There has been much progress in recent years in developing checkpoint inhibitors, primarily PD-1 antibodies and PD-L1 antibodies. However, because of lack of tumor-infiltrating effector T cells, many patients in clinical trials do not respond to checkpoint inhibitor treatment. It was recently suggested that the combination of an immune checkpoint inhibitor and another anti-tumor drug, such as a cancer vaccine or BRAF inhibitor, may function synergistically to induce more effective antitumor immune responses. In this work, we considered the combination therapies of cancer with a checkpoint inhibitor and a cancer vaccine (or BRAF/MEK inhibitor) using mathematical models. Cancer vaccine activates dendritic cells so that they induce more T cells to infiltrate the tumor. BRAF kinase, is a key part of MAPK pathway of cancer cell proliferation. BRAF-targeted therapy induces significant responses in the majority of patients. We use mathematical models with systems of partial differential equations to explore the efficacy of the two drugs and compare the simulations with data from mouse experiments. The synergy map of combinations of an anti-PD-1 and a cancer vaccine shows that for optimal efficacy under MTD constraint, the level of dosage of anti-PD-1 should be related to the level of dosage of cancer vaccine as indicated by the optimal dose curve in the map. In contrast, the efficacy map of combination of an anti-PD-1 and a BRAF/MEK inhibitor shows that at large doses the drugs may become antagonistic: an increase in one of the drugs may actually result in an increase in the tumor volume.