Background Exogenous peptide-loaded antigen presenting cells (APCs) have been under investigation as a therapeutic approach for the treatment of cancer patients. However, in general APC vaccines have demonstrated limited efficacy in clinical trials. To date, only one APC based vaccine, Sipuleucel-T, has been approved by FDA for the treatment of cancer, in this case castrate-resistant metastatic prostate cancer. Dendritic cells (DCs), best known for their cross priming ability, have been the ultimate choice for APC based vaccine research. However, B cells, which also serve as professional APC and can function similarly to activate CD4 and CD8 T cells, remain largely understudied. We compared the phenotype and function of activated T cells that resulted from epitope-specific priming through either B cells or DCs.

Methods We isolated B cells and DCs from C57Bl/6 mice, which were either treated or not with LPS for maturation. These cells were then either loaded or not with SIINFEKL peptide (dominant ovalbumin epitope) for priming CD8 T cells isolated from OT-1 mice (transgenic for TCR specific for SIINFEKL). Resulting T cells were analyzed for their phenotype, function, and anti-tumor efficacy via flow cytometry, ELISA, and E.G7-OVA murine tumor model respectively.

Results We report that priming through peptide-pulsed immature B cells or immature DCs similarly activated antigen-specific CD8 T cells. However, priming through mature DCs resulted in generation of a stronger CD8 T cell activation profile when compared to priming through mature B cells. Similarly, we report that CD8 T cell priming through B cells or DCs resulted in comparable expression of exhaustion and checkpoint related markers on activated CD8 T cells, and similar expression of pro-inflammatory and cytotoxicity related cell surface proteins and intracellular cytokines. Lastly, we report that CD8 T cells primed through immature B cells, immature DCs or mature DCs, all generated a similar anti-tumor response upon adoptive transfer to tumor-bearing mice.

Conclusions Collectively, our data indicated that both B cells and DCs are equally capable of activating CD8 T cells and generating an anti-tumor response. Given that B cells are relatively easier to culture and expand when compared to DCs, our study warrants further investigation into the APC function of B cells and their potential use as APC-based vaccines.

Ethics Approval All experiments involving animals were performed under IACUC approved protocol no. M005690.