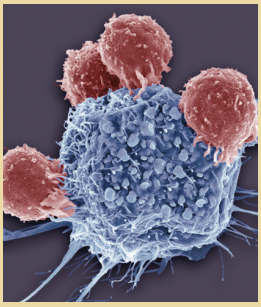
■ Article

Primer on Immuno-Oncology and Immune Response

Rajni Kannan, BS, MS, RN, ANP-BC, Kathleen Madden, RN, BSN, MSN, FNP-BC, AOCNP®, and Stephanie Andrews, MS, ANP-BC



© Steve Gschmeissner/Science Source

Advances in the understanding of the immunogenicity of tumors have provided the basis for immuno-oncology, the development of immunotherapeutic agents that augment the patient's antitumor immunity and disrupt the immune-regulatory circuits that allow tumors to evade the immune system. Two immunomodulatory agents recently have been introduced for the treatment of malignancy: sipuleucel-T and ipilimumab. Unlike cytotoxic chemotherapy, immunotherapies stimulate the patient's immune system to mount or augment existing endogenous antitumor immune responses. Both agents have demonstrated significant improvements in long-term overall survival in patients. Like other immunotherapies, sipuleucel-T and ipilimumab also are characterized by adverse events that manifest as immune-related inflammatory conditions that typically are low grade. Management guidelines have been developed and emphasize early recognition of the signs and symptoms of immune-related adverse events and treatment with corticosteroids. Because these events can manifest even after the cessation of therapy, patients treated with immunotherapies should continue to be followed by their oncology team and other healthcare providers.

Rajni Kannan, BS, MS, RN, ANP-BC, and Kathleen Madden, RN, BSN, MSN, FNP-BC, AOCNP®, are nurse practitioners in the Laura and Isaac Perlmutter Cancer Center at New York University Medical Center in New York City, and Stephanie Andrews, MS, ANP-BC, is a nurse practitioner in medical oncology at Moffitt Cancer Center in Tampa, FL. The authors take full responsibility for the content of this article. Kannan, Madden, and Andrews served on the speakers bureau for Bristol-Myers Squibb. Writing and editorial support was provided by Jennifer Wietzke, PhD, at StemScientific through support from Bristol-Myers Squibb. The content of this article has been reviewed by independent peer reviewers to ensure that it is balanced, objective, and free from commercial bias. No financial relationships relevant to the content of this article have been disclosed by the independent peer reviewers or editorial staff. Kannan can be reached at rajni.kannan@nyumc.org, with copy to editor at CJONEditor@ons.org. (Submitted March 2013. Accepted for publication August 25, 2013.)

Key words: immuno-oncology; immunotherapy; immune responses; patient management

Digital Object Identifier: 10.1188/14.CJON.311-317

Cancer immunotherapy was observed over 100 years ago when the remission of tumors was generally associated with acute infections, leading to the realization that activated immunity in response to an underlying infection was responsible for the observed tumor regression (Coley, 1891; Thomas & Bandini, 2011). Since then, advances in the understanding of molecular interactions between tumors and the immune system have provided the basis for development of immunostimulatory and inhibitory monoclonal antibodies, cancer vaccines, immune adjuvants, and cytokines (see Table 1), which all aim to augment protective antitumor immunity and disrupt the immune-regulatory circuits that allow tumors to evade the immune system (Dougan & Dranoff, 2009).

Two immunomodulatory agents, sipuleucel-T and ipilimumab, have recently received regulatory approval for the treatment of malignancy (Pazdur, 2013; Witten, 2013). Sipuleucel-T is a dendritic cell (DC)–based vaccine approved by the U.S. Food and Drug Administration (FDA) in 2010 for the treatment of asymptomatic or minimally symptomatic metastatic prostate cancer (Witten, 2013). Ipilimumab, an anticytotoxic T lymphocyte–associated antigen (CTLA)-4 monoclonal antibody that augments T-cell activation and proliferation, was approved by the FDA in 2011 for the treatment of advanced or metastatic melanoma (Pazdur, 2013).

This article provides an overview of tumor immunology supporting the rationale for the development of these new immunotherapeutics and the patterns of response seen with them. Common adverse events (AEs) are discussed, together with practical management strategies. The aim of this article is to provide oncology nurses with the knowledge and tools for clinical management of patients treated with these new immunotherapies.

Overview

Classic hallmarks of cancer include sustaining proliferative signaling, evading growth suppressors, resisting cell death, enabling replicative immortality, inducing angiogenesis, activating