**Table S2. Comparison of MHC-I expression of tumor organoids and original tumors**, related to Figure 1.

| | HCA2 | | | | | HC10 | | | | | Comparison | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Strong (%) | Moderate (%) | Weak (%) | Negative (%) | **Score HCA2** | Strong (%) | Moderate (%) | Weak (%) | Negative (%) | Sore HC10 | *Tumor slides (composite score HCA2/HC10 IHC)* | *Tumor organoids (MFI)* |
| CRC-1 | 30 | 0 | 0 | 70 | **90** | 70 | 20 | 10 | 0 | 260 | *175* | *2368* |
| CRC-3 | 0 | 0 | 0 | 100 | **0** | 0 | 1 | 10 | 89 | 12 | *6* | *23* |
| CRC-4 | 0 | 0 | 1 | 99 | **1** | 0 | 0 | 1 | 99 | 1 | *1* | *154* |
| CRC-5 | 0 | 0 | 0 | 100 | **0** | 0 | 0 | 15 | 85 | 15 | *8* | *461* |
| CRC-6M | 35 | 25 | 20 | 20 | **175** | 30 | 25 | 20 | 15 | 160 | *168* | *1158* |
| CRC-6P | 70 | 20 | 10 | 0 | **260** | 65 | 30 | 5 | 0 | 260 | *260* | *1165* |
| CRC-7 | 0 | 0 | 0 | 100 | **0** | 0 | 0 | 0 | 100 | 0 | *0* | *1* |
| CRC-8M | 0 | 2 | 8 | 90 | **12** | 0 | 0 | 0 | 100 | 0 | *6* | *0* |
| CRC-8P | 2 | 0 | 5 | 93 | **11** | 2 | 0 | 2 | 96 | 8 | *10* | *3* |
| CRC-12 | 40 | 45 | 10 | 5 | **220** | 0 | 0 | 0 | 100 | 0 | *110* | *1548* |

Excised tumor pieces were fixed and paraffin-embedded, and slides were stained with the HCA2 or HC10 antibody against MHC-I. Tumor slides were scored by a pathologist for staining intensity, with the percentage of tumor cells negative or strongly, moderately or weakly positive for MHC-I indicated in the table. The score for each individual staining is calculated by multiplying the percentage of tumor cells strongly (3), moderately (2), or weakly (1) positive with the number indicated in brackets, and summing the outcome. The composite IHC score (average of the HCA2 and HC10 scores) is compared to mean fluorescence intensity (MFI) of anti-HLA-A,B,C-PE staining (isotype control MFI subtracted) of tumor organoids.

**Table S3. Characteristics of panel of NSCLC samples**, related to Figure 3.

| Sample | Sex | Age | Type | Tumor location | Stage | Primary tumor/metastasis | Biopsy / resection |
|--------|-----|-----|------|----------------|-------|--------------------------|--------------------|
| NSCLC-1 | M | 70 | Adenocarcinoma | Lung | I | Primary tumor | Resection |
| NSCLC-2 | M | 57 | Squamous cell carcinoma | Lung | I | Primary tumor | Resection |
| NSCLC-3 | F | 61 | NOS | Lung | II | Primary tumor | Resection |
| NSCLC-4 | M | 62 | Adenocarcinoma | Lung | IV | Primary tumor | Biopsy |
| NSCLC-5 | M | 62 | Adenocarcinoma | Adrenal gland | IV | Metastasis | Biopsy |
| NSCLC-6 | M | 57 | Squamous cell carcinoma | Lung | III | Primary tumor | Resection |