**Supplementary Table S1. Adverse event**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Gr 1 | Gr 2 | Gr 3 | Gr 4 or 5 |
| Anorexia/Nausea | 5 (26%) | 2 (11%) | 1 (5%) | 0 |
| Skin rash/Pruritus | 7 (37%) | 1 (5%) | 0 | 0 |
| Fatigue (+ general weakness) | 4 (21%) | 0 | 0 | 0 |
| Arthralgia (+ myalgia, osteoarthritis) | 2 (11%) | 1 (5%) | 0 | 0 |
| Abdominal pain | 1 (5%) | 1 (5%) | 0 | 0 |
| Dyspepsia (+ epigastric sore) | 0 | 1 (5%) | 1 (5%) | 0 |
| Hyperglycemia | 1 (5%) | 0 | 0 | 0 |
| Thyroiditis | 1 (5%) | 0 | 0 | 0 |
| Anterior uveitis | 1 (5%) | 0 | 0 | 0 |
| Anemia | 0 | 1 (5%) | 3 (16%) | 0 |
| Neutropenia | 0 | 0 | 1 (5%) | 0 |
| Pneumonia | 0 | 1 (5%) | 1 (5%) | 0 |
| Bacterial peritonitis | 0 | 0 | 1 (5%) | 0 |
| Herpes Zoster | 0 | 1 (5%) | 0 | 0 |

**Supplementary Table S2. List of tumor sequencing and tumor volume**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Patient ID** | **Pathology††** | **Tumor location** | **Best of Response (BOR)** | **SEQ ID** | **Baseline** | **Cycle 4** | **Cycle 12** |
| **TV** | **WES** | **WTS** | **scRNA-seq** | **TV** | **WES** | **WTS** | **scRNA-seq** | **TV** | **WES** | **WTS** |
| **EP-62** | M/D adeno |  | **CR** | **N/A** | **N/A** |  |  |  | **N/A** |  |  |  |  |  |  |
| **EP-63** | Signet ring cell | **Body** | **SD** | **PB-16-070** | **60** | **O** | **O** |  | **70** | **O** | **O** |  |  |  |  |
| **EP-64** | P/D adeno | **Antrum** | **NE** | **PB-16-072** | **60** | **O** | **O** |  | **N/A** |  |  |  |  |  |  |
| **EP-65** | M/D adeno | **Antrum** | **PR** | **PB-16-071** | **70** | **O** | **O** |  | **30** | **O** | **O** |  | **40****<5****10****30****20****80****20****30** | **O****O****O****O****O****O****O****O** | **O\*** |
| **EP-66** | P/D adeno | **Body** | **PR** | **PB-16-073** | **?** |  | **O** |  | **N/A** |  |  |  |  |  |  |
| **EP-67** | P/D adeno | **Body** | **CR** | **PB-16-074** | **50****100** | **O\*** | **O\*** |  | **80** | **O\*** | **O\*** |  |  |  |  |
| **EP-68** | M/D adeno | **Antrum** | **PR** | **PB-16-077** | **40** | **O** | **O** |  |  |  |  |  |  |  |  |
| **EP-69** | P/D adeno | **Body** | **PR** | **PB-16-075** | **90** | **O** | **O** |  | **20****30****20****40****70****60****50** | **O****O****O****O****O****O****O** | **O\*** |  |  |  |  |
| **EP-71** | P/D adeno | **Body** | **PD** | **PB-16-078** | **80****80****90****90** | **O****O****O****O** | **O\*** |  | **40****60** | **O****O** | **O\*** |  |  |  |  |
| **EP-72** | M/D adeno | **Antrum** | **PR** | **PB-16-079** | **30****10****50****50****30** | **O\*** | **O\*** | **O\*** | **10****5****10** | **O\*** | **O\*** | **O\*** |  |  |  |
| **EP-73** | M/D adeno |  | **PR** | **N/A** | **0** |  |  |  |  |  |  |  |  |  |  |
| **EP-74** | M/D adeno |  | **CR** | **N/A** | **0** |  |  |  |  |  |  |  |  |  |  |
| **EP-75** | M/D adeno | **Antrum** | **SD** | **PB-16-080** | **10****90****20****50****5** | **O\*** | **O\*** | **O\*** | **80****80** | **O\*** | **O\*** | **O\*** |  |  |  |
| **EP-76** | Signet ring cell | **Body** | **SD** | **PB-16-081** | **80****80** | **O\*** | **O\*** | **O\*** |  |  |  |  |  |  |  |
| **EP-77** | Signet ring cell | **Antrum** | SD | **PB-16-082** | **90****75** | **O\*** | **O\*** |  |  |  |  |  |  |  |  |
| **EP-78** | M/D adeno | **Antrum** | SD | **PB-16-083** | **70****60** | **O\*** | **O\*** | **O\*** | **40** | **O** | **O** | **O** |  |  |  |
| **EP-79** | P/D adeno | **Body** | SD | **PB-16-084** | **35** | **O** | **O** |  |  |  |  |  |  |  |  |
| **EP-80** | P/D adeno | **Body** | PR | **PB-16-085** | **30****15** | **O\*** | **O\*** |  |  |  |  |  |  |  |  |
| **EP-81** | P/D adeno | **Body** | SD | **PB-16-086** | **70****50** | **O\*** | **O\*** |  |  |  |  |  |  |  |  |

\* Assays were performed with pooled-tissues of multi-regional biopsies.

**Supplementary Table S4. List of antibodies used for multi-color flow cytometry**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Antibody** | **Manufacture** | **Clone** | **Conjugate** | **Cat. No.** |
| Live/Dead fixable near-IR dead cell stain  | Thermo Fisher | n/a | n/a | L34976 |
| mouse anti-human CD137 | Biolegend | 4B41 | BV421 | 309820 |
| mouse anti-human CD4  | Biolegend | RPA-T4 | BV570 | 300534 |
| mouse anti-human ki-67 | Biolegend | ki-67 | BV605 | 350522 |
| mouse anti-human PD-1 | Biolegend | EH12.2H7 | BV650 | 329950 |
| mouse anti-human CD3 | Biolegend | sk7 | BV750 | 344846 |
| mouse anti-human CTLA-4 | Biolegend | BNI3 | BV785 | 369623 |
| mouse anti-human CD45RA | Biolegend | HI100 | AF488 | 304114 |
| mouse anti-human CD25 | BD bioscience | M-A251 | BB515 | 565096 |
| mouse anti-human CCR7 | Biolegend | G043H7 | CCR7 | 353220 |
| mouse anti-human FOXP3 | Thermo Fisher | PCH101 | PE | 12-4776-42 |
| mouse anti-human CD39 | Thermo Fisher | eBioA1 | PE-Cy7 | 25-0399-42 |
| mouse anti-human TOX | Thermo Fisher | TXRX10 | eFluor 660 | 50-6502-82 |
| mouse anti-human CD8  | Thermo Fisher | RPA-T8 | AF700 | 56-0088-42 |
| BV480 Streptavidin  | BD bioscience | 　 | BV480 | 564876 |
| mouse anti-human IgG4 Fc secondary antibody, biotin | Thermo Fisher | 　 | 　 | MH1542 |