Alisha Stein, RNC, BSN, OCN®

Patterns of breast cancer care continue to be amended because of the more frequent use of anthracyclines and taxanes in earlier lines of therapy (particularly in the adjuvant setting) and the emergence of multidrug resistance. When treating women with recurrent or metastatic breast cancer that is resistant to anthracyclines and taxanes, nurses have a unique opportunity to foster a sense of hope by helping patients understand available treatment options and what to expect during therapy. This article presents information on the use of an epothilone agent, ixabepilone (Ixempra®, Bristol-Myers Squibb), a new treatment option for metastatic breast cancer after anthracycline and taxane failure. The information will allow nurses and their patients to collaborate as a team to help prevent or effectively manage side effects. In addition, nurses can take a proactive approach in educating patients about treatment options to enhance their quality of life.

At a Glance

- More breast cancers are becoming resistant to taxanes and anthracyclines.
- Ixabepilone is a novel agent that has been approved to treat taxane- and anthracycline-resistant breast cancer.
- Awareness of indications for ixabepilone and associated treatment side effects can improve nursing interventions and significantly enhance patients’ quality of life.

Breast cancer is the most frequently diagnosed cancer among women in the United States, with almost 200,000 women diagnosed in 2009 (Surveillance Epidemiology and End Results, 2009). Early detection and treatment advances have contributed to a steady decline in mortality rates. Breast cancer management has evolved significantly during the past several decades with the use of less-invasive surgical techniques, the incorporation of new agents (e.g., anthracyclines, taxanes, aromatase inhibitors, trastuzumab) in the adjuvant setting, and the use of novel therapies (e.g., ixabepilone, lapatinib) in the advanced disease setting. Despite treatment advances in early-stage breast cancer, about 20%–30% of patients with node-negative disease and 50%–60% with node-positive disease will have recurrent disease (American Cancer Society, 2008). The five-year survival rate for patients with stage IV breast cancer remains at about 20%. An increased number of patients are expected to have pretreated metastatic breast cancer that has developed resistance to multiple agents, including anthracyclines and taxanes (Longley & Johnston, 2005).

Cytotoxic strategies approved by the U.S. Food and Drug Administration (FDA) for the management of metastatic breast cancer include anthracyclines, taxanes, capecitabine, gemcitabine, and ixabepilone. Trastuzumab and bevacizumab in combination with paclitaxel may be used for first-line treatment of HER2-positive and -negative invasive disease, respectively (National Comprehensive Cancer Network [NCCN], 2010). Ixabepilone, alone or in combination with capecitabine, is approved as a treatment for taxane- and anthracycline-resistant disease. Despite indications, the agents typically are used after most other options have failed.
This article provides nurses with a brief background about treatment resistance and current treatment options in recurrent or metastatic breast cancer. The article also provides detailed information on new treatment options for patients with breast cancer, focusing on the novel agent ixabepilone (Ixempra®, Bristol-Myers Squibb). Ixabepilone, an epothilone, has demonstrated efficacy against recurrent or metastatic breast cancer, particularly in the triple-negative (estrogen receptor-, progesterone receptor-, and HER2-negative) patient population (Thomas, Gomez, et al., 2007; Thomas, Tabernero, et al., 2007). As patterns of care evolve and more patients begin to receive treatment with agents such as ixabepilone, nurses will need to be acquainted with and prepared for treatment-related issues and know which interventions they can use to prevent or treat potential side effects. As such, nurses can provide women with new hope for treatment of recurrent breast cancer after taxane or anthracycline failure as well as play a direct role in helping to improve women’s quality of life.

History and Current Trends in Breast Cancer Therapy

Before the late 1970s, radical mastectomies were the standard of care for all patients with breast cancer. The evolution of breast cancer care offered women the option of breast conservation with lumpectomies plus radiation, and the advent of pharmacologic options, particularly CMF (cyclophosphamide, methotrexate, and 5-fluorouracil) and tamoxifen in the adjuvant setting, improved disease-free survival (Hortobagyi, 1998). The addition of anthracyclines to the arsenal in the late 1980s and taxanes in the early 1990s significantly improved prognosis for recurrent or metastatic breast cancer (Hortobagyi, 1998); anthracyclines and taxanes still are the therapeutic agents of choice for early-stage breast cancer and often metastatic treatment in the United States (Thomas, Tabernero, et al., 2007). However, changing adjuvant treatment patterns may alter patterns of drug resistance observed in patients with metastatic disease. The trend reflects the ongoing need for additional agents that are active in the metastatic setting.

Since 2000, a better understanding of breast cancer biology has given rise to effective new agents. Some are targeted agents, which are directed at specific proteins that are more prevalent in tumor cells. The specificity may make targeted agents more effective than traditional treatments and less harmful to healthy cells (Cleator, Heller, & Coombes, 2007; Longley & Johnston 2005; Thomas, Taberner, et al., 2007). The trend toward targeted agents began with the development of trastuzumab (Herceptin®, Genentech, Inc.), a monoclonal antibody approved for metastatic breast cancer in 1998 (“Monoclonal Antibody Approved for Metastatic Breast Cancer,” 1998). Trastuzumab is a treatment for women with breast cancer whose tumors overexpress HER2, which tend to grow and spread more quickly than tumors that are not HER2-positive (Genentech, Inc., 2010b). In HER2-positive metastatic breast cancer, trastuzumab is indicated in combination with paclitaxel for first-line treatment or as a single agent in patients who have received one or more chemotherapy regimens for metastatic breast cancer (Genentech, Inc., 2008; NCCN, 2010).

Trastuzumab commonly is used beyond progression for metastatic HER2-positive disease. Uncertainty exists among clinicians on whether or not to discontinue trastuzumab and introduce an alternative therapy, such as lapatinib (Love, 2008). Lapatinib is an inhibitor that targets epidermal growth factor receptor in addition to HER2 and is indicated in combination with capecitabine for the treatment of patients with advanced or metastatic breast cancer whose tumors overexpress HER2 and who have received prior therapy with trastuzumab, an anthracycline, and a taxane (GlaxoSmithKline, 2008).

Current studies have not determined whether bevacizumab antibody, which specifically targets vascular endothelial growth factor and inhibits angiogenesis, should continue beyond progression. Bevacizumab is indicated for the treatment of patients who have not received chemotherapy for metastatic HER2-negative breast cancer in combination with paclitaxel, as well as other solid tumor types (Genentech, Inc., 2010a).

Despite advancements in the treatment of breast cancer and declining mortality rates, metastatic breast cancer still is considered an incurable disease. Management approaches are palliative, with the ultimate goal being to achieve the greatest control of the disease with the least toxic effects (NCCN, 2010).

Capecitabine previously was the only agent with a third-line indication and is the standard treatment for patients in whom anthracyclines and taxanes have failed (Blum et al., 2001; Fumoleau et al., 2004; Reichardt et al., 2003). Capecitabine is widely prescribed because of its proven effectiveness in anthracycline- and taxane-pretreated patients with objective response rates of 20%-28% and because some patients prefer oral therapy (Blum et al., 2001; Fumoleau et al., 2004). Epothilones, a novel class of cytotoxic agents, have reduced susceptibility to the underlying resistance mechanisms associated with most chemotherapeutic agents. Nurses may be unfamiliar with associated treatment indications and side effects of novel compounds such as epothilones and, therefore, may not be familiar with associated treatment indications and side effects.

Epothilones: An Emerging Option in Breast Cancer Therapy

Epothilones are similar to taxanes in that they target and inhibit the function of microtubules, thus arresting breast cancer cells at the mitotic (G2/M) stage of cell division and causing apoptotic cell death (Goodin, Kane, & Rubin, 2004; Lee et al., 2001, 2009; Rowinsky & Calvo, 2006). However, epothilones are significantly different in structure from taxanes and are less susceptible to the most common mechanisms of drug resistance associated with taxanes and anthracyclines. For example, ixabepilone is able to interact with a wider range of tubulin isofoms and preferentially binds to the βIII tubulin isoform. As a result, ixabepilone is less likely to be affected by overexpression of the βIII tubulin isoform, which can make cancer cells resistant to taxanes (Lee et al., 2009). Epothilones also have a lower susceptibility to other types of resistance related to expression of multidrug-resistant proteins, such as P-glycoprotein. In particular, ixabepilone and sagopilone are not subject to resistance mediated by P-glycoprotein (Hoffmann et al., 2008; Lee et al., 2009). The epothilones have shown...
activity against a broad range of cancer cell types and tumor models, including breast cancer cells resistant to taxanes and anthracyclines (Goodin et al., 2004; Lee et al., 2009; Rivera, Lee, & Davies, 2008).

To date, no classwide toxicity pattern has emerged for epothilones. The most common side effects associated with some epothilones include nausea and vomiting, diarrhea, and fatigue; neurotoxicity, neutropenia, and arthralgia are commonly observed for other agents (Goodin et al., 2004; Rivera et al., 2008). Neutropenia and peripheral neuropathy were dose-limiting during ixabepilone dose-finding studies (Gianni, 2007), diarrhea was dose-limiting with patupilone (Rubin et al., 2005), and peripheral sensory neuropathy and ataxia are commonly dose-limiting with sagopilone (Schmid et al., 2005).

Several investigational drug candidates exist from the epothilone class of compounds. To date, patupilone (natural epothilone B) and sagopilone (a fully synthetic epothilone-B derivative) are undergoing clinical development. In preliminary clinical trials, patupilone and sagopilone have shown activity in patients with breast cancer (Rubin et al., 2005; Schmid et al., 2005), and patupilone has shown activity in patients with brain metastases in breast cancer (Conlin et al., 2008). Phase II data for sagopilone demonstrated limited activity in heavily pretreated patients (three or less prior anthracycline- or taxane-containing regimens) with recurrent metastatic breast cancer (Morrow et al., 2009). Additional results from phase II and III studies in patients with metastatic breast cancer are expected by 2012.

The investigational agent epofolate consists of an epothilone attached to a folate molecule for the purpose of delivering the epothilone to tumor cells through the folic acid receptor. Two phase I trials (NCT00546247 and NCT00550017) are evaluating the safety of epofolate in patients with several types of advanced cancers, including breast cancer (for more information, visit www.clinicaltrials.gov).

Ixabepilone is a derivative of naturally occurring epothilone B, modified to improve its pharmacokinetic profile and decrease toxicity. Ixabepilone has demonstrated consistent activity in chemotherapy-resistant breast cancer cell lines in animal studies, and it has proven tolerable and effective in treating anthracycline- and taxane-resistant breast cancer in phase II and III clinical trials (Cortes & Baselga, 2007; Lee et al., 2001). Data from two parallel phase III trials that investigated ixabepilone plus capecitabine versus single-agent capecitabine confirmed that the combination significantly improved overall response rates (43% versus 29% in the confirmatory trial and 42% versus 23% in the registration trial) and progression-free survival (6.2 months versus 4.4 months in the confirmatory trial and 5.3 months versus 3.8 months in the registration trial) (Hortobagyi et al., 2008; Thomas, Gomez, et al., 2007). As a result, the FDA approved ixabepilone for clinical use in October 2007. Specific indications for ixabepilone are presented in Figure 1.

**Efficacy and Safety Data for Ixabepilone**

Ixabepilone was effective and well tolerated in first and subsequent lines of therapy in patients with anthracycline- and taxane-resistant metastatic or recurrent breast cancer, offering an effective treatment alternative for this population (Denduluri et al., 2007; Low et al., 2005; Perez et al., 2007; Roché et al., 2007; Thomas, Gomez, et al., 2007; Thomas, Tabernero, et al., 2007). As with other microtubule-targeting agents, neutropenia and peripheral neuropathy are the most common side effects associated with ixabepilone treatment. Unlike taxanes and vinca alkaloids, neuropathy with ixabepilone was noted to be manageable and reversible. All side effects typically resolve after dose delay or reduction (Bristol-Myers Squibb, 2009).

**Combination Therapy: Ixabepilone Plus Capecitabine**

A subsequent clinical trial identified promising synergistic antitumor activity between ixabepilone and capecitabine when used to treat patients with metastatic breast cancer who had been treated previously with an anthracycline and a taxane (Bunnell, Klimovsky, & Thomas, 2006). The overall response rate to the doublet in this group of patients was 30% (Bunnell et al., 2006). Most reported side effects were mild; the few instances of serious (grade 3 or 4) events were managed effectively by dose reduction (Vahdat, Klimovsky, & Bunnell, 2006).

A pivotal phase III clinical trial examined the effectiveness of ixabepilone plus capecitabine versus capecitabine alone in 752 patients with metastatic breast cancer previously treated with or resistant to anthracyclines and taxanes. Treatment with ixabepilone plus capecitabine was superior to capecitabine alone as first-, second-, or third-line therapy and beyond for this group of patients, but the efficacy of the combination was greater when used as first-line therapy in metastatic disease. Again, side effects were manageable or reversible with dose reduction. Grades 3–4 adverse events included neuropathy (which generally resolved within six weeks), hand-foot syndrome, and fatigue (Thomas, Gomez, et al., 2007).

**Ixabepilone as Monotherapy**

Ixabepilone also can be effective as monotherapy for some patients with metastatic disease that is difficult to treat. In phase II clinical trials, ixabepilone demonstrated efficacy as second- or third-line monotherapy for patients with progressive metastatic breast cancer who had been treated unsuccessfully with a taxane within the prior four months (objective response rate = 12%; median time to progression = 2.2 months; median survival = 79 months) (Thomas, Tabernero, et al., 2007). In addition, ixabepilone monotherapy also proved to be effective and well tolerated as a second- or third-line therapy for metastatic breast cancer not previously treated with taxanes (objective response rate = 57%; median time to progression = 5.5 months) (Denduluri et al., 2007).
al., 2007). Most women in the trials tolerated ixabepilone well, with low rates of peripheral neuropathy and neutropenia and minimal nausea, vomiting, and diarrhea. The results are similar to those of published trials of docetaxel or paclitaxel as first- or second-line treatment for patients with metastatic breast cancer (Denduluri et al., 2007).

Ixabepilone monotherapy demonstrated efficacy as first-line therapy in a phase II trial in women with metastatic breast cancer who had been treated previously with anthracyclines (objective response rate = 41.5%; median survival = 22 months). Neuropathy was the most common adverse effect but usually was grade 1 or 2 intensity and manageable with dose reduction (Roché et al., 2007).

Another phase II trial demonstrated that ixabepilone monotherapy was effective and well tolerated by patients with advanced metastatic breast cancer that was resistant to taxanes, anthracyclines, and capecitabine (objective response rate = 11.5%; median progression-free survival = 3.1 months; median overall survival = 8.6 months) (Perez et al., 2007). Ixabepilone monotherapy is indicated in this setting. Although the patient group was pretreated heavily (88% had received at least two lines of therapy in the metastatic setting), grade 3 or 4 peripheral neuropathy resolved after a few weeks (median time to resolution = 5.4 weeks) (Perez et al., 2007).

Clinical trial results have established that ixabepilone is a promising treatment option for patients with recurrent or metastatic breast cancer that has not responded to established cytotoxic agents. Importantly, ixabepilone has proven effective for patients whose disease is estrogen receptor-negative, progesterone receptor-negative, and HER2-neu-negative. These triple-negative tumors only account for 10%–15% of all breast cancers, but they often are treatment-resistant and carry a poorer prognosis, leaving an urgent, unmet need for effective treatments for this patient population (Cleator et al., 2007). Data from several clinical studies illustrated that ixabepilone can offer an effective treatment approach for this challenging type of breast cancer (Perez et al., 2007; Thomas, Gomez, et al., 2007; Thomas, Tabernero, et al., 2007).

**Additional Safety Data on Ixabepilone**

Studies that specifically examined the safety of ixabepilone have found that side effects are predictable and manageable when ixabepilone is administered at the recommended dose and schedule of 40 mg/m² infused IV for three hours every three weeks (Bristol-Myers Squibb, 2009; Perez et al., 2007; Roché et al., 2007; Thomas, Gomez, et al., 2007). As in other studies noted previously, the most common clinically relevant adverse events associated with ixabepilone are peripheral neuropathy and hematologic toxicity, which typically resolve within weeks after dose reduction or delay (an average of six weeks for resolution to baseline for neuropathy). In one prospective study of 47 patients with metastatic breast cancer, baseline neurologic function scores (by several methods) were not predictive of developing grade 2 or higher peripheral neuropathy during ixabepilone therapy (Lee et al., 2006).

The safety of weekly ixabepilone dosing was explored in a phase I dose escalation trial (Awada et al., 2008). Some ixabepilone dosages were associated with lower rates of grade 3–4 neuropathy than others, although patients with baseline neuropathy higher than grade 1 were excluded from the trial. Another phase I trial reported no neuropathic adverse events higher than grade 2 in severity among patients receiving ixabepilone 6 mg/m² over five consecutive days (Abraham et al., 2003). Neutropenia was the dose-limiting toxicity in the study.

Of note, toxicities of ixabepilone do not seem to overlap with those of capecitabine. Treatment with ixabepilone does not increase the incidence of grade 3–4 hand-foot syndrome (18% for ixabepilone plus capecitabine versus 17% for capecitabine alone), and capecitabine does not seem to exacerbate the neuropathy associated with ixabepilone treatment (23% for ixabepilone plus capecitabine versus 0% for capecitabine alone) (Thomas, Gomez, et al., 2007).

**Managing Treatment Challenges in Patients Receiving Ixabepilone**

**Neuropathy**

Often underevaluated, peripheral neuropathy is a characteristic side effect of all microtubule-stabilizing agents (MTSAs), such as taxanes and epothilones (Armstrong, Almadrones, & Gilbert, 2005; Lee & Swain, 2006; Wickham, 2007). Ixabepilone may be associated with less peripheral neuropathy, which also may be reversible when ixabepilone is used as first-line therapy in taxane-naïve patients (Gianni, 2007). To date, treatments to resolve peripheral neuropathy associated with MTSAs are not well supported, and occurrences are unpredictable (Armstrong et al., 2005; Lee & Swain, 2006). However, peripheral neuropathy has proven reversible in ixabepilone within an acceptable time frame in clinical trials, with a median time to resolution of 15 days to six weeks (Lee et al., 2006; Thomas, Gomez, et al., 2007). Healthcare providers should be alert particularly to the development of cumulative peripheral neuropathy in patients who have been heavily pretreated with other MTSAs prior to ixabepilone therapy (Lee & Swain, 2006).

Patients with preexisting neuropathy are at an increased risk for developing severe peripheral neuropathy during cytotoxic chemotherapy; patients with comorbid conditions associated with neuropathy, diabetes, vitamin B₁₂ deficiencies, thyroid dysfunction, or certain immunosuppressive disorders (e.g., HIV) also are at increased risk (Armstrong et al., 2005; Wickham, 2007). Although peripheral neuropathy associated with ixabepilone was reversible in most patients in clinical trials, patients with diabetes mellitus appeared to be at higher risk for developing severe neuropathy; ixabepilone should be used with caution in diabetic patients or those with preexisting moderate to severe neuropathy (Bristol-Myers Squibb, 2009; Perez et al., 2008).

**Hematologic Toxicity**

Neutropenia is the hematologic toxicity most often associated with ixabepilone therapy (Roché et al., 2007). As with neuropathy, the potentially severe adverse event typically is manageable with the use of granulocyte colony-stimulating factors and dose reductions or delays. Clinical studies conducted to date have identified a relatively low incidence of febrile neutropenia and bone marrow suppression when ixabepilone is administered...
at the recommended dosage of 40 mg/m² (Denduluri et al., 2007; Perez et al., 2007; Roché et al., 2007; Thomas, Gomez, et al., 2007; Thomas, Tabernero, et al., 2007). However, patients with abnormal liver function tests (grade 2 severity or higher) are at a significantly increased risk for neutropenic events, particularly when ixabepilone is combined with capecitabine. As a result, patients with aspartate aminotransferase or alanine aminotransferase higher than 2.5 times upper limit of normal (ULN) or bilirubin higher than 1 ULN must not be treated with ixabepilone in combination with capecitabine (Bristol-Myers Squibb, 2009).

Hypersensitivity Reactions

The Cremophor® EL delivery vehicle (BASF Corp.) in the ixabepilone formulation poses a risk for hypersensitivity reactions. The incidence of severe hypersensitivity reactions (including anaphylaxis) is 1% when patients are premedicated as indicated in the prescribing instructions (Bristol-Myers Squibb, 2009). The interventions are summarized in Figure 2.

Supportive Care

Patients who experience adverse events during ixabepilone treatment can benefit from supportive care designed to minimize effects and maximize patient comfort (Markman, 2003; Marsé, Van Cutsem, Grothey, & Valverde, 2004). Nursing assessment of patients prior to treatment is vital; patients at increased risk for adverse events during ixabepilone treatment may require dose modifications (Bristol-Myers Squibb, 2009). Ixabepilone is contraindicated in patients with a low neutrophil count (less than 1,500 cells/mm³) or a low platelet count (less than 100,000 cells/mm³). Ixabepilone should be administered with caution in patients with a history of hypersensitivity reactions to drugs formulated with Cremophor EL; these patients should be premedicated with antihistamines, H₂-receptor antagonists, or corticosteroids (Bristol-Myers Squibb, 2009). Patients with preexisting peripheral neuropathy (grade 2 or higher) or coexisting medical illnesses associated with peripheral neuropathy (e.g., diabetes mellitus, substantial prior alcohol use) may be at increased risk for severe neuropathy during ixabepilone therapy (Bristol-Myers Squibb, 2009).

Ixabepilone is administered by IV infusion over three hours. Healthcare providers should plan ahead for administration. All bags, containers, and infusion kits must be free of diethylhexyl phthalate (DEHP). The drug kit must be refrigerated in its original packet to protect from light until 30 minutes before the infusion solution (Bristol-Myers Squibb, 2009; Roché et al., 2007). In contrast to clinical practice with taxanes, corticosteroid premedication is not required for ixabepilone unless the patient has experienced a hypersensitivity reaction to a previous administration. Patients should be advised to tell their nurse or physician if they experience urticaria, pruritus, rash, flushing, swelling, dyspnea, chest tightness, or other hypersensitivity-related symptoms after treatment.

Neuropathic Symptoms

- Nurses, patients, and family members should be vigilant to the onset of neuropathic symptoms associated with ixabepilone therapy.
- Sensory neuropathy presents as paresthesias, numbness, and pain in the feet and hands (Lee & Swain, 2006), with symptoms typically appearing first in the toes, then in the fingers.
- Paresthesias occur in distal lower extremities with a glove-and-stocking distribution and are most severe on plantar surfaces (Lee & Swain, 2006). The severity of most symptoms is mild to moderate, and symptoms generally disappear once therapy has ended (Lee & Swain, 2006).
- Motor neuropathy usually is mild and presents as muscle weakness, such as foot drop or difficulty in climbing stairs (Rowinsky et al., 1993). Fine motor skills (e.g., buttoning a shirt, putting on earrings) may be diminished (Lee & Swain, 2006).

Hematologic Toxicity

- Appropriate interventions include dose reduction or delay. Treatment should not be restarted until neuropathy has returned to baseline or grade 1 severity or less. Ixabepilone then may be resumed at a reduced dose. Gabapentin has been shown to provide relief for symptoms such as tingling or neuropathic pain in some patients (Lee & Swain, 2006).
- Early detection of peripheral neuropathy is critical during ixabepilone-based chemotherapy to prevent progression to grade 3–4 neuropathy. Healthcare providers should identify and record the onset, distribution, and severity of neuropathic symptoms and the patient’s response to treatment.

Hypersensitivity Reactions

- Premedication with antihistamines, such as an H₁ antagonist (e.g., diphenhydramine 50 mg orally) and an H₂ antagonist (e.g., ranitidine 150–300 mg orally), reduces the risk of hypersensitivity reactions to Cremophor® EL (BASF Corp.), which acts as a delivery vehicle in the ixabepilone IV solution (Bristol-Myers Squibb, 2009; Roché et al., 2007).

Additional Supportive Measures

- Analgesics for myalgia and arthralgia
- Anesthetic mouthwashes for mucositis or stomatitis
- Antiemetics for nausea and vomiting
- Emollients for hand-foot syndrome (associated with capecitabine in the combination therapy)
- Antibiotics and fluid replacement for diarrhea; prophylactic anti-

Neutropenic Effects and Maximize Patient Comfort (Markman, 2003; Marsé, Van Cutsem, Grothey, & Valverde, 2004). Nursing assessment of patients prior to treatment is vital; patients at increased risk for adverse events during ixabepilone treatment may require dose modifications (Bristol-Myers Squibb, 2009). Ixabepilone is contraindicated in patients with a low neutrophil count (less than 1,500 cells/mm³) or a low platelet count (less than 100,000 cells/mm³). Ixabepilone should be administered with caution in patients with a history of hypersensitivity reactions to drugs formulated with Cremophor EL; these patients should be premedicated with antihistamines, H₂-receptor antagonists, or corticosteroids (Bristol-Myers Squibb, 2009). Patients with preexisting peripheral neuropathy (grade 2 or higher) or coexisting medical illnesses associated with peripheral neuropathy (e.g., diabetes mellitus, substantial prior alcohol use) may be at increased risk for severe neuropathy during ixabepilone therapy (Bristol-Myers Squibb, 2009).

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To date, the recommended dosage of ixabepilone is 40 mg/m² every three weeks. Doses for patients with a body surface area

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Figure 2. Nursing Interventions That May Prevent or Minimize Adverse Effects of Ixabepilone Therapy

Clinical Journal of Oncology Nursing • Volume 14, Number 1 • Ixabepilone for Women With Breast Cancer
greater than 2.2 m² should be calculated based on 2.2 m². The
infusion solution must be administered through an appropriate
in-line filter with a microporous membrane of 0.2–1.2 microns.
DEHP-free infusion containers and administration sets must be
used (Bristol-Myers Squibb, 2009).

Conclusions

Use of anthracycline and taxane therapy in the adjuvant setting
has contributed to the emergence of multidrug resistance
to these agents if disease recurs. Women who present with
recurrent or metastatic breast cancer may be unresponsive
to taxanes or anthracyclines. Nurses are tasked with helping
women manage their treatment as well as encouraging them
by providing clinical information and guidance regarding their
treatment options. To help bridge the gap between emerging
data, clinical practice, and patient education, nurses must be
familiar with novel cancer therapies such as biologic agents
and epothilones that offer alternatives to traditional treatment
agents.

Among the novel agents, ixabepilone has proven effective
in clinical trials, with predictable adverse effects that are manageable
with dose reduction or delay. Ixabepilone received FDA
approval for treatment of patients with recurrent and metastatic
disease in October 2007 and offers another treatment option for
patients in these populations. The interventions described in
this article may aid nurses in optimizing treatment with ixabepi-
lone and other emerging therapies by anticipating and prevent-
ning or minimizing adverse events. This proactive approach to
care can help patients complete their treatments with minimal
side effects and enhance their quality of life.

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Author Contact: Alisha Stein, RNC, BSN, OCN®, can be reached at
alistein09@yahoo.com, with copy to editor at CJONEditor@ons.org.

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