Since the approval of ipilimumab (Yervoy; a monoclonal antibody that blocks cytotoxic T-lymphocyte–associated antigen 4 for late-stage melanoma) in 2011, it may be easier to answer the question: For which types of cancer are immunotherapy agents not effective? Together with nivolumab (Opdivo) and pembrolizumab (Keytruda)—both of which are programmed death 1 (PD-1) receptor–blocking antibodies—these agents had a combined 7 new or expanded US Food and Drug Administration approvals in 2015 alone.\(^1\)

Using the immune system to attack cancer is not a new concept; basic and clinical researchers have been attempting to use the immune system to fight malignancy for decades. Interleukin-2 and interferon-alpha are 2 agents that have made clinical improvements in patients with melanoma and renal-cell cancers. However, with the approval of these agents come new challenges for pharmacists and other healthcare professionals. New strategies for adverse effect management and patient counseling have been developed, and continue to be refined to improve patient outcomes, with the prompt initiation of high-dose steroids at the forefront of strategies used.

Time to response also often differs with these agents when compared with traditional cytotoxic therapy. Response with these agents may depend on the amount of PD-1–expressing T-cells in the cancer environment, and responses occurring months after treatment are not uncommon. In fact, tumor size may initially increase before a measurable response is seen. The use of modified response criteria for immunotherapies—termed immune-related response criteria—are being developed to better quantify responses to these agents.\(^2\)

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Finally, the cost of these agents cannot be ignored. For melanoma alone, ipilimumab given in 4 treatments, 3 weeks apart, costs $120,000, whereas pembrolizumab given every 2 weeks is dosed by weight, but costs $150,000 annually for the average patient.\(^3\) The cost of nivolumab alone averages $103,220 per patient, based on progression-free survival benefits. In addition, these agents are approved for use in combination, which drastically increases the cost of use to approximately $300,000 per patient.\(^4\) The costs of these agents for other cancers are similar or higher depending on dosage and observed clinical benefit.

Although these agents undoubtedly deserve to be called the “Cancer Advance of the Year” by the American Society of Clinical Oncology for 2015, the increased use of these agents presents many clinical and financial puzzles for healthcare professionals to solve over the next several years. □

References