

Description of Additional Supplementary Files

File Name: Supplementary Data 1

Description: Cosine similarity indices (CSI) for 130 samples, related to Figure 1. CSI is calculated based on the count of 2500 most IgG binding peptide epitope abundance values in individual samples using R package “Isa”. Groups: *PEM-Mel* – melanoma patients receiving pembrolizumab treatment (n=5); *CTRL-Mel* – healthy controls for melanoma group (n=80); *MeIVac* – NSCLC patients who received MelCancerVac® vaccine (n=6); *MeIVac-CTRL* – paired samples of MeIVac group taken before vaccination (n=6); *NSCLC* – non-small cell lung cancer patients (n=18); *CTRL-NSCLC* – non-cancer controls for NSCLC group (n=10); *duplicate* – series samples of NSCLC or MeIVac patients (n=5).

File Name: Supplementary Data 2

Description: The highest seroresponse patterns at the epitope level for each MelCancerVac® receiving patient, related to Figure 2. Seroresponse to 50 most abundant epitopes in pre- (*Pre*) and post-vaccination (*Vac*) samples for each NSCLC patient who received MelCancerVac® (*MeIVac1-MeIVac6*) are included along with the number of IgG-bound peptides for each epitope from mimotope variation analysis. The number of epitopes shown differs for each patient as some epitopes were detected among the top 50 of both, *Pre* and *Vac* samples. Epitopes are ranked by highest-to-lowest values as observed in the *Vac* sample. “x” in *Epitope* sequences denotes any amino acid.

File Name: Supplementary Data 3

Description: Average abundance values of epitopes aligning to 35 melanoma-associated antigens, related to Figure 3a. *CTRL-Mel* – healthy controls for melanoma group (n=21, all individuals older than 45 years); *PEM-Mel* – melanoma patients receiving pembrolizumab treatment (n=5); *MeIVac-CTRL* – paired samples of MeIVac group taken before vaccination (n=6); *MeIVac* – NSCLC patients who received MelCancerVac® vaccine (n=6); *NSCLC* – non-small cell lung cancer patients (n=18).

File Name: Supplementary Data 4

Description: Average abundance values of epitopes aligning to 35 melanoma-associated antigens, related to Figure 3b-c. *CTRL-Mel* – healthy controls for melanoma group (n=21, all individuals older than 45 years); *PEM-Mel* – melanoma patients receiving pembrolizumab treatment (n=5); *MeIVac-CTRL* – paired samples of MeIVac group taken before vaccination

(n=6); *MeIVac* – NSCLC patients who received MelCancerVac® vaccine (n=6); *NSCLC* – non-small cell lung cancer patients (n=18).

File Name: Supplementary Data 5

Description: Abundance values of 15 melanoma-specific and 2 virus-related epitope containing peptides, related to Figures 4 and 5. Groups: *PEM-Mel* – melanoma patients receiving pembrolizumab treatment (n=5); *CTRL-Mel* – healthy controls for melanoma group (n=80); *MeIVac* – NSCLC patients who received MelCancerVac® vaccine (n=6); *MeIVac-CTRL* – paired samples of MeIVac group taken before vaccination (n=6); *NSCLC* – non-small cell lung cancer patients (n=18); *CTRL-NSCLC* – non-cancer controls for NSCLC group (n=10); *MeIVacComp* – MeIVac samples competed with DDM-1.7 melanoma cell lysate (n=6). *Marker* – biomarker M1 to M15 or virus-related epitopes (EBV or CMV). *Abundance* – number of IgG-bound peptides containing the specified epitope sequence detected in a sample.

File Name: Supplementary Data 6

Description: ELISA measurements of CMV and EBV serology for cohort samples. Human cytomegalovirus (CMV) and Epstein-Barr virus (EBV) serostatuses were measured from blood samples with anti-CMV ELISA (IgG) (EUROIMMUN EI 2570-9601 G) and anti-EBV-CA ELISA (IgG) method (EUROIMMUN EI 2791-9601 G) according to the manufacturer's specifications. *NSCLC* – non-small cell lung cancer patients; *MeIVac-CTRL* – samples of NSCLC patients taken before MelCancerVac® vaccination; *Control* – healthy controls for melanoma group; *PEM-Mel* – melanoma patients receiving pembrolizumab treatment; *POS* – sample positive for either anti-CMV or anti-EBV-CA IgG antibodies; *NEG* – sample negative for either anti-CMV or anti-EBV-CA IgG antibodies; *Borderline* – serology test inconclusive.