

**Supplementary Table S1. Patient Characteristics.** Patients with metastatic melanoma containing BRAF<sup>V600E</sup> mutation (confirmed by genotyping) were enrolled on clinical trials for treatment with a BRAF inhibitor (BRAFi), or combined BRAF inhibition and MEK inhibition (BRAFi + MEKi). Patient, age, site of disease, treatment, maximal response, and duration of response are reported.

**Supplementary Table S2. Inhibition of BRAF<sup>V600E</sup> increases expression of MDAs in tumors of patients with metastatic melanoma.** Tumors were harvested and levels of gp100 and MART-1 were assayed via immunohistochemistry in patients with metastatic melanoma undergoing treatment with a selective inhibitor of BRAF<sup>V600E</sup>. Slides were evaluated by a dedicated dermatopathologist to determine pre treatment versus post treatment percentage of staining cells and staining intensity for gp100 and MART-1.

**Supplementary Figure S1. Inhibition of BRAF<sup>V600E</sup> increases expression of MART-1 in tumors of patients with metastatic melanoma.** Immunofluorescence staining for the melanoma antigen MART-1 in pre-treatment and on-treatment biopsies was performed to confirm that protein expression correlated with mRNA expression. The images are shown at a 40x magnification. Slides were evaluated by a dedicated dermatopathologist to determine pre treatment versus post treatment percentage of staining cells and staining intensity for gp100 and MART-1.

**Supplementary Figure S2. Inhibition of BRAF<sup>V600E</sup> is not associated with a significant increase in HLA expression in patients with metastatic melanoma.** Tumors (n=14) were harvested and mRNA levels of HLA-A, HLA-B, and B2M in patients with metastatic melanoma undergoing treatment with a selective inhibitor of

BRAF<sup>V600E</sup> were assayed. Expression levels are shown as fold increase over pre-treatment value. All experiments were performed in triplicate.

**Supplementary Figure S3. Melanoma antigen expression is decreased at time of progression.**

Tumors were harvested at time of progression for patient 16. mRNA levels of the melanoma antigens gp100, MART-1, TYRP-1, and TYRP-2 were assayed.