

Supplemental Table 1 Predicted and observed transfer constants

| | Literature values | | | | | | Predicted transfer constants | | Observed transfer constants | |
|--------|------------------------------|-------------------------------------|---|-------------------------------------|--|--|------------------------------|---------|-----------------------------|------------------|
| | ABC (2-fold error) (9) | total tissue volume (mL) (22) | tissue plasma volume (mL) (22) | plasma volume fraction * (11) | Fraction of whole body catabolic rate per tissue (11) | No target expression for (20) | V_t † | K_i ‡ | Baseline V_t § | Baseline K_i § |
| kidney | 0.137 (0.07-0.27) | 332 | 18.2 | 0.055 | 0.06 | CD20 EGFR HER2 | 0.19 | 1.41 | 0.20 (0.16-0.25) | 0.7 (0.4-1.3) |
| liver | 0.121 (0.06-0.24) | 2143 | 183 | 0.085 | 0.30 | CD20 | 0.21 | 1.13 | 0.24 (0.21-0.28) | 1.1 (0.8-2.1) |
| lung | 0.149 (0.07-0.30) | 1000 | 55 | 0.055 | 0.013 | CD20 EGFR PSMA | 0.10 | 0.10 | 0.09 (0.07-0.10) | 0.2 (0.1-0.3) |
| spleen | 0.128 (0.06-0.26) | 221 | 26.8 | 0.121 | 0.028 | EGFR HER2 | 0.25 | 0.99 | 0.24 (0.20-0.27) | 0.5 (0.3-0.7) |

Observed values for V_t ($\text{mL}\cdot\text{cm}^{-3}$) and K_i ($\mu\text{L}\cdot\text{g}^{-1}\cdot\text{h}^{-1}$) presented as median (interquartile range)

* Plasma volume divided by total tissue volume.

† ABC plus plasma volume fraction.

‡ Fraction of whole body catabolic rate per tissue multiplied by the estimated whole body catabolic rate of $7.8 \text{ mL}\cdot\text{h}^{-1}$, divided by the tissue plasma volume, multiplied by 1000.

§ To determine baseline values per tissue, data from ^{89}Zr -labeled mAbs, for which no target expression was reported, were used.

|| The ABC for lung was reported as 0.149 based on quantified tissue biodistribution per gram. To correct for the density of the lung in the calculation of predicted V_t (per ml), the ABC was multiplied by 0.3 g/mL.

Supplemental Table 2 Relative difference between fitted and measured tissue activity concentrations

| | ⁸⁹ Zr-antiHER2 24 h p.i. | ⁸⁹ Zr-antiHER2 48-96 h p.i. | ⁸⁹ Zr-antiHER2 120-192 h p.i. | ⁸⁹ Zr-antiPSMA 24 h p.i. | ⁸⁹ Zr-antiPSMA 48-120 h p.i. | ⁸⁹ Zr-antiPSMA 144-168 h p.i. |
|--------|--|---|---|--|--|---|
| kidney | -1.1 (11.0) n=10 | 3.3 (14.3) n=10 | -1.1 (3.6) n=10 | 18.2 (14.5) n=9 | -8.3 (6.6) n=9 | 2.0 (1.6) n=9 |
| liver | 3.5 (5.6) n=10 | -3.3 (5.4) n=10 | 0.7 (2.1) n=10 | 0.5 (11.2) n=8 | 0.6 (6.2) n=8 | 0.1 (1.5) n=8 |
| lung | -1.7 (6.1) n=10 | 3.0 (10.9) n=10 | -0.6 (3.0) n=10 | 1.1 (5.0) n=6 | -1.0 (10.4) n=6 | 0.0 (2.0) n=6 |
| spleen | 1.4 (4.0) n=10 | -1.1 (4.9) n=10 | 0.2 (1.7) n=10 | 0.4 (8.2) n=8 | 0.2 (6.6) n=8 | 0.1 (1.4) n=8 |

Data presented as mean (SD) in %