**Figure 1. CTLA-4 and PD-1**

**A.** In lymphatic tissue, antigen-presenting cells (APC) activate naïve T-cells via the T-cell receptor (TCR) and stimulatory receptor CD28. This leads to expression of CTLA-4 on the T-cell surface, which binds to B7 with higher avidity than does CD28. Interaction of CTLA-4 with B7 leads to T-cell inactivation. Ipilimumab binds to CTLA-4 and reverses this inactivation.

**B.** In peripheral tissue, tumor cells upregulate PD-1 ligands, which bind to PD-1 on activated T-cells, leading to T-cell inhibition or death. Monoclonal antibodies that bind to either PD-1 or PD-L1 interfere with this, allowing antitumor T-cells to survive and kill the tumor cells.

*MHC = major histocompatibility complex, TCR = T-cell receptor*