**SUPPLEMENT**

**Supplemental Figure 1. Purification and Stability of [64Cu]Cu-NOTA-anti-CD8.** (**a**) Purification of [64Cu]Cu-NOTA-anti-CD8 quantified by iTLC. (**b**) Stability of [64Cu]Cu-NOTA-anti-CD8 in human serum at 37 °C quantified by iTLC (*n* = 3/time point).

**Supplemental Figure 2. PET/CT of [64Cu]Cu-NOTA-anti-CD8 in Non-HIS and Non-Tumor-Bearing Controls in PDX 160721-1.** Representative co-registered PET/CT images of + Tumor – PBMC and – Tumor + PBMC NOG CIEA mouse brains 24 h following [64Cu]Cu-NOTA-anti-CD8 tracer injection (*n* = 3/condition).

**Supplemental Figure 3. Flow Cytometry Gating Strategy.** Splenocytes were gated for (**1**) cells (**2-3**) single cells (**4**) live cells (**5**) mouse CD45 - cells (**6**) human CD45 + cells (**7**) human CD3 + cells and (**8**) human CD8 + cells.

**Supplemental Figure 4. [64Cu]Cu-NOTA-anti-CD8 Uptake in PDX 160615-1.** Coregistered PET/CT images of + PBMCs GBM PDX 160615-1 at 24 hours following [64Cu]Cu-NOTA-anti-CD8 tracer injection (*n* = 5). IHC for human CD8,H&E and autoradiography (*n* = 3/condition) of PDX 160615-1.

**Supplemental Figure 5. Distribution of [64Cu]Cu-NOTA-anti-CD8 in the Brain.** H&E and autoradiography of striatal, hippocampal and cerebellar sections in the same respective brain. GBM tumor is PDX 160721-1 (*n* = 3).

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| **PDX ID** | **PDX Mutation Features** | **PDX Deletion Features** | **PDX Amplification Features** |
| 160721-1 | APC, AR, ARID1B, BRCA2, EGFR, KIT, MAP3K1, MET, MLL2, MSH2/6, MYC, NOTCH1/2, PRDM1, PTEN, SOX9, SRSF2, TERT | B2M,  CDKN2B, FGFR2, GATA3, H3F3A, MAP2K1, PARP1, PTEN | EGFR, MDM4 |
| 160615-1 | AXIN1, BCOR, BRAF, BRCA2, FGFR2, MAP3K1, MSH6, NCOR1, NF1, NOTCH1, PTPRD, TERT, TET, TP53 | FGFR2, GATA3, PTEN, RET | EGFR |

**Supplemental Table 1. Mutation and Copy Number Alterations Maintained Across PDX Passages in Mice.** Genes mutated, deleted and amplified were identified by MSK IMPACT sequencing provided by the Brain Tumor Center.

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| PDX# 160721-1 | A\*01:01 | A\*30:01 | B\*08:01 | B\*52:01 | C\*07:01 | C\*12:02 | DRB1\*03:01 | DRB1\*15:02 | DQB1\*2:01 | DQB1\*6:01 |
| Donor 1 | A\*01:01 | A\*02:01 | B\*08:01 | B\*07:02 | C\*07:01 | C\*07:02 | DRB1\*03:01 | DRB1\*15:01 | DQB1\*02:01 | DQB1\*06:02 |
| Donor 2 | A\*01:01 | A\*29:02 | B\*08:01 | B\*44:03 | C\*07:01 | C\*16:01 | DRB1\*03:01 | DRB1\*07:01 | DQB1\*02:01 | DQB1\*03:03 |
| Donor 3 | A\*01:01 | A\*11:01 | B\*08:01 | B\*35:01 | C\*07:01 | C\*04:01 | DRB1\*03:01 | DRB1\*01:01 | DQB1\*02:01 | DQB1\*05:01 |
| Donor 4 | A\*01:01 | A\*02:01 | B\*08:01 | B\*44:02 | C\*07:01 | C\*07:04 | DRB1\*03:01 | DRB1\*07:01 | DQB1\*02:01 | DQB1\*02:01 |
| Donor 5 | A\*01:01 | A\*24:02 | B\*08:01 | B\*38:01 | C\*07:01 | C\*12:03 | DRB1\*03:01 | DRB1\*04:01 | DQB1\*02:01 | DQB1\*03:02 |
| Donor 6 | A\*01:01 | A\*26:01 | B\*08:01 | B\*38:01 | C\*07:01 | C\*12:03 | DRB1\*03:01 | DRB1\*04:02 | DQB1\*02:01 | DQB1\*03:02 |
| Donor 7 | A\*23:01 | A\*33:03 | B\*07:02 | B\*44:03 | C\*07:01 | C\*07:02 | DRB1\*07:01 | DRB1\*09:01 | DQB1\*02:01 | DQB1\*02:01 |
| Donor 8 | A\*03:01 | A\*24:02 | B\*07:02 | B\*40:01 | C\*03:04 | C\*07:02 | DRB1\*07:01 | DRB1\*15:01 | DQB1\*03:03 | DQB1\*06:02 |
| Donor 9 | A\*03:01 | A\*26:01 | B\*07:02 | B\*40:01 | C\*03:04 | C\*07:02 | DRB1\*11:03 | DRB1\*15:01 | DQB1\*03:01 | DQB1\*06:02 |
| Donor 10 | A\*30:02 | A\*66:01 | B\*18:01 | B\*58:02 | C\*05:01 | C\*06:02 | DRB1\*13:01 | DRB1\*15:01 | DQB1\*03:03 | DQB1\*06:02 |
| Donor 11 | A\*02:01 | A\*24:02 | B\*44:02 | B\*44:05 | C\*02:02 | C\*05:01 | DRB1\*04:01 | DRB1\*11:01 | DQB1\*03:01 | DQB1\*03:01 |
| Donor 12 | A\*02:01 | A\*02:01 | B\*44:02 | B\*44:02 | C\*05:01 | C\*05:01 | DRB1\*04:01 | DRB1\*04:04 | DQB1\*03:01 | DQB1\*03:02 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PDX# 160615-1 | A\*02:01 | A\*02:01 | B\*40:01 | B\*44:02 | C\*03:04 | C\*07:04 | DRB1\*11:01 | DRB1\*13:01 | DQB1\*03:01 | DQB1\*06:03 |
| Donor 13 | A\*02:01 | A\*02:01 | B\*07:02 | B\*27:05 | C\*02:02 | C\*07:02 | DRB1\*11:01 | DRB1\*15:01 | DQB1\*03:01 | DQB1\*06:02 |
| Donor 14 | A\*02:01 | A\*02:01 | B\*35:01 | B\*57:01 | C\*04:01 | C\*07:01 | DRB1\*11:01 | DRB1\*15:01 | DQB1\*02:01 | DQB1\*03:03 |

**Supplemental Table 2. Human PBMC Donor HLA.** Table contains the HLA type of the GBM PDXs 160721-1 and 160615-1 and the PBMC donors. Green indicates major locus match to the respective PDX.