Supplemental Figures

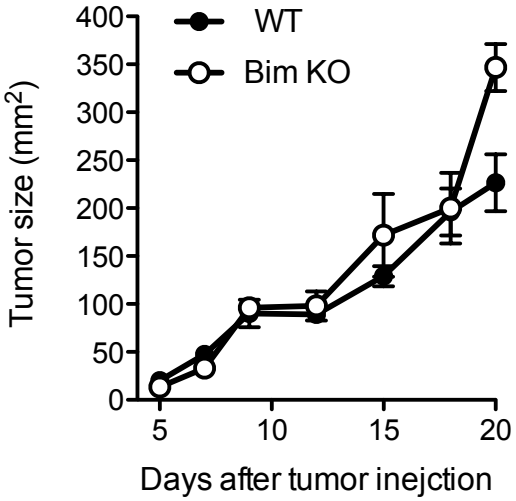

Figure S1: **Tumor growth in WT and Bim KO mice.** B16 melanoma tumor cells were injected s.c. in wild type and Bim KO mice. The tumor size were measured with a caliper and shown as square millimeter.

Supplemental Figures

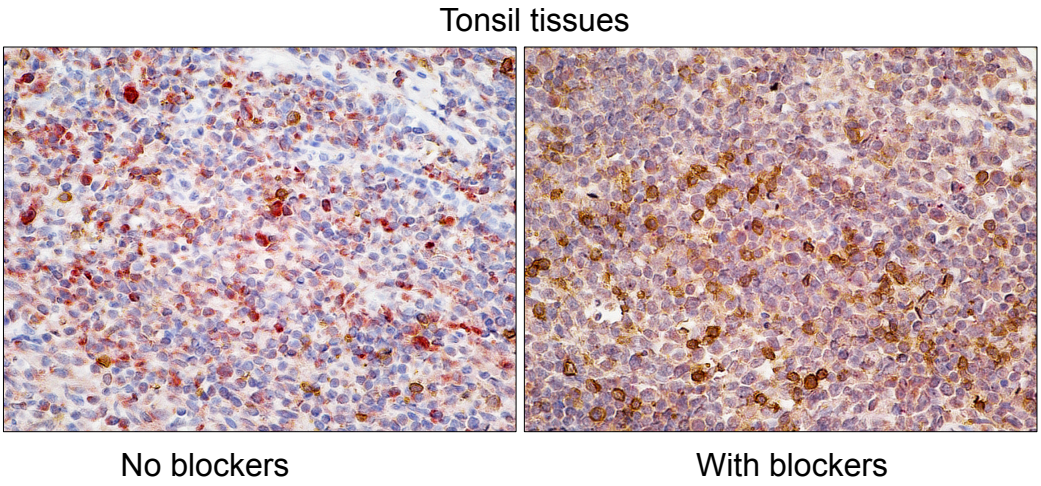

Figure S2: **Blocking of Bim staining in human tonsil.** Human tonsils were stained with anti-Bim (Red) and anti-PD-1 (Brown) with or without blockers for Bim. The blockers were recombinant human Bim proteins (#1325-BL-050, R&D Systems) that was pre-mixed with anti-Bim antibody before staining for 20 min.

Supplemental Figures

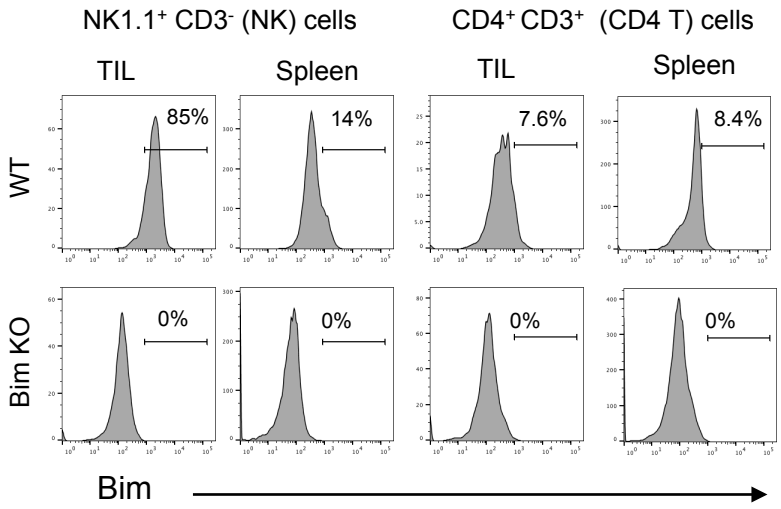

Figure S3: **Bim expressed by NK and CD4 T cells within tumors and spleen.** Tumor infiltrating lymphocytes (TIL) and spleen cells were isolated from WT or Bim KO mice bearing B16 tumors. Following cell surface staining of markers for NK cell and CD4 T cells as indicated, cells were stained for intracellular expression of Bim. One of three experiments was shown.

Supplemental Figures

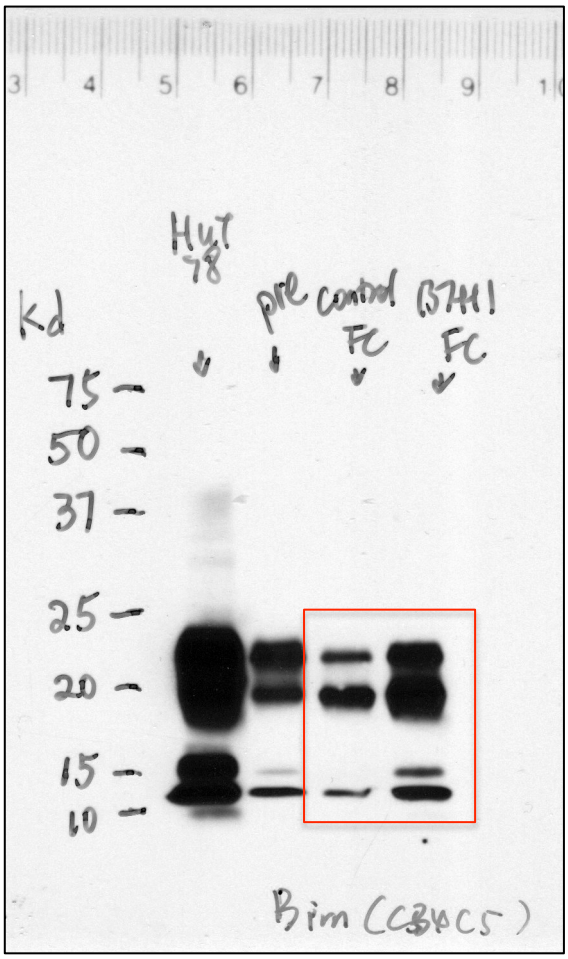

Figure S4: **Full unedited gel for Figure 5B.** Boxed area is correspond to those shown in the cropped images within the Figure 5B. $CD8^+$ T cells isolated from PBMC activated with PHA-L for 48 hours and then incubated with control fusion protein or human B7-H1 (PD-L1) fusion protein in the presence of anti-CD3 for another 24 hours before Western blotting assay. Control groups including Hut78 lymphoma cell line for Bim positive control. Purified activated $CD8^+$ T cells before incubation with B7-H1 protein was used as baseline control (pre).

Supplemental table 1 Baseline patient characteristics by disease status at 12 weeks

Characteristic	Total N=13	Responders (CR/PR/) N=6	Progressors N=7
Median age (range)	63 (46-80)	65.5 (46-80)	63 (52-74)
Gender-male (N, %)	7 (54)	4 (67)	3 (43)
Median # of previous systemic treatments (range)	2 (1-6)	2 (1-6)	3 (1-4)
Previous treatment (N, %) Ipilimumab Chemotherapy Targeted therapy Other immunotherapy	 13 (100) 6 (46) 4 (31) 4 (31)	 6 (100) 3 (50) 2 (33) 2 (33)	 7 (100) 3 (43) 2 (29) 2 (29)
LDH > ULN (N; %)	7 (54)	2 (33)	5 (71)
M1c disease (N; %)	13 (100)	6 (100)	7 (100)
BRAF status (N; %) Mutant Wild type Unknown	 4 (31) 7 (54) 2 (15)	 2 (33) 3 (50) 1 (17)	 2 (29) 4 (57) 1 (14)

CR: Complete response; PR: Partially response; SD: Stable disease.
Note: Percentages in parenthesis correspond to column subgroups.

Supplemental table 2 Baseline and 12-week percent change in the frequency of Bim^+ per $PD\text{-}1^+$ $CD11a^{high}$ $CD8^+$ T cells and Bim MFI[≠]

	Responders (CR/PR)	Progressors	P value
Median baseline %$Bim^+/PD1^+$ $CD11a^{high}$ $CD8^+$ T cells (interquartile range); n	56.95 (49.52-72.25); n=6	33.30 (27.82-49.82; 22); n=7	0.0047*
Median baseline Bim MFI (interquartile range); n	59.75 (32.5-84.1); n=6	17.00 (11.7-39.8); n=7	0.0350*
Median 12-week % change in %$Bim^+/PD1^+$ $CD11a^{high}$ $CD8^+$ T cells (interquartile range; N)	-49.26 (-72.97; -27.39) n=6	23.72 (-4.68; 47.94) n=7	0.0047*
Median 12-week % change in Bim MFI (interquartile range; N)	-33.79 (-71.87; 8.19); n=6	30.63 (-62.31; 52.94); n=7	0.2949
Median 12-week % change in %$Bim^+/PD1^+$ $CD11a^{high}$ $CD8^+$ T cells (interquartile range; N)[≠]	-32.58 (-55.29; 37.50); n=6	-57.72 (-68.21; -54.52); n=7	0.1014

[≠] Includes only patients with objective response (CR/PR) versus patients with progression at 12 weeks for whom baseline and 12-week samples were available.
*Statistically significant.