

# Managing Drug Infusion Reactions: Focus on Cetuximab Monoclonal Antibody Therapy

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J.S. is a 54-year-old African American man originally from North Carolina who now lives in Boston, MA. He was diagnosed with stage IV colon cancer two years ago; his past medical history is remarkable only for intermittent asthma related to seasonal allergies. J.S.'s tumor responded to treatment with FOLFIRI (folinic acid, 5-FU, irinotecan) and bevacizumab but recently has progressed. A new regimen is planned containing irinotecan and cetuximab (Erbix<sup>TM</sup> [Imcolone Systems, Inc. and Bristol-Myers Squibb]), a chimeric monoclonal antibody created from multiple types of protein (mouse [murine] and human). The nurse in the outpatient oncology clinic spent time with J.S. last week, describing the treatment and focusing on possible side effects of this monoclonal drug therapy (rare allergic reaction, common skin rash, and less common, diarrhea) and self-care management measures.

J.S. comes into clinic today to begin treatment. The nurse's baseline examination reveals a temperature of 98.2°F, heart rate 76 and regular, blood pressure 110/70, respiratory rate 14, and oxygen saturation 98% on room air. His breath sounds are clear. His skin is smooth, unblemished, and without rash. He is premedicated with diphenhydramine and acetaminophen as ordered. The nurse stays with J.S. during initiation of cetuximab infusion. She monitors him closely during this time because cetuximab is known to produce a severe infusion reaction in about 3% of patients overall; of these, 90% occur during the first infusion

(Bristol-Myers Squibb Company, 2007). Immediately after beginning the drug, J.S. complains of feeling uneasy, and shortly thereafter, develops wheezing with shortness of breath.

## Etiology

Infusion reaction is a term used to describe a range of patient responses to the infusion of certain chemotherapy or biotherapy agents, from localized allergic responses, such as fever and flu-like symptoms, to sudden death related to cytokine release (Lim, Koh, & Tan, 1999). According to the National Cancer Institute ([NCI], 2006), symptoms may overlap among allergic or hypersensitivity reactions (HSRs) that are mediated by mast cells and the immune system and cytokine-release syndrome.

Symptoms related to cytokine-release syndrome are common with monoclonal antibodies and develop soon after the initiation of the infusion, usually resolving within 24 hours. Signs and symptoms of cytokine-release syndrome include fever, arthralgias and myalgias, lethargy, headache, hyper or hypotension, nausea, pruritis, rash, rigors, chills, tachycardia, tumor pain, urticaria, and vomiting. Similarly, grades 1 and 2 allergic reactions may include transient flushing or rash,

fever to 100.4°F, urticaria, and dyspnea; grade 3 is symptomatic bronchospasm; and grade 4 is anaphylaxis with stridor, hypotension, nausea, and vomiting (NCI, 2006).

True HSRs rarely occur on the patient's first exposure to a drug, whether chemotherapy or biotherapy agent. A HSR is an immune reaction mediated by immunoglobulin E (IgE), an antibody that forms in response to initial exposure to the antigen (drug). IgE antibodies coat mast cells, which are inflammatory cells. When the patient is reexposed to the same drug, the IgE antibodies cause the mast cells to rupture, releasing histamine, prostaglandins, and leukotrienes, as well as cytokines, into the bloodstream and surrounding tissue. The presence of these substances can lead to histamine-induced vasodilation of arteries, resulting in hypotension with compensatory tachycardia, which can lead to cardiac ischemia, arrhythmias, or cardiac arrest; mucosal constriction of the bronchi, resulting in wheezing, stridor, bronchospasm, laryngeal edema, or even respiratory arrest; cutaneous effects, including flushing, urticaria, generalized pruritis, or angioedema; gastrointestinal effects, including nausea, vomiting, diarrhea, or cramping; and neurologic effects, including head-

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