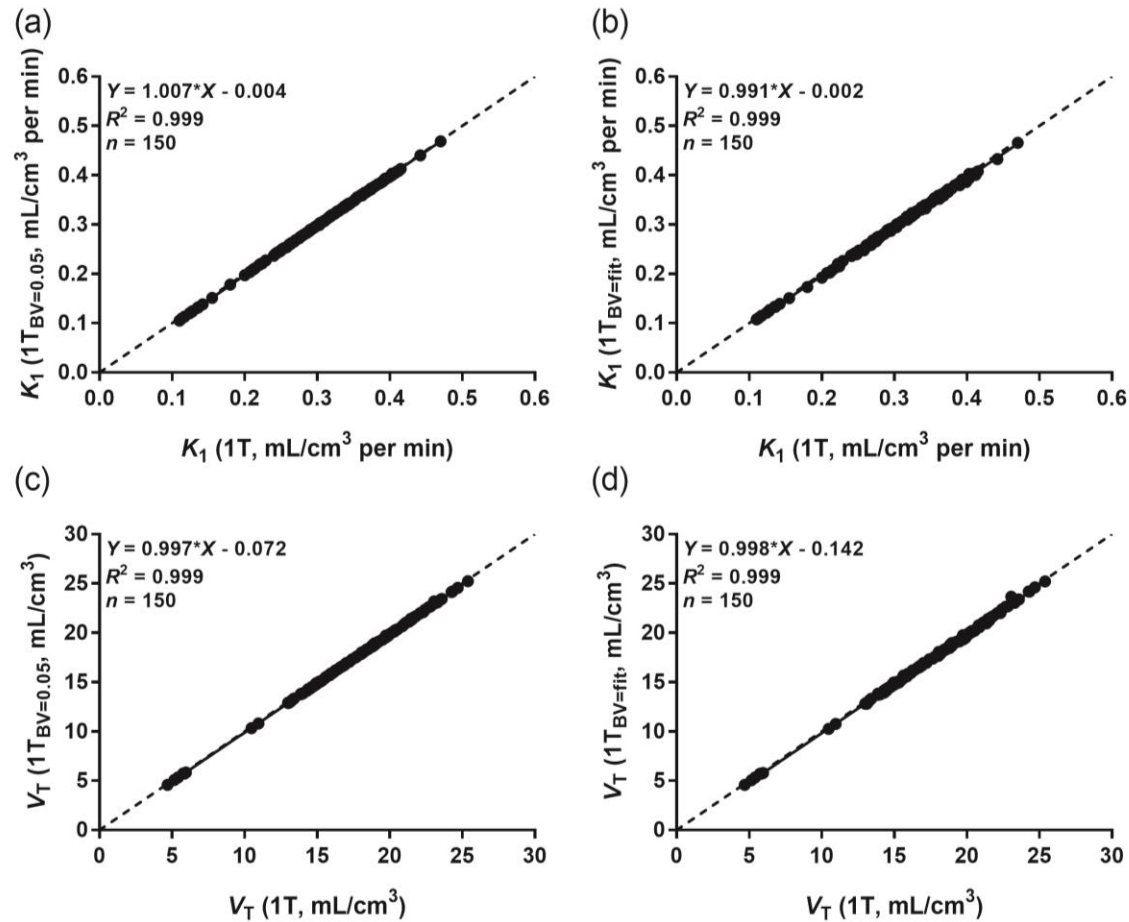
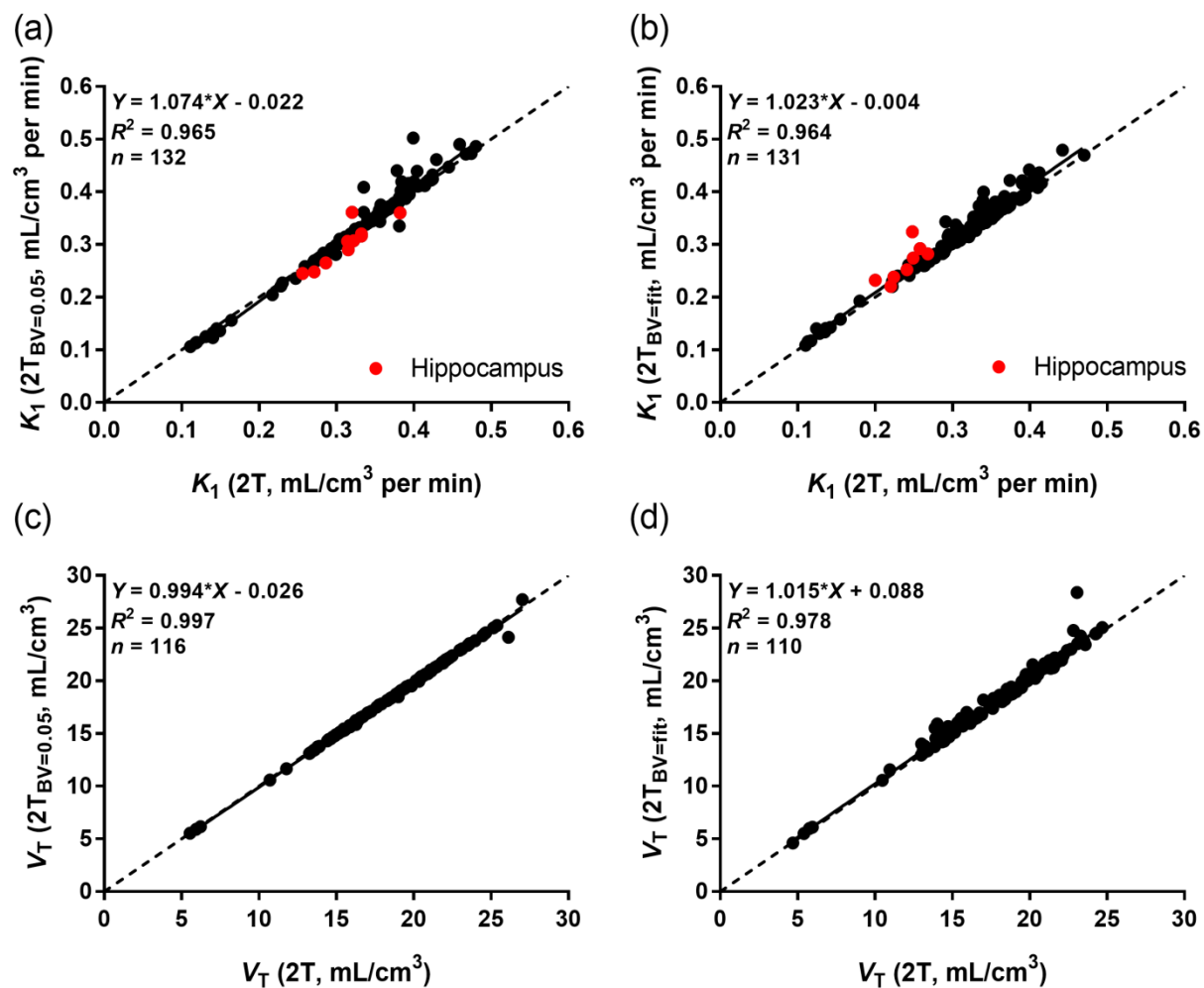


SUPPLEMENTARY DATA

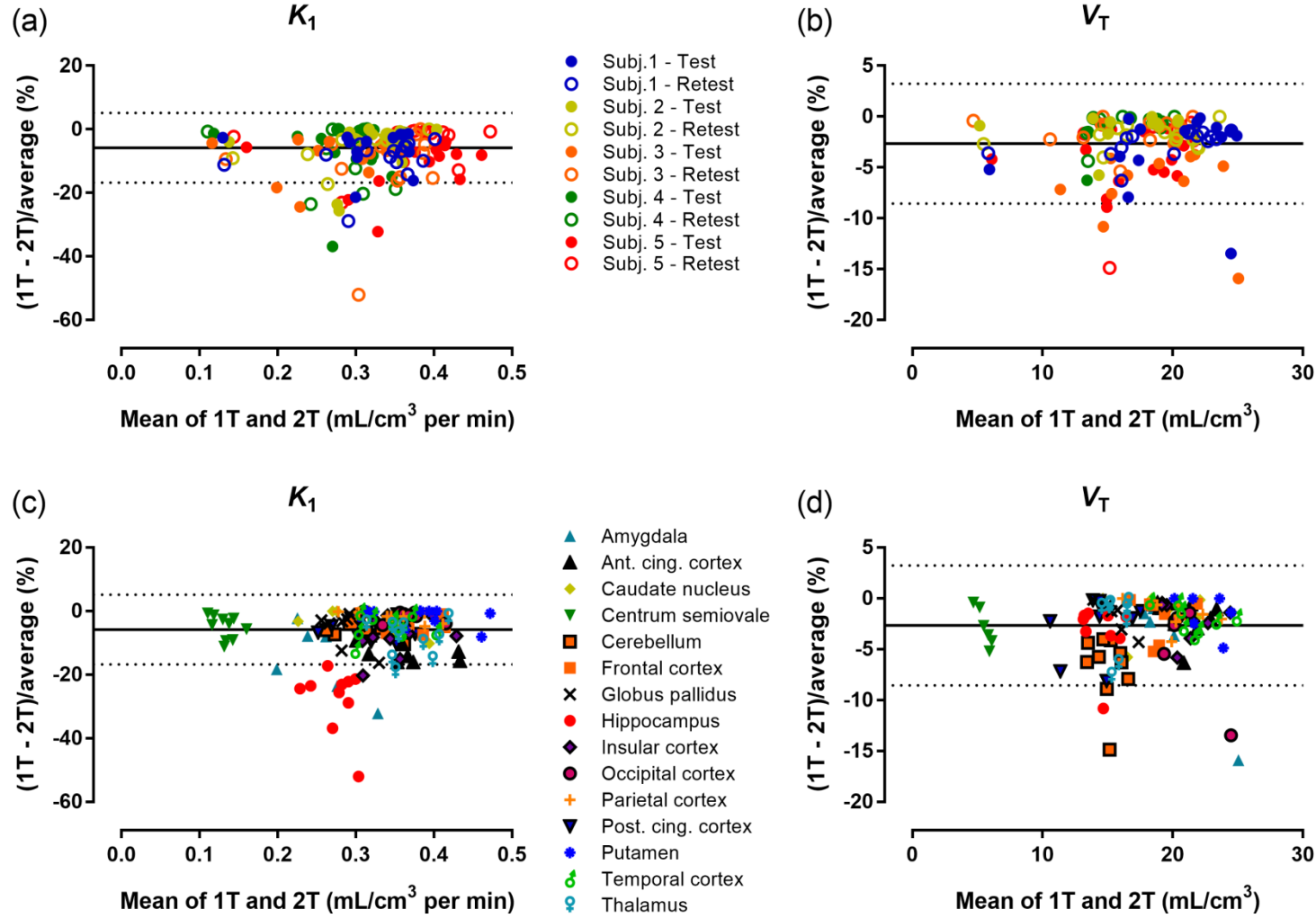
Supplemental Figures



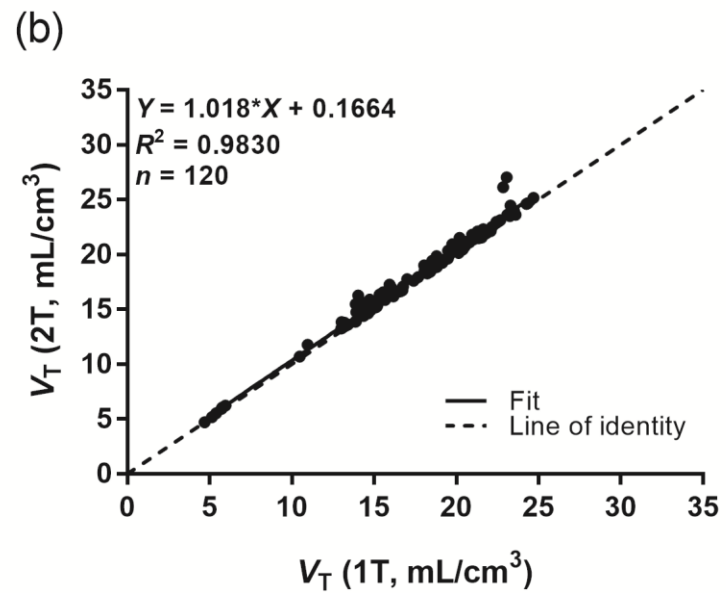
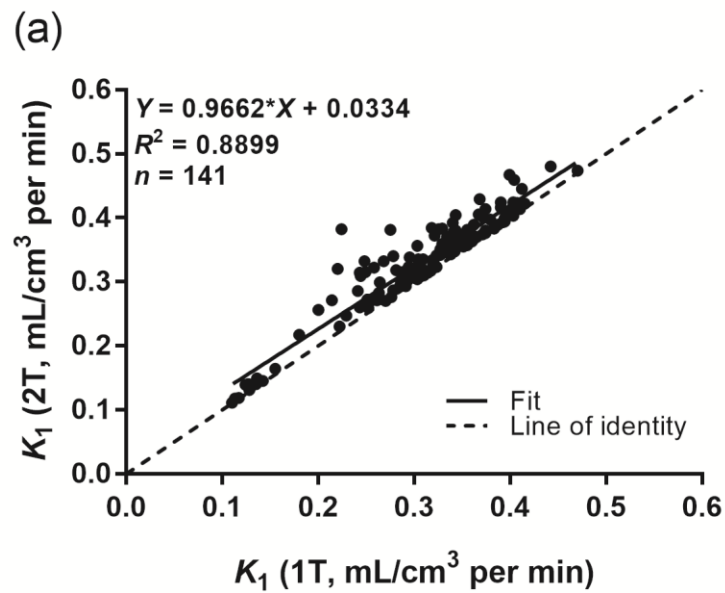
Supplemental Figure 1. Correlation between (a and b) K_1 values and (c and d) V_T values calculated with 1T model using 120 min of PET data time (a and c) without blood volume fraction (1T), and fixed blood volume fraction of 0.05 ($1T_{BV=0.05}$) or (b and d) without blood volume fraction (1T) and with fit of blood volume fraction ($1T_{BV=fit}$).



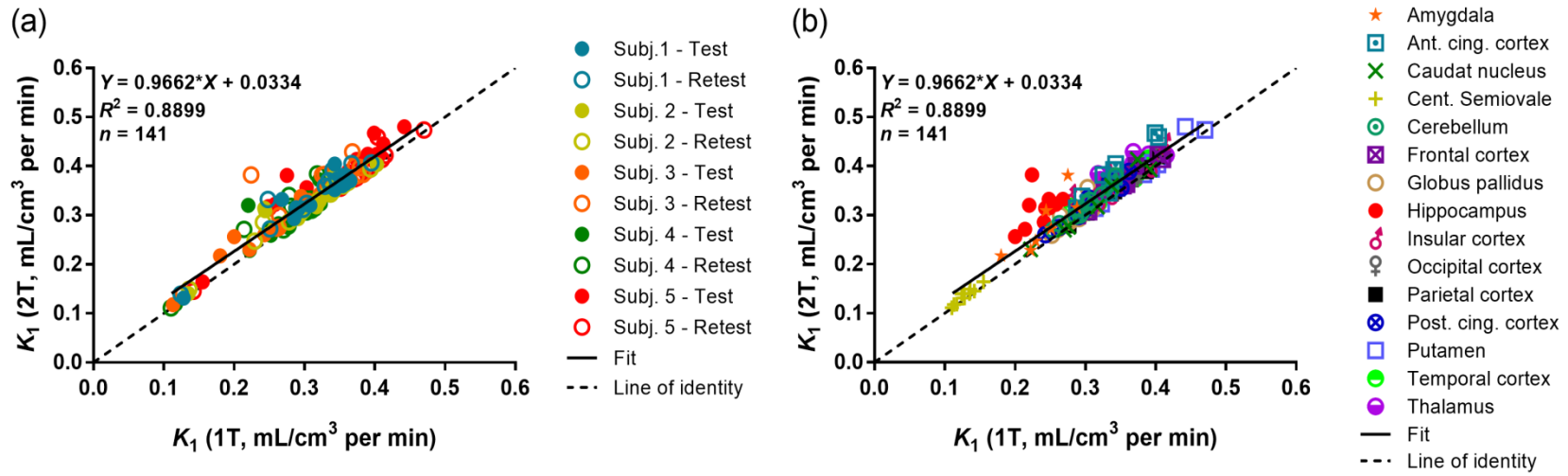
Supplemental Figure 2. Correlation between (a and b) K_1 values and (c and d) V_T values calculated with 2T model using 120 min of PET data time (a and c) without blood volume fraction (2T), and fixed blood volume fraction of 0.05 ($2T_{BV=0.05}$) or (b and d) without blood volume fraction (2T) and with fit of blood volume fraction ($2T_{BV=fit}$). K_1 and V_T values with relative SE > 25% were excluded from the comparison.



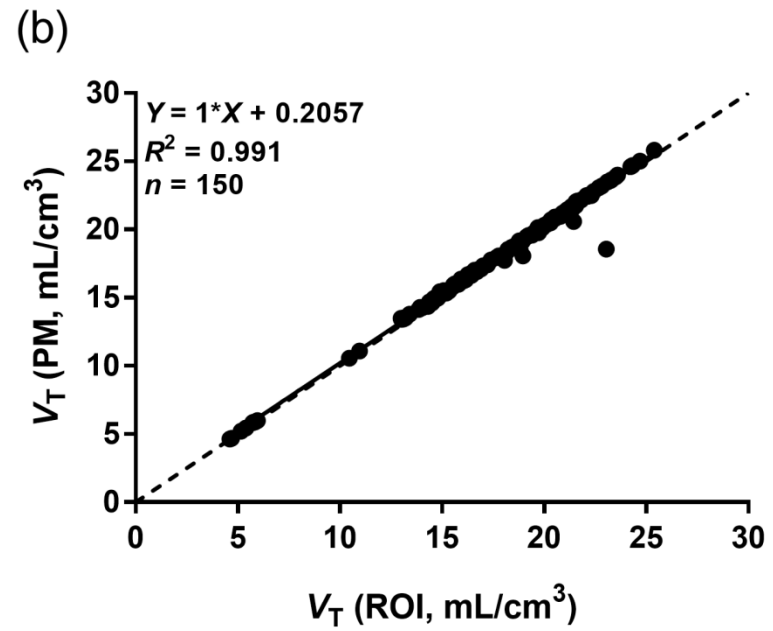
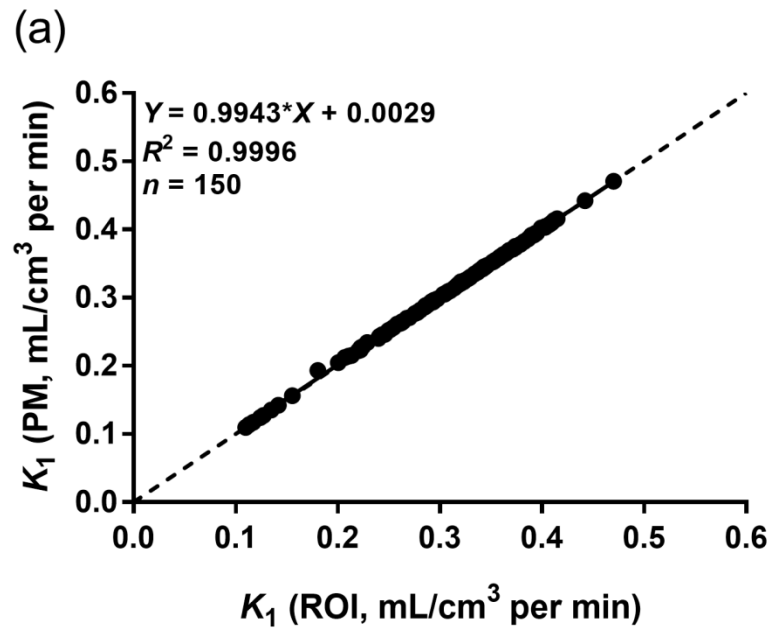
Supplemental Figure 3. Bland-Altman plots for K_1 and V_T values derived by 1T and 2T using 120 min of PET data time. (a) K_1 values and (b) V_T values color coded by subject and (c) K_1 values and (d) V_T values color coded by region of interest. K_1 and V_T values with relative SE > 25% were excluded from the comparison. Solid lines indicate mean value and dotted lines indicate 2 s.d. range.



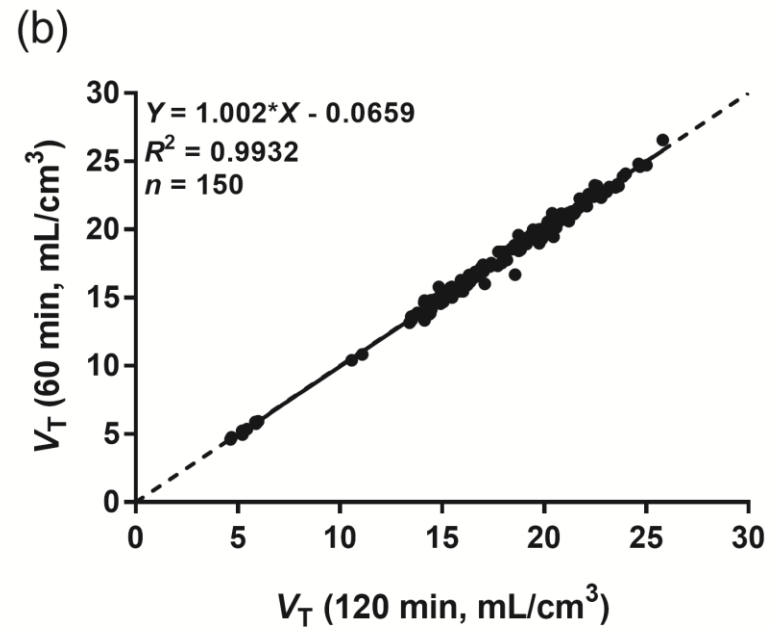
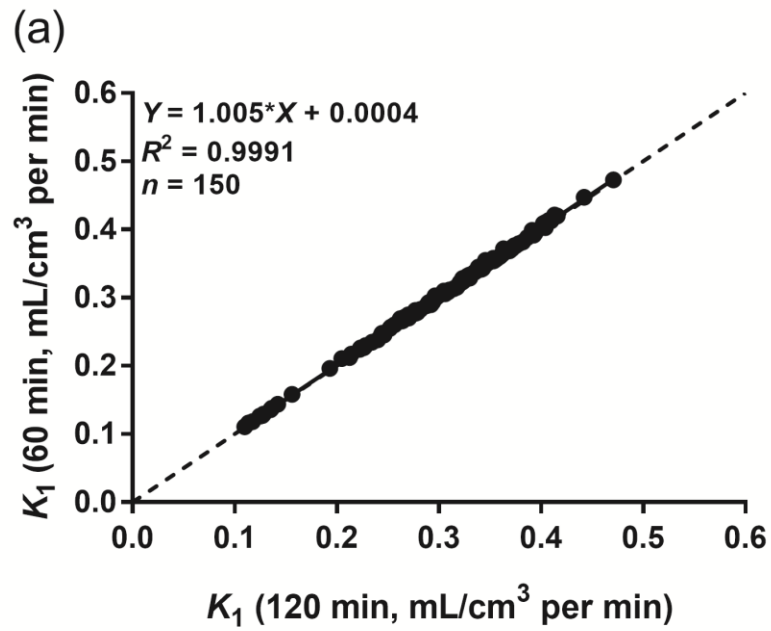
Supplemental Figure 4. Correlation between (a) K_1 values and (b) V_T values calculated with 1T and 2T model using 120 min of PET data time. K_1 and V_T values with relative SE > 25% were excluded from the comparison.



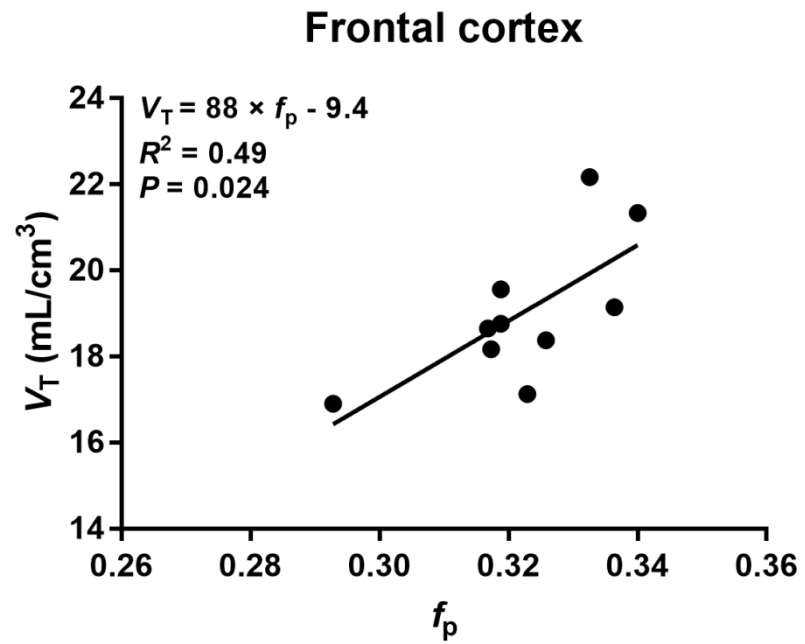
Supplemental Figure 5. K_1 values from Supplemental Figure 3 color coded for (a) subject or (b) region of interest.



Supplemental Figure 6. Correlation between (a) K_1 values and (b) V_T values calculated from region of interest time activity curves (ROI) or from parametric maps (PM) using 1-tissue compartment model and 120 min of PET data time.



Supplemental Figure 7. Correlation between regional (a) K_1 values and (b) V_T values calculated from parametric maps using 1-tissue compartment model and 120 min or 60 min of PET data time.



Supplemental Figure 8. Linear fit of f_p and frontal cortex V_T values. Data are 5 subjects during test and retest condition.

Supplemental Tables

Supplemental Table 1. Results of model selection for curve fitting of 120 min time activity curves

| <i>Region</i> | <i>Preferred model</i> | | | |
|------------------------|------------------------|-----|---------------|-----|
| | <i>AIC</i> | | <i>F-test</i> | |
| | 1T | 2T | 1T | 2T |
| Putamen | 6 | 4 | 6 | 4 |
| Temporal cortex | 1 | 9 | 1 | 9 |
| Insular cortex | 0 | 10 | 0 | 10 |
| Ant. cingulate cortex | 0 | 10 | 0 | 10 |
| Amygdala | 1 | 9 | 5 | 5 |
| Parietal cortex | 1 | 9 | 2 | 8 |
| Occipital cortex | 1 | 9 | 2 | 8 |
| Caudate nucleus | 7 | 3 | 7 | 3 |
| Frontal cortex | 0 | 10 | 1 | 9 |
| Globus pallidus | 4 | 6 | 6 | 4 |
| Thalamus | 1 | 9 | 2 | 8 |
| Cerebellum | 0 | 10 | 0 | 10 |
| Hippocampus | 0 | 10 | 0 | 10 |
| Post. cingulate cortex | 2 | 8 | 3 | 7 |
| Centrum semiovale | 1 | 9 | 5 | 5 |
| Total | 25 | 125 | 40 | 110 |

Abbreviations: AIC = Akaike information criterion; Ant. = anterior; Post. = posterior; 1T = 1-tissue compartment model; 2T = 2-tissue compartment model.

Supplemental Table 2. Test-retest reproducibility of kinetic parameters of [¹¹C]UCB-J derived with 1-tissue compartment model from 120 min parametric maps

| <i>Region</i> | <i>K₁ (mL/cm³ per min)</i> | | <i>V_T (mL/cm³)</i> | | <i>V_T/f_p (mL/cm³)</i> | |
|-------------------------------|--|------------|--|------------|--|------------|
| | <i>aTRV</i> | <i>TRV</i> | <i>aTRV</i> | <i>TRV</i> | <i>aTRV</i> | <i>TRV</i> |
| Putamen | 4% | 2% ± 5% | 5% | 0% ± 6% | 7% | 0% ± 9% |
| Temporal cortex | 7% | 2% ± 10% | 4% | -1% ± 5% | 6% | -1% ± 7% |
| Insular cortex | 8% | -3% ± 8% | 5% | -1% ± 6% | 7% | -1% ± 8% |
| Ant. cingulate cortex | 4% | 0% ± 6% | 5% | 0% ± 6% | 5% | 0% ± 7% |
| Amygdala | 8% | -4% ± 9% | 5% | 0% ± 6% | 6% | 0% ± 7% |
| Parietal cortex | 5% | -1% ± 7% | 4% | 0% ± 5% | 5% | -1% ± 6% |
| Occipital cortex | 8% | -2% ± 11% | 4% | -1% ± 5% | 5% | -2% ± 6% |
| Caudate nucleus | 4% | 3% ± 4% | 4% | -1% ± 6% | 7% | -1% ± 9% |
| Frontal cortex | 4% | 2% ± 7% | 3% | 1% ± 4% | 5% | 0% ± 6% |
| Globus pallidus | 3% | 0% ± 4% | 8% | -5% ± 8% | 10% | -5% ± 10% |
| Thalamus | 7% | 7% ± 7% | 3% | 1% ± 5% | 6% | 1% ± 7% |
| Cerebellum | 3% | 1% ± 4% | 2% | 1% ± 3% | 5% | 1% ± 7% |
| Hippocampus | 5% | -1% ± 7% | 4% | 0% ± 5% | 7% | -1% ± 8% |
| Post. cingulate cortex | 6% | 3% ± 7% | 3% | -1% ± 3% | 6% | -1% ± 7% |
| Centrum semiovale | 6% | -1% ± 8% | 4% | -2% ± 6% | 7% | -2% ± 9% |

Abbreviations: Ant. = anterior; aTRV = absolute test-retest variability; Post. = posterior; TRV = test-retest variability. Data are mean ± s.d.

Supplemental Table 3. Intra-class correlation coefficients of K_1 , V_T and V_T/f_p with different analysis methods using 1-tissue compartment model and 120 min or 60 min of PET data

| Region | K_1 (mL/cm ³ per min) | | | | V_T (mL/cm ³) | | | | V_T/f_p (mL/cm ³) | | | |
|------------------------|------------------------------------|------|------|------|-----------------------------|------|------|------|---------------------------------|-------|-------|-------|
| | TAC | | PM | | TAC | | PM | | TAC | | PM | |
| | 120 | 60 | 120 | 60 | 120 | 60 | 120 | 60 | 120 | 60 | 120 | 60 |
| Putamen | 0.93 | 0.95 | 0.93 | 0.79 | 0.80 | 0.79 | 0.79 | 0.79 | 0.31 | 0.29 | 0.34 | 0.36 |
| Temporal cortex | 0.68 | 0.68 | 0.68 | 0.68 | 0.87 | 0.85 | 0.88 | 0.88 | 0.56 | 0.48 | 0.59 | 0.53 |
| Insular cortex | 0.82 | 0.84 | 0.82 | 0.84 | 0.73 | 0.62 | 0.74 | 0.64 | 0.22 | 0.18 | 0.27 | 0.29 |
| Ant. cingulate cortex | 0.93 | 0.95 | 0.93 | 0.95 | 0.81 | 0.82 | 0.80 | 0.84 | 0.51 | 0.69 | 0.53 | 0.72 |
| Amygdala | 0.76 | 0.80 | 0.78 | 0.78 | -0.18 | 0.37 | 0.60 | 0.63 | -0.25 | 0.37 | 0.31 | 0.58 |
| Parietal cortex | 0.86 | 0.85 | 0.86 | 0.85 | 0.92 | 0.92 | 0.92 | 0.92 | 0.79 | 0.78 | 0.80 | 0.79 |
| Occipital cortex | 0.16 | 0.17 | 0.16 | 0.17 | 0.88 | 0.87 | 0.88 | 0.88 | 0.67 | 0.63 | 0.69 | 0.66 |
| Caudate nucleus | 0.98 | 0.98 | 0.98 | 0.98 | 0.94 | 0.95 | 0.93 | 0.96 | 0.80 | 0.80 | 0.80 | 0.81 |
| Frontal cortex | 0.86 | 0.88 | 0.87 | 0.89 | 0.92 | 0.89 | 0.91 | 0.89 | 0.68 | 0.66 | 0.68 | 0.67 |
| Globus pallidus | 0.92 | 0.89 | 0.92 | 0.89 | 0.28 | 0.33 | 0.23 | 0.40 | -0.42 | -0.66 | -0.40 | -0.46 |
| Thalamus | 0.59 | 0.63 | 0.58 | 0.63 | 0.65 | 0.62 | 0.63 | 0.67 | 0.14 | 0.29 | 0.23 | 0.42 |
| Cerebellum | 0.93 | 0.91 | 0.93 | 0.91 | 0.92 | 0.95 | 0.93 | 0.96 | 0.34 | 0.42 | 0.37 | 0.46 |
| Hippocampus | 0.78 | 0.81 | 0.79 | 0.79 | 0.80 | 0.86 | 0.85 | 0.91 | 0.61 | 0.76 | 0.68 | 0.82 |
| Post. cingulate cortex | 0.83 | 0.81 | 0.84 | 0.80 | 0.98 | 0.96 | 0.98 | 0.95 | 0.91 | 0.89 | 0.92 | 0.90 |
| Centrum semiovale | 0.79 | 0.83 | 0.80 | 0.83 | 0.90 | 0.97 | 0.89 | 0.97 | 0.62 | 0.70 | 0.61 | 0.70 |

Abbreviations: Ant. = anterior; PM = parametric map; Post. = posterior; TAC = time activity curve.

Supplemental Table 4. Test-retest reproducibility of kinetic parameters of [¹¹C]UCB-J derived with 1-tissue compartment model from 60 min time activity curves

| <i>Region</i> | <i>K₁ (mL/cm³ per min)</i> | | <i>V_T (mL/cm³)</i> | | <i>V_T/f_p (mL/cm³)</i> | |
|------------------------|--|------------|--|------------|--|------------|
| | <i>aTRV</i> | <i>TRV</i> | <i>aTRV</i> | <i>TRV</i> | <i>aTRV</i> | <i>TRV</i> |
| Putamen | 4% | 2% ± 5% | 5% | 0% ± 6% | 7% | 0% ± 9% |
| Temporal cortex | 8% | 2% ± 10% | 4% | -1% ± 5% | 6% | -2% ± 7% |
| Insular cortex | 8% | -4% ± 8% | 6% | -1% ± 7% | 7% | -1% ± 9% |
| Ant. cingulate cortex | 4% | 0% ± 6% | 4% | 1% ± 5% | 4% | 1% ± 5% |
| Amygdala | 9% | -4% ± 9% | 7% | 2% ± 8% | 9% | 2% ± 11% |
| Parietal cortex | 5% | -1% ± 7% | 4% | -1% ± 5% | 5% | -1% ± 6% |
| Occipital cortex | 9% | -2% ± 11% | 4% | -1% ± 5% | 5% | -1% ± 6% |
| Caudate nucleus | 4% | 3% ± 3% | 3% | -1% ± 4% | 7% | -1% ± 8% |
| Frontal cortex | 4% | 2% ± 6% | 4% | 1% ± 5% | 5% | 1% ± 6% |
| Globus pallidus | 4% | -1% ± 4% | 6% | -1% ± 7% | 9% | -1% ± 10% |
| Thalamus | 7% | 6% ± 7% | 4% | 2% ± 5% | 5% | 2% ± 7% |
| Cerebellum | 4% | 1% ± 5% | 2% | 1% ± 2% | 5% | 1% ± 7% |
| Hippocampus | 5% | -2% ± 6% | 3% | 2% ± 4% | 5% | 2% ± 6% |
| Post. cingulate cortex | 7% | 4% ± 8% | 4% | -2% ± 5% | 6% | -2% ± 7% |
| Centrum semiovale | 6% | -1% ± 7% | 2% | -1% ± 2% | 6% | -1% ± 7% |

Abbreviations: Ant. = anterior; aTRV = absolute test-retest variability; Post. = posterior; TRV = test-retest variability. Data are mean ± s.d.

Supplemental Table 5. Test-retest reproducibility of kinetic parameters of [¹¹C]UCB-J derived with 1-tissue compartment model from 60 min parametric maps

| <i>Region</i> | <i>K₁ (mL/cm³ per min)</i> | | <i>V_T (mL/cm³)</i> | | <i>V_T/f_p (mL/cm³)</i> | |
|------------------------|--|------------|--|------------|--|------------|
| | <i>aTRV</i> | <i>TRV</i> | <i>aTRV</i> | <i>TRV</i> | <i>aTRV</i> | <i>TRV</i> |
| Putamen | 4% | 2% ± 4% | 5% | 0% ± 6% | 6% | 0% ± 9% |
| Temporal cortex | 8% | 2% ± 10% | 3% | -1% ± 4% | 5% | -2% ± 6% |
| Insular cortex | 8% | -4% ± 8% | 6% | -1% ± 7% | 6% | -1% ± 8% |
| Ant. cingulate cortex | 4% | -1% ± 6% | 4% | 1% ± 5% | 4% | 1% ± 5% |
| Amygdala | 8% | -4% ± 9% | 5% | 1% ± 6% | 5% | 1% ± 7% |
| Parietal cortex | 5% | -1% ± 7% | 4% | -1% ± 5% | 5% | -1% ± 6% |
| Occipital cortex | 9% | -3% ± 11% | 4% | -1% ± 5% | 5% | -2% ± 6% |
| Caudate nucleus | 4% | 3% ± 3% | 2% | -1% ± 3% | 6% | -1% ± 8% |
| Frontal cortex | 4% | 2% ± 6% | 4% | 1% ± 5% | 8% | 1% ± 6% |
| Globus pallidus | 4% | -1% ± 4% | 5% | -2% ± 7% | 9% | -2% ± 10% |
| Thalamus | 7% | 6% ± 7% | 4% | 1% ± 5% | 5% | 1% ± 7% |
| Cerebellum | 4% | 1% ± 5% | 2% | 0% ± 2% | 5% | 0% ± 7% |
| Hippocampus | 5% | -2% ± 6% | 2% | 1% ± 3% | 4% | 1% ± 6% |
| Post. cingulate cortex | 7% | 3% ± 8% | 5% | -2% ± 5% | 6% | -3% ± 8% |
| Centrum semiovale | 6% | -1% ± 7% | 3% | -2% ± 2% | 6% | -2% ± 7% |

Abbreviations: Ant. = anterior; aTRV = absolute test-retest variability; Post. = posterior; TRV = test-retest variability. Data are mean ± s.d.

Supplemental Table 6. Results of linear fit of f_p and V_T values, as shown for frontal cortex in Supplementary Figure 5

| <i>Region</i> | <i>Equation</i> | <i>R</i> ² | <i>P value</i> |
|------------------------|-----------------------------|-----------------------|----------------|
| Putamen | $V_T = 80 \times f_p - 3.1$ | 0.33 | 0.081 |
| Temporal cortex | $V_T = 98 \times f_p - 10$ | 0.48 | 0.027* |
| Insular cortex | $V_T = 74 \times f_p - 2.8$ | 0.35 | 0.072 |
| Ant. cingulate cortex | $V_T = 86 \times f_p - 6.9$ | 0.47 | 0.030* |
| Amygdala | $V_T = 34 \times f_p + 8.1$ | 0.16 | 0.250 |
| Parietal cortex | $V_T = 123 \times f_p - 20$ | 0.54 | 0.016* |
| Occipital cortex | $V_T = 95 \times f_p - 11$ | 0.44 | 0.037* |
| Caudate nucleus | $V_T = 76 \times f_p - 5.3$ | 0.18 | 0.225 |
| Frontal cortex | $V_T = 88 \times f_p - 9.4$ | 0.49 | 0.024* |
| Globus pallidus | $V_T = 33 \times f_p + 4.8$ | 0.17 | 0.238 |
| Thalamus | $V_T = 24 \times f_p + 7.9$ | 0.18 | 0.222 |
| Cerebellum | $V_T = 46 \times f_p - 0.0$ | 0.36 | 0.066 |
| Hippocampus | $V_T = 22 \times f_p + 7.5$ | 0.06 | 0.508 |
| Post. cingulate cortex | $V_T = 52 \times f_p - 2.4$ | 0.10 | 0.382 |
| Centrum semiovale | $V_T = 24 \times f_p - 2.4$ | 0.34 | 0.078 |