------------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|-----------------------|--------------------|----------------------------------|-------------------------------|-----------------|----------------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|
| Human      | Shen <i>et al.</i> 1999 [115]        | Glc <sub>1</sub>                    |                    | -                                                                                                                                                                |                                                             | Cortex                | 0.32               | 0.71                             | 0.06                          | 0.04            | 0.41                       |                                 |                                |                                  |                                 |
|            | Gruetter <i>et al.</i> 2001 [36]     | Glc <sub>1</sub>                    |                    | -                                                                                                                                                                |                                                             | Cortex                | 0.17               | 0.57                             | 0.15                          | 0.09            | 0.41                       |                                 |                                |                                  |                                 |
|            | Lebon <i>et al.</i> 2002 [121]       | Ac <sub>2</sub>                     |                    | V <sub>TCA</sub> <sup>n</sup> = 0.80, V <sub>PC</sub> = 0.04                                                                                                     |                                                             | Cortex                | 0.32               |                                  | 0.14                          |                 | 0.49                       |                                 |                                |                                  |                                 |
|            | Mason <i>et al.</i> 2007 [122] *     | Glc <sub>1</sub> & Glc <sub>2</sub> |                    | V <sub>TCA</sub> <sup>n</sup> = 0.73, V <sub>TCA</sub> <sup>g</sup> = 0.14, V <sub>gln</sub> = 0.32                                                              |                                                             | Cortex                | 0.34               | 0.72                             |                               | 0.022           | 0.44                       |                                 |                                |                                  |                                 |
|            | Boumezbeur <i>et al.</i> 2010 [123]  | Glc <sub>1</sub> & Ac <sub>2</sub>  |                    | V <sub>PC</sub> = 0.06*V <sub>NT</sub>                                                                                                                           | Young                                                       | Cortex                | 0.16               | 0.53                             | 0.13                          | 0.010           | 0.33                       |                                 |                                |                                  |                                 |
|            | Boumezbeur <i>et al.</i> 2010 [123]  | Glc <sub>1</sub> & Ac <sub>2</sub>  |                    | V <sub>PC</sub> = 0.06*V <sub>NT</sub>                                                                                                                           | Elderly                                                     | Cortex                | 0.13               | 0.38                             | 0.17                          | 0.008           | 0.28                       |                                 |                                |                                  |                                 |
|            | Jiang <i>et al.</i> 2013 [124]       | Ac <sub>2</sub>                     |                    | V <sub>TCA</sub> <sup>n</sup> = 0.73, V <sub>PC</sub> = 0.02                                                                                                     |                                                             | Cortex                | 0.18               | 0.73                             | 0.15                          |                 | 0.45                       |                                 |                                |                                  |                                 |
| Rat        | Choi <i>et al.</i> 2002 [119]        | Glc <sub>1</sub>                    | deep thiopental    | -                                                                                                                                                                | Sprague Dawley rat                                          | whole brain           | 0.04               | 0.35                             | 0.29                          | 0.03            | 0.34                       |                                 |                                |                                  |                                 |
|            | Oz <i>et al.</i> 2004 [65]           | Glc <sub>16</sub>                   | none; awake        | -                                                                                                                                                                | Sprague Dawley rat                                          | whole brain           | 0.57               | 1.13                             | 0.54                          | 0.14            | 0.91                       |                                 |                                |                                  |                                 |
|            | de Graaf <i>et al.</i> 2004 [125]    | Glc <sub>16</sub>                   | halothane          | V <sub>TCA</sub> <sup>g</sup> = 0.05*V <sub>TCA</sub> <sup>n</sup> , V <sub>PC</sub> = 0.096                                                                     | Sprague Dawley rat                                          | Cortex                | 0.28               | 0.73                             |                               |                 | 0.43                       |                                 |                                |                                  |                                 |
|            | de Graaf <i>et al.</i> 2004 [125]    | Glc <sub>16</sub>                   | halothane          | V <sub>TCA</sub> <sup>g</sup> = 0.05*V <sub>TCA</sub> <sup>n</sup> , V <sub>PC</sub> = 0.096                                                                     | Sprague Dawley rat                                          | Corpus calosum        | 0.14               | 0.42                             |                               |                 | 0.27                       |                                 |                                |                                  |                                 |
|            | de Graaf <i>et al.</i> 2004 [125]    | Glc <sub>16</sub>                   | halothane          | V <sub>TCA</sub> <sup>g</sup> = 0.05*V <sub>TCA</sub> <sup>n</sup> , V <sub>PC</sub> = 0.096                                                                     | Sprague Dawley rat                                          | subcortical area      | 0.19               | 0.44                             |                               |                 | 0.28                       |                                 |                                |                                  |                                 |
|            | Patel <i>et al.</i> 2004 [126]       | Glc <sub>16</sub>                   | halothane          | V <sub>TCA</sub> <sup>g</sup> = 0.15*(V <sub>TCA</sub> <sup>n</sup> +V <sub>TCA</sub> <sup>g</sup> ), V <sub>PC</sub> = 0.20*(V <sub>PC</sub> +V <sub>NT</sub> ) | Wistar rat                                                  | Cortex                | 0.22               | 0.52                             |                               |                 | 0.33                       |                                 |                                |                                  |                                 |
|            | Patel <i>et al.</i> 2004 [126]       | Glc <sub>16</sub>                   | halothane          | V <sub>TCA</sub> <sup>g</sup> = 0.15*(V <sub>TCA</sub> <sup>n</sup> +V <sub>TCA</sub> <sup>g</sup> ), V <sub>PC</sub> = 0.20*(V <sub>PC</sub> +V <sub>NT</sub> ) | Wistar rat with bicuculline-induced seizures                | Cortex                | 0.52               | 1.14                             |                               |                 | 0.74                       |                                 |                                |                                  |                                 |
|            | Patel <i>et al.</i> 2005 [30]        | Glc <sub>16</sub> & Ac <sub>2</sub> | deep pentobarbital | V <sub>TCA</sub> <sup>g</sup> = 0.15*(V <sub>TCA</sub> <sup>n</sup> +V <sub>TCA</sub> <sup>g</sup> ), V <sub>PC</sub> = 0.20*(V <sub>PC</sub> +V <sub>NT</sub> ) | Sprague Dawley rat                                          | Cortex                | 0.015              | 0.35                             | 0.06                          | 0.004           | 0.21                       | <0.015                          | <0.015                         | 0.060                            | 0.29                            |
|            | Patel <i>et al.</i> 2005 [30]        | Glc <sub>16</sub> & Ac <sub>2</sub> | halothane          | V <sub>TCA</sub> <sup>g</sup> = 0.15*(V <sub>TCA</sub> <sup>n</sup> +V <sub>TCA</sub> <sup>g</sup> ), V <sub>PC</sub> = 0.20*(V <sub>PC</sub> +V <sub>NT</sub> ) | Sprague Dawley rat                                          | Cortex                | 0.60               | 1.20                             | 0.21                          | 0.151           | 0.78                       | 0.107                           | 0.50                           | 0.214                            | 0.99                            |
|            | Chowdhury <i>et al.</i> 2007 [31]    | Glc <sub>16</sub> & Ac <sub>2</sub> | urethane           | V <sub>TCA</sub> <sup>g</sup> = 0.15*(V <sub>TCA</sub> <sup>n</sup> +V <sub>TCA</sub> <sup>g</sup> ), V <sub>PC</sub> = 0.20*(V <sub>PC</sub> +V <sub>NT</sub> ) | Sprague Dawley rat P30                                      | Cortex                | 0.34               | 0.70                             | 0.12                          | 0.086           | 0.46                       | 0.062                           | 0.28                           | 0.144                            | 0.56                            |
|            | Chowdhury <i>et al.</i> 2007 [31]    | Glc <sub>16</sub> & Ac <sub>2</sub> | urethane           | V <sub>TCA</sub> <sup>g</sup> = 0.15*(V <sub>TCA</sub> <sup>n</sup> +V <sub>TCA</sub> <sup>g</sup> ), V <sub>PC</sub> = 0.20*(V <sub>PC</sub> +V <sub>NT</sub> ) | Sprague Dawley rat P10                                      | Cortex                | 0.089              | 0.24                             | 0.04                          | 0.022           | 0.15                       | 0.009                           | 0.08                           | 0.029                            | 0.21                            |
|            | van Eijdsen <i>et al.</i> 2010 [127] | Glc <sub>U</sub> & Ac <sub>2</sub>  | halothane          | V <sub>PC</sub> = 0.20*(V <sub>PC</sub> +V <sub>NT</sub> )                                                                                                       | Wistar rat                                                  | Cortex+Hippocampus    | 0.31               | 0.53                             | 0.14                          | 0.077           | 0.37                       | 0.033                           | 0.27                           | 0.062                            | 0.47                            |
|            | Duarte <i>et al.</i> 2011 [37]       | Glc <sub>16</sub>                   | α-Chloralose       | -                                                                                                                                                                | Sprague Dawley rat                                          | whole brain           | 0.11               | 0.45                             | 0.28                          | 0.069           | 0.40                       |                                 |                                |                                  |                                 |
|            | Jeffrey <i>et al.</i> 2013 [116]     | Glc <sub>16</sub>                   | α-Chloralose       | -                                                                                                                                                                | Sprague Dawley rat                                          | whole brain           | 0.12               | 0.43                             | 0.25                          | 0.07            | 0.38                       |                                 |                                |                                  |                                 |
|            | Duarte & Gruetter, 2013 [32]         | Glc <sub>16</sub>                   | α-Chloralose       | -                                                                                                                                                                | Sprague Dawley rat                                          | whole brain           | 0.24               | 0.40                             | 0.44                          | 0.092           | 0.47                       | 0.053                           | 0.18                           | 0.070                            | 0.33                            |
|            | Lanz <i>et al.</i> 2014 [53]         | Ac <sub>2</sub>                     | α-Chloralose       | -                                                                                                                                                                | Sprague Dawley rat                                          | whole brain           | 0.15               | 0.37                             | 0.36                          | 0.087           | 0.41                       |                                 |                                |                                  |                                 |
|            | Lin <i>et al.</i> 2014 [128]         | Glc <sub>16</sub>                   | α-chloralose       | V <sub>TCA</sub> <sup>g</sup> = 0.15*(V <sub>TCA</sub> <sup>n</sup> +V <sub>TCA</sub> <sup>g</sup> ), V <sub>PC</sub> = 0.20*(V <sub>PC</sub> +V <sub>NT</sub> ) | Fischer 344 Brown-Norway F1 rat, young                      | Cortex                | 0.23               | 0.49                             | 0.09                          | 0.058           | 0.32                       |                                 |                                |                                  |                                 |
|            | Lin <i>et al.</i> 2014 [128]         | Glc <sub>16</sub>                   | α-chloralose       | V <sub>TCA</sub> <sup>g</sup> = 0.15*(V <sub>TCA</sub> <sup>n</sup> +V <sub>TCA</sub> <sup>g</sup> ), V <sub>PC</sub> = 0.20*(V <sub>PC</sub> +V <sub>NT</sub> ) | Fischer 344 Brown-Norway F1 rat, aged                       | Cortex                | 0.13               | 0.25                             | 0.04                          | 0.033           | 0.16                       |                                 |                                |                                  |                                 |
|            | Lin <i>et al.</i> 2014 [128]         | Glc <sub>16</sub>                   | α-chloralose       | V <sub>TCA</sub> <sup>g</sup> = 0.15*(V <sub>TCA</sub> <sup>n</sup> +V <sub>TCA</sub> <sup>g</sup> ), V <sub>PC</sub> = 0.20*(V <sub>PC</sub> +V <sub>NT</sub> ) | Fischer 344 Brown-Norway F1 rat, aged + caloric restriction | Cortex                | 0.21               | 0.39                             | 0.07                          | 0.053           | 0.26                       |                                 |                                |                                  |                                 |
|            | Patel <i>et al.</i> 2015 [129]       | Glc <sub>16</sub> & Ac <sub>2</sub> | halothane          | V <sub>TCA</sub> <sup>g</sup> = 0.15*(V <sub>TCA</sub> <sup>n</sup> +V <sub>TCA</sub> <sup>g</sup> ), V <sub>PC</sub> = 0.20*(V <sub>PC</sub> +V <sub>NT</sub> ) | Wistar rat                                                  | Cortex                | 0.62               | 0.72                             | 0.13                          | 0.124           | 0.49                       | 0.16                            | 0.46                           | 0.18                             | 0.54                            |
|            | Dehghani <i>et al.</i> 2016 [47]     | Glc <sub>16</sub>                   | α-Chloralose       | -                                                                                                                                                                | Sprague Dawley rat                                          | whole brain           | 0.063              | 0.33                             | 0.21                          | 0.040           | 0.29                       |                                 |                                |                                  |                                 |
|            | Sonnay <i>et al.</i> 2017 [29]       | Glc <sub>16</sub>                   | α-Chloralose       | -                                                                                                                                                                | Sprague Dawley rat, Rest                                    | Cortex                | 0.070              | 0.53                             | 0.31                          | 0.064           | 0.45                       |                                 |                                |                                  |                                 |
|            | Sonnay <i>et al.</i> 2017 [29]       | Glc <sub>16</sub>                   | α-Chloralose       | -                                                                                                                                                                | Sprague Dawley rat, Somatosensory stimulation               | Cortex                | 0.137              | 0.59                             | 0.37                          | 0.07            | 0.52                       |                                 |                                |                                  |                                 |
|            | Sonnay <i>et al.</i> 2017 [117]      | Glc <sub>16</sub>                   | deep thiopental    | -                                                                                                                                                                | Sprague Dawley rat                                          | Cortex                | 0.092              | 0.46                             | 0.16                          | 0.023           | 0.32                       |                                 |                                |                                  |                                 |
|            | Girault <i>et al.</i> 2019 [118]     | Glc <sub>16</sub>                   | α-Chloralose       | -                                                                                                                                                                | Wistar rat                                                  | whole brain           | 0.20               | 0.34                             | 0.32                          | 0.09            | 0.38                       |                                 |                                |                                  |                                 |
|            | McNair <i>et al.</i> 2022 [34]       | Glc <sub>1</sub> & Glc <sub>2</sub> | none; awake        | several fixed relations between fluxes                                                                                                                           | Sprague Dawley rat                                          | Cortex                | 0.81               | 1.59                             | 0.22                          | 0.106           | 0.96                       | 0.109                           | 0.70                           | 0.32                             | 1.27                            |
|            | McNair <i>et al.</i> 2022 [34]       | Glc <sub>1</sub> & Glc <sub>2</sub> | none; awake        | several fixed relations between fluxes                                                                                                                           | Sprague Dawley rat                                          | Cerebellum            | 0.52               | 1.22                             | 0.25                          | 0.087           | 0.78                       | 0.075                           | 0.44                           | 0.25                             | 0.96                            |
|            | McNair <i>et al.</i> 2022 [34]       | Glc <sub>1</sub> & Glc <sub>2</sub> | none; awake        | several fixed relations between fluxes                                                                                                                           | Sprague Dawley rat                                          | Hippocampus           | 0.80               | 1.18                             | 0.19                          | 0.114           | 0.74                       | 0.079                           | 0.72                           | 0.30                             | 0.88                            |
|            | McNair <i>et al.</i> 2022 [34]       | Glc <sub>1</sub> & Glc <sub>2</sub> | none; awake        | several fixed relations between fluxes                                                                                                                           | Sprague Dawley rat                                          | Striatum              | 0.89               | 1.44                             | 0.23                          | 0.125           | 0.90                       | 0.083                           | 0.81                           | 0.28                             | 1.16                            |
| Tree shrew | Sonnay <i>et al.</i> 2018 [26]       | Glc <sub>16</sub>                   | isoflurane         | -                                                                                                                                                                | tree shrew, low V <sub>NT</sub>                             | Cortex                | 0.19               | 0.52                             | 0.26                          | 0.074           | 0.43                       |                                 |                                |                                  |                                 |
|            | Sonnay <i>et al.</i> 2018 [26]       | Glc <sub>16</sub>                   | isoflurane         | -                                                                                                                                                                | tree shrew, high V <sub>NT</sub>                            | Cortex                | 0.23               | 0.58                             | 0.32                          | 0.066           | 0.49                       |                                 |                                |                                  |                                 |
| Mouse      | Tiwari <i>et al.</i> 2013 [130]      | Glc <sub>16</sub>                   | urethane           | several fixed relations between fluxes                                                                                                                           | C57BL6 mice                                                 | Cortex                | 0.46               | 1.15                             | 0.25                          | 0.02            | 0.71                       | 0.10                            | 0.36                           | 0.24                             | 0.91                            |
|            | Tiwari <i>et al.</i> 2013 [130]      | Glc <sub>16</sub>                   | urethane           | several fixed relations between fluxes                                                                                                                           | C57BL6 mice                                                 | Hippocampus           | 0.40               | 0.90                             | 0.26                          | 0.03            | 0.60                       | 0.09                            | 0.31                           | 0.26                             | 0.64                            |
|            | Tiwari <i>et al.</i> 2013 [130]      | Glc <sub>16</sub>                   | urethane           | several fixed relations between fluxes                                                                                                                           | C57BL6 mice                                                 | Striatum              | 0.29               | 1.02                             | 0.19                          | 0.06            | 0.64                       | 0.11                            | 0.18                           | 0.27                             | 0.75                            |
|            | Tiwari <i>et al.</i> 2013 [130]      | Glc <sub>16</sub>                   | urethane           | several fixed relations between fluxes                                                                                                                           | C57BL6 mice                                                 | Thalamus+Hypothalamus | 0.34               | 1.01                             | 0.26                          | 0.03            | 0.65                       | 0.12                            | 0.22                           | 0.28                             | 0.73                            |
|            | Tiwari <i>et al.</i> 2013 [130]      | Glc <sub>16</sub>                   | urethane           | several fixed relations between fluxes                                                                                                                           | C57BL6 mice                                                 | Cerebellum            | 0.40               | 1.06                             | 0.28                          | 0.03            | 0.69                       | 0.08                            | 0.32                           | 0.25                             | 0.81                            |
|            | Lai <i>et al.</i> 2018 [120]         | Glc <sub>16</sub>                   | isoflurane         | -                                                                                                                                                                | Swiss nude mouse                                            | whole brain           | 0.084              | 0.56                             | 0.20                          | 0.041           | 0.40                       |                                 |                                |                                  |                                 |

Tracers: Ac<sub>2</sub>, [2-<sup>13</sup>C] acetate; Glc<sub>1</sub>, [1-<sup>13</sup>C]glucose; Glc<sub>2</sub>, [2-<sup>13</sup>C]glucose; Glc<sub>16</sub>, [1,6-<sup>13</sup>C<sub>2</sub>]glucose; Glc<sub>U</sub>, [U-<sup>13</sup>C<sub>6</sub>]-glucose.

\* V<sub>NT</sub> calculated with mass balance equation V<sub>gln</sub> = V<sub>NT</sub> + V<sub>PC</sub>

\*\* For 3-compartment models, V<sub>NT</sub> = V<sub>NT</sub><sup>Glu</sup> + V<sub>PC</sub><sup>GABA</sup> and V<sub>TCA</sub><sup>n</sup> = V<sub>TCA</sub><sup>Glu</sup> + V<sub>TCA</sub><sup>GABA</sup>

\*\*\* Calculated as CMR<sub>glc(ox)</sub> = (V<sub>TCA</sub><sup>g</sup> + V<sub>TCA</sub><sup>n</sup> + V<sub>PC</sub>)/2