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## Trastuzumab-Induced Cardiotoxicity

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**B**reast cancer is the most common cancer diagnosis for women in the United States, excluding skin cancer; it is the second leading cause of cancer death among women in the United States (American Cancer Society [ACS], 2009). In 2009, an estimated 192,370 new cases of invasive breast cancer will be diagnosed in women and about 40,610 men and women will succumb to the disease (ACS). Many treatment options are available, including surgery, radiation, and systemic therapies such as endocrine therapy, chemotherapy, and biologic treatments (National Cancer Institute [NCI], 2008). Tremendous progress has been made in the treatment of breast cancer, but not without cost in terms of short- and long-term toxicities, one of which is cardiotoxicity from anthracyclines, taxanes, radiation, hormonal therapy, tyrosine kinase-targeting drugs, and trastuzumab (Bird & Swain, 2008; Menna, Salvatorelli, & Minotti, 2008; Viale & Yamamoto, 2008).

Trastuzumab (Herceptin®, Genentech, Inc.) is a biologic treatment originally approved by the U.S. Food and Drug Administration (FDA) in 1998 for treatment of metastatic breast cancer (FDA, 2006). Clinical trials have demonstrated a disease-free and overall survival benefit for women receiving trastuzumab in an adjuvant setting, leading to FDA approval for that indication in 2006. One of the major risks of trastuzumab is cardiotoxicity, including left ventricular (LV) cardiac dysfunction, dysrhythmias, hypertension, cardiac failure, cardiomyopathy, and death (Genentech, Inc., 2009b). The clinical challenge is to treat women to prevent or delay recurrence while sparing them the cardiotoxic effects.

Adjuvant clinical trials of trastuzumab excluded women with a history of cardiac symptoms, abnormal electrocardiographs, abnormal radiologic films, or abnormal LV ejection fraction (LVEF), as well as uncon-

**Purpose/Objectives:** To review trastuzumab-related cardiotoxic effects in the breast cancer adjuvant setting, present a system for pretreatment screening for cardiovascular risk factors, describe monitoring recommendations, provide a tool to facilitate adherence to monitoring guidelines, and discuss implications for patient education.

**Data Sources:** Literature regarding cardiotoxicity and trastuzumab in breast cancer.

**Data Synthesis:** Trastuzumab was approved in 2006 for use in the adjuvant setting. A small percentage of women (~ 4%) developed heart failure during or after treatment. However, the trials excluded women with cardiac disease. Current screening for cardiotoxicity relies on sequential left ventricular function measurements with either echocardiography or multigated acquisition scanning at baseline and every three months. Treatment modifications are recommended if changes from baseline are detected. Long-term and late effects have yet to be determined.

**Conclusions:** Although a small number of women experienced cardiotoxicity in the adjuvant setting, an increase may be seen because women with preexisting heart disease receive this treatment. Guidelines and tools will be helpful for appropriate and consistent screening of cardiac risk factors and disease prior to initiation of trastuzumab and for monitoring during and after administration.

**Implications for Nursing:** Nurses are instrumental in assessing, monitoring, and treating women receiving trastuzumab. Implementing guidelines to promote adherence to recommended monitoring is important in the early detection of cardiotoxicity in this population. Educating women about their treatment and side effects is an important aspect of care.

trolled hypertension. The incidence of cardiotoxicity in such women if they are treated with trastuzumab is not known. Current recommendations for patient selection and cardiac monitoring are stated in the package insert (Genentech, Inc., 2009b) and were developed based on