**Use of Hair Dyes Following Chemotherapy**

*Georgia M. Decker, MS, RN, CS-ANP, AOCN®*

**Question:** Why are patients advised to avoid hair color products during hair regrowth after chemotherapy-induced alopecia? Does hair dye use or exposure to these dyes increase the risk of developing cancer?

**Answer:** Hair provides no vital function but does protect the surface of the skin, conserves body heat, and contributes to self-image. Hair is associated with femininity (e.g., long hair) and masculinity (e.g., facial hair) and, for many, closely associated with sexuality (DeVillez, 2003; Ehmahn, Sheehan, & Decker, 1991). Although not considered life threatening, chemotherapy-induced hair loss can emotionally devastate a patient who has endured life-threatening side effects associated with cancer therapy.

The American Cancer Society (ACS) and others provide information about techniques to assist with cancer therapy-related hair loss. These techniques include choosing a wig, hairpiece, or toupee before the onset of treatment to match hair color, texture, and style, and treating the hair and scalp gently before hair loss and continuing throughout hair regrowth. This includes use of a mild shampoo, soft hairbrushes, satin pillowcases, low settings on hair dryers, and scarves and hats to protect the scalp from the sun and prevent loss of body heat in cold weather, as well as avoiding brush rollers, permanents, and hair dyes (ACS, 2003a).

An estimated 20%–40% of people in the United States regularly dye hair color products (Sinnott, 1998). Although no research findings suggest that use of hair dye during hair regrowth following chemotherapy is harmful, most healthcare providers recommend that patients do not use hair dyes until hair returns to “normal,” a process that may take up to six months (ACS, 2003b). Some professional hair colorists assert that the new hair growth is “virgin” hair and, therefore, fragile and more vulnerable to the effects of hair dyes, especially those containing harsh chemicals such as peroxide.

**Effects of Dyes**

An average scalp contains approximately 100,000 hairs. Hair is constantly growing, shedding, and replacing itself, making it a target of chemotherapy. Hair grows from primary follicles that are not vascularized in the early stages of development. The follicles enlarge and sprout hair, and capillary networks develop. Actively growing scalp hair follicles extend to the entire epidermis and dermis as well as subcutaneous adipose tissue. Scalp follicles and hair undergo many cycles of regrowth, beginning in the neonatal period and continuing throughout adolescence (DeVillez, 2003).

Steinman and Epstein (1995) assert that chemical hair dyes are absorbed easily into the body via the scalp, which is comprised of highly vascular tissue. Animal and human studies have shown that the body rapidly absorbs chemicals from permanent and semipermanent dyes. The rinses that are used to remove the hair dyes increase this absorption (Epstein & Steinman, 1997). On the other hand, mild bleaching agents, nonpermanent vegetable dyes, and henna have not been associated with concerns about systemic absorption (Steinman & Epstein).

Some studies have found that small amounts of the chemicals in hair dyes are absorbed from the scalp or skin and travel to internal organs, such as the bladder (Epstein & Steinman, 1997; U.S. Food & Drug Administration, 2003). Concerns about absorption for people having their hair dyed, as well as for people who dye hair (e.g., hair salon workers), have been expressed since 1975 (Shafer & Shafer, 1975). Although hair color product formulations are being updated continually, the basic chemicals that comprise hair dyes have not changed since their inception.

Hair product manufacturers prepare Manufacturers’ Safety Data Sheets (MSDSs) in accordance with the requirements of the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard. These sheets contain information about hazardous ingredients (1% concentration or greater, 0.1% for carcinogens), effects of acute and chronic exposure, and safe handling and use. For instance, the MSDS for a semipermanent hair dye remover stated that it contains lauramide and cocamide diethanolamines (DEAs). DEAs are classified by OSHA as a carcinogen. The MSDS for this dye remover cited National Toxicology Program research that found an increased incidence of kidney and/or liver tumors in mice dermally exposed to DEAs for their lifetime. The MSDS also noted that the significance of these findings and their potential relevance to humans are not clear (Clairol Professional, 2003).

Dark brown and black hair dyes contain a higher number of chemicals than lighter dye colors, and one chemical contained in many dark dyes, phenylenediamine, is known to be extremely irritating. Steinman and Epstein (1995) consider permanent hair dyes containing phenylenediamine to be carcinogenic and assert that temporary hair dyes that contain Acid Orange 87, Solvent Brown 44, Acid Blue 168, or Acid Violet 73 should be viewed as potentially carcinogenic.

In 1994, considerable media attention was given to the findings of a study conducted by ACS and reported in the *Journal of the National Cancer Institute*. In this study, hair dye use and cancer development among 573,369 women were analyzed over a seven-year period. Women who used black hair dyes for 20 years or longer had a statistically significant increased risk of developing non-Hodgkin’s lymphoma and multiple myeloma (Thun et al., 1994). This study, and others, raised concern about the type of hair dye (permanent versus temporary) and color (dark-colored dyes versus light) and the development of various types of cancers.

**Risk for Bladder Cancer**

A study conducted in Los Angeles, CA, comparing 897 patients with bladder cancer who used hair dye with a similar number of healthy adults (matched controls) found that the women who used permanent hair dye at least once a month were twice as likely to develop bladder cancer than women who did not use hair dye. People who worked for 10 or more years as hairdressers or barbers were five times more likely to have bladder cancer compared to people who are not occupationally exposed to hair dyes (Gago-Domínguez, Castelao, Yuan, Yu, & Ross, 2001).

**Georgia M. Decker, MS, RN, CS-ANP, AOCN®**

is a nurse practitioner and certified nutritionist at Integrative Care in Albany, NY.

**Key Words:** hair, hair dye
Risk for Hematologic Cancers

Correa, Mohan, Jackson, Perry, and Helzlsouer (2000) reviewed the literature published from 1966–1996 that examined the role of hair dyes in the development of leukemia, myelodysplastic syndromes, and multiple myeloma. The researchers located 13 epidemiologic studies and analyzed study designs and populations, use of comparison groups, personal exposure to hair dyes and methods of data collection, and other variables. Overall, the correlation between hair dye use or exposure and development of hematologic malignancies was weak, despite several studies that reported a positive connection.

For instance, Sandler, Shore, Bloomfield, and Group B Investigators (1993) compared hair dye use among 615 patients with leukemia and 630 people who did not have a diagnosis of leukemia. They determined that people who used hair dye had a 50% increased risk of leukemia compared with people who had never used any hair dye products. The highest risk was identified as occurring with those who used semipermanent (40% increased risk) and permanent (60% increased risk) hair color. Temporary color was associated with a 20% increase in risk for leukemia, whereas those who had used any hair dye for more than 16 years were 2.5 times more likely to develop leukemia than those who had never used hair color.

In 1992, a population-based case control study in Iowa of 173 Caucasian men with multiple myeloma and 650 controls obtained information on hair dye use. The risk of multiple myeloma was elevated significantly among hair dye users and greatest for men who used hair dyes at least once a month for a year or longer (Brown, Everett, Burmeister, & Blair, 1992).

The National Cancer Institute conducted a study of risk for non-Hodgkin’s lymphoma associated with hair color use. The researchers noted a 50% increase in risk for developing non-Hodgkin’s lymphoma and an 80% increased risk for developing multiple myeloma in women who used hair color compared to women who did not use hair color. The risk was more significant with use of permanent hair color than for semi- or nonpermanent hair color. The increased risk associated with permanent hair color was 70%, compared to 40% in women who used semipermanent or temporary hair color products (Zahn et al., 1992).

This study also considered other risks for cancer, including family history, cigarette smoking, and pesticide exposure, but found that these risk factors did not alter the calculated risks. Conversely, in a study conducted more recently at the University of California, San Francisco, Holly, Lele, and Bracci (1998) determined that no increased risk existed for non-Hodgkin’s lymphoma associated with the use of hair dye in a population-based case control study of 4,108 people.

Risk for Breast Cancer

In a case-controlled study, use of hair dye among 1,617 women with primary breast cancer was compared to hair dye use by 1,617 healthy women. No association was observed among breast cancer development and ever using hair dyes, age when dye use started, duration of hair dye use, and types of dye used (Nasca, Baptiste, Field, Metzger, & DeMartino, 1992). Hair dye use also was not found to increase the risk for breast cancer in another study; however, in this study, women who worked for five years or longer in hair salons were three times more likely to develop breast cancer than those who had not been exposed to hair dyes occupationally (Koenig, Pasternak, Shore, & Strax, 1991).

In a more recent study of 960 women with breast cancer aged 45 or younger and 960 matched controls, no association between hair dye use and breast cancer risk was found (Cook, Malone, Daling, Voigt, & Weiss, 1999). A case control study of 608 women with breast cancer and 690 controls that examined several variables found no increased risk of breast cancer associated with the use of hair dye, type of dye used, age at first use, duration of use, total number of applications, and years since first use. No relationship between use of dark versus light dye shades was noted (Zheng et al., 2002).

Conclusion

In clinical practice, patients may ask whether dyeing their regrowing hair is safe and generally can be advised to refrain from coloring their hair with permanent hair dye until significant regrowth has occurred. If they are coloring their hair themselves, instruct them to follow hair dye packaging instructions closely, including dyeing a test strip (called a strand test) or small area before coloring the whole head, because newly regrown hair differs in texture and dye absorption ability than hair that has been growing for years. If patients are having their hair dyed in a salon, they need to inform their hairdresser that they received chemotherapy and experienced alopecia. Hairdressers will then take this information into consideration when selecting a hair dye and determining the amount of time that is needed to color the newly regrown hair. Henna and vegetable dyes are considered safe to use on hair of any length that is regrowing following chemotherapy-induced loss.

Although some study findings suggest a link between exposure to hair dye and the development of bladder cancer, leukemia, and multiple myeloma, researchers have not found any conclusive association between hair dye use and the development of breast cancer. Individuals concerned about cancer risk related to exposure to hair dyes (e.g., hair salon workers) can be advised to reduce the risk of skin contact by wearing protective gloves and clothing; placing containers of hair dye in places where they are not easily knocked over, spilled, or dropped; and promptly washing hands or skin after inadvertent contact with hair dyes. People who are concerned about the risk of developing cancer from using hair dyes to color their hair can be advised to use vegetable or henna dyes, use dyes for a shorter duration of time, use lighter shades of dye, and avoid skin contact while applying dye by wearing gloves and protective clothing. They also should be advised to reduce their risk of cancer by modifying other lifestyle factors that are known to influence cancer risk, such as diet, exercise, and smoking.

Author Contact: Georgia M. Decker, MS, RN, CS-ANP, AOCN®, can be reached at jorja@att.net.

References


Rita Wickham, PhD, RN, AOCN®, CHPN, is a clinical nurse specialist in the section of palliative care and associate professor in the College of Nursing at Rush University Medical Center in Chicago, IL. (Mention of specific products and opinions related to those products do not indicate or imply endorsement by the Clinical Journal of Oncology Nursing or the Oncology Nursing Society.)

Key Words: nausea, vomiting

Management of Intractable Nausea and Vomiting

Rita Wickham, PhD, RN, AOCN®, CHPN

**Question:** I have had a few patients recently who have experienced intractable nausea and vomiting (NV). What strategies can I use with these patients?

**Answer:** The challenge of alleviating nausea, with or without vomiting, is analogous to managing pain. That is, nausea and pain can have different causes that affect pathogenesis and thus require different management approaches. Individuals who have progressive cancer are at greater risk for nausea than vomiting, but both symptoms have negative effects on quality of life. Little research has focused on managing NV from causes other than chemotherapy. This, unfortunately, may lead to the use of inappropriate antiemetics or doses of antiemetics. Continued administration of ineffective antiemetics may result in considering that patients have “intractable” (difficult or seemingly impossible to relieve) nausea and/or vomiting. A logical, stepwise management approach may clarify whether patients are experiencing these difficult problems.

**Step 1: Determine Likely Causes of Nausea and Vomiting**

The problems of NV often are complex and multifactorial, particularly in patients with progressive cancer. Thus, nurses must perform a thorough patient assessment to identify probable iatrogenic (related to medical treatment) and disease-related causes, as well as secondary factors (Feyer, 1998, 2003). Emetogenic chemotherapy-induced NV (CINV) is usually a correctly identified iatrogenic cause. But some clinicians do not know that radiation therapy, especially to the chest, abdomen, or pelvis and, less frequently, whole-brain irradiation, can cause radiation therapy NV (RTNV) (see Figure 1) that may lead to the premature stopping of treatment (Feyer, Stewart, & Titlbach, 1998). Postoperative NV (PONV) can occur secondary to anesthesia, and patients undergoing eyes, nose, and throat; breast; or gynecologic surgeries or craniotomy or laparotomy are at greater risk for PONV than patients undergoing other surgeries. In addition, medications such as digoxin, opioids, nonsteroidal anti-inflammatory drugs (NSAIDs), and antibiotics sometimes cause nausea.

Cancer and other illness-related causes of nausea include metabolic abnormalities (e.g., uremia, hypercalcemia, hepatic dysfunction), increased intracranial pressure, and gastrointestinal (GI) system problems related to obstruction or to other problems (e.g., ascites, hepatomegaly, paraneoplastic gastroparesis, gastric outlet syndrome). Patients who have brain or base-of-skull tumors or Meniére’s syndrome may become nauseated when they move their heads and may require different antiemetics. Secondary risk factors, such as female gender, NV with previous therapies, and anxiety (particularly when associated with emotional and physical cues that increased NV in the past), may complicate management.

A thorough patient history will elicit the onset and severity of NV and the aggravating factors (the events or activities that precipitate nausea or vomiting), as well as the impact of both symptoms on important aspects of patients’ lives. Additional information to elicit includes whether patients are experiencing any changes in mental status or have a persistent cough that leads to vomiting; nurses also should perform physical assessments of the mouth (for fungal or other infection), abdomen, and pelvis (Davis & Walsh, 2000). Nurses should review patients’ medications (prescription and over the counter) with them to identify drugs that might directly or indirectly cause NV. For example, opioids can directly cause NV, but opioids and other medications that have anticholinergic effects may compound constipation, indirectly leading to obstipation and nausea.

Serum hepatic and renal function tests, calcium, and sodium are laboratory values that may provide clues about the etiology of NV. Other, more specific tests, such as a serum digoxin level, may identify toxic levels in...
patients who are taking digoxin and explain new nausea. Unnecessary medication that might be exacerbating NV should be discontinued or the dose reduced to alleviate toxic levels (e.g., an NSAID exacerbating nausea could be discontinued, the digoxin dose might be decreased or administration changed to every other day). During this time, nurses can explore nondrug measures for NV that patients have tried previously and determine whether they would be willing to try other measures in addition to antiemetics.

Step 2: Select Antiemetics Based on Probable Effectiveness and Side-Effect Profile

Serotonin receptor antagonists (5HT₃-RAs) (ondansetron, granisetron, and dolasetron) (see Table 1), particularly when given with dexamethasone, clearly enhance control of acute CINV from moderately to highly emetogenic chemotherapy (Koeller et al., 2002) (see Figure 2). Palonosetron, the newest 5HT₃-RA available in the United States, has a long half-life (about 40 hours) and high binding affinity for 5HT receptors. The indications for palonosetron are to prevent acute and delayed NV resulting from moderately to highly emetogenic chemotherapy.

Patients receiving radiation therapy to the chest or abdomen are at highest risk for RTNV and should receive a single dose of scopolamine or diphenhydramine was added to the antiemetic regimen. Lorazepam and diazepam are much less expensive and act on 5HT₂ and other receptors. These medications not only may ameliorate intractable NV but also decrease pain (with reduced opioid requirement), insomnia, and anxiety and improve appetite (Khojainova, Santiago-Palma, Kornick, Breitbart, & Gonzales, 2002; Srivastava, Brito-Dellan, Davis, Leach, & Lagman, 2003; Theobald, Kirsh, Holtsclaw, Donaghy, & Passik, 2002).

Aprepitant, another new antiemetic, has a completely different mechanism of action than other currently available antiemetics. Aprepitant is a neurokinin 1 receptor antagonist that is indicated solely for the prevention of acute and delayed CINV from highly emetogenic chemotherapy. Aprepitant should be used in combination with a 5HT₃-RA and dexamethasone.

When high-dose metoclopramide was the “best” antiemetic available, either lorazepam or diphenhydramine was added to the antiemetic regimen. These drugs were thought to have minor antiemetic activity and were used mainly to counter extrapyramidal symptoms (EPS) and to induce sedation and amnesia after emetogenic chemotherapy. Lorazepam does not decrease emesis but may decrease nausea, anticipatory NV, and anxiety that may exacerbate anticipatory NV (Ahn et al., 1994; Kris, Gralla, Tyson, & Groschen, 1987). Thus, lorazepam alone is not an adequate antiemetic, and, if it is given to decrease nausea, nurses first should help patients weigh the benefits and burdens of sedation.

First-line antiemetics for medication-related NV include prochlorperazine, haloperidol, or metoclopramide, which act on dopamine 2 (D₂) receptors. These antiemetic
ics also are useful for NV associated with cancer-related or other metabolic abnormalities. Patients with hypercalcemia often have constipation secondary to diuresis and slowed GI motility and may require disimpaction followed by a suppository or enema as the first step to manage nausea.

Pathophysiologic processes accompanied by inflammation, such as increased intracranial pressure, hepatomegaly, and bowel obstruction, can cause nausea. Terminally ill patients—who are not at risk for long-term corticosteroid complications—often benefit from dexamethasone, which may decrease nausea and pain and enhance general well-being and appetite. Dexamethasone has a long half-life and can be administered once or twice a day. The drug has no standard doses, but 8–16 mg per day is reasonable for NV related to progressive disease (Kaye, 1989).

When a GI problem is the cause of NV, nurses must determine whether patients have a complete small bowel obstruction (SBO) or another problem (e.g., ileus, obstruction, gastroparesis, hepatomegaly, partial SBO) before starting antiemetics. If SBO is highly suspected or confirmed, management centers on bowel rest and administration of prochlorperazine, promethazine, or haloperidol. Metoclopramide is contraindicated in complete SBO because it increases GI motility and can exacerbate NV and crampy abdominal pain. Helpful measures include giving a medication to decrease bowel secretions, such as hyoscymamine, transdermal scopolamine, or octreotide, if NV are severe and nonresponsive to other measures. In addition, IV fluids should be limited to a volume that will maintain adequate fluid volume status (1,000–1,500 ml per 24 hours). Larger volumes may increase bowel secretions and cause crampy pain and NV. A nasogastric tube initially may provide some relief from NV, but it is only a short-term measure for patients with SBO.

If patients have an incomplete or intermittent bowel obstruction or other nonobstructive problem, metoclopramide is a useful and inexpensive drug to use. In addition to the effects it has on D2 receptors, metoclopramide is also a prokinetic agent. That is, it enhances gastric emptying and hastens small bowel transit. Patients may have markedly decreased NV with small doses (10 mg every six hours), and doses can be escalated stepwise until NV are improved if patients do not have distressing side effects from the antiemetic. In addition, metoclopramide can be administered by continuous subcutaneous or IV infusions to patients at the end of life. The antiemetics used for NV from SBO, such as prochlorperazine and haloperidol, also may be used for NV from nonobstructive problems. Similarly, adding other agents (e.g., dexamethasone, olanzapine, octreotide) may maximize antiemetic control.

If nausea occurs with movement (e.g., from motion sickness or base-of-brain tumors), a histamine blocker or anticholinergic agent, such as promethazine, hydroxyzine, meclizine, or transdermal scopolamine, may be useful. If scopolamine is used, one or two patches should be applied to a high blood-flow site, such as the upper chest, and changed every 72 hours.

Step 3: Use Additional Nondrug Measures

Complementary measures, such as acupressure bands and dietary modifications, may enhance antiemetic control (Dibble, Chapman, Mack, & Shih, 2000). Acupressure bands are inexpensive and are applied to the medial, inner aspect of one or both wrists about two inches above the wrist creases. Bands should be placed snugly enough to apply pressure, but not so tight as to cause pain, tingling, or skin color changes in the distal hand, and can be kept on most of the time. Nurses can remind patients that eating small, frequent meals and decreasing fluid intake with meals are potentially helpful self-care strategies to reduce the risk of nausea. In addition, nurses can instruct them to not eat their favorite foods while they are nauseated, lest they develop aversions to these foods. Herbal remedies, including ginger or peppermint (tea, tablets, or other), also may alleviate nausea to some degree (Ernst & Pittler, 2000). Nurses also can explore measures that patients found helpful for NV with pregnancy or illness and remind them that frequent oral care increases comfort.

Step 4: Assess the Efficacy of Interventions

As with pain, the symptoms of NV are subjective, so nurses must ask patients to rate their antiemetic effectiveness on a frequent and regular basis. Efficacy considers how much relief of NV patients have achieved, as well as any unpleasant or distressing antiemetic side effects. Examples of distressing side effects include EPS (e.g., sedation, extrapyramidal symptoms), increase dose (e.g., metoclopramide 20 mg every six hours).

Add a second antiemetic (or other drug) if NV are not well controlled and side effects are likely to increase with a larger dose of the first antiemetic.

Reassess for other possible causes of NV if antiemetic control continues to be suboptimal. Assure patients that you and your colleagues will continue to aggressively try to control these (and other) symptoms.

Teach patients adjunctive nonpharmacologic measures whenever feasible and practical.

Author Contact: Rita Wickham, PhD, RN, AOCN®, CHPN, can be reached at rita_j_wickham@rush.edu.

References


Laser Therapy in the Management of Lung Cancer

Dana Inzeo, RN, MA, AOCN®, and Anne Haughney, RN, OCN®

Question: How is laser therapy used in the management of lung cancer?

Answer: Approximately 171,900 new cases of lung cancer were diagnosed in 2003. Most patients present with advanced disease, and the overall five-year relative survival for all stages of lung cancer is only 15% (American Cancer Society, 2003). Improved staging techniques and widespread adoption of a standardized staging system have allowed for tailoring of treatment to the extent of disease, which has produced the best results with minimal sequelae. Complete surgical resection frequently is possible in patients with early-stage disease, but recurrence rates are high. Multimodality treatment has improved survival and symptom control for patients with later-stage disease, but overall prognosis is poor. Laser therapy is a technique that can be used in patients in different clinical settings, including treatment of very early-stage tumors, as well as for symptom management in advanced disease. In addition, evidence suggests that laser therapy is helpful in screening for early lung cancers (Mathur, Edell, Sutedja, & Vergnon, 2003). Mantovani et al. (2000) found that overall quality of life of patients with advanced or unresectable lung cancer improved when laser therapy was used to palliate symptoms.

Laser is an acronym for light amplification by the stimulated emission of radiation. Currently, laser therapy has two main uses in the treatment of lung cancer. The carbon dioxide laser or the neodymium: yttrium-aluminum-garnet laser (Nd:YAG™, Laserscope®, San Jose, CA) is used to coagulate or vaporize tumors (Philipp, Rohde, & Berlien, 1995). The Nd:YAG laser is safe and effective for the treatment of airway obstructions with good tissue penetration and coagulation properties (DeLatorre, Mostovsky, Mutrie, Erdogan, & Mathisen, 2000). This laser is used most commonly for the treatment of endobronchial obstructions from tumors (Cavaliere, Foccoli, Toninelli, & Feijo, 1994). Reported complications include a 1%–14% post-laser incidence of hypoxia, hemorrhage, cardiac arrhythmia, myocardial infarction, and cardiac arrest (Hetzel, 1995; Thomas & Mathew, 2001). An approximate 1% mortality rate has been reported in the past (Cavaliere et al.). However, this number varies according to physician reports and techniques used. Diaz-Jimenez (1996) reported a lower mortality rate with the use of the rigid bronchoscope versus a fiber-optic bronchoscope. Precautions, such as using a lower voltage, have reduced complications and mortality from this procedure (Thomas & Mathew).

Photodynamic therapy (PDT) is the other main form of laser therapy. This technique involves the administration of a tumor photosensitizer, photofrin, followed by application of the laser that destroys the tumor via a photochemical reaction (Fisher, Muphree, & Gomez, 1995). PDT has been used more commonly in the curative treatment of early-stage lung tumors. Potential adverse effects from PDT include scarring, fibrosis, and perforation of the airway. In addition, the photofrin injection is widely absorbed by the skin, causing extreme photosensitivity for up to six weeks after the procedure (Dougherty, 2002).

For patients diagnosed with early-stage lung cancer, surgical removal of the lesion is the treatment of choice. However, if patients are not surgical candidates because of comorbidities such as chronic obstructive pulmonary disease or cardiac disease, bronchoscopic laser therapy offers an alternative and potentially curative option. PDT has been shown to be an effective treatment for centrally located superficial tumors with distinct margins and no invasion of the bronchial wall (Vonk-Noordegraaf, Postmus, & Sutedja, 2003). PDT is the most widely studied laser method for the treatment of early-stage lung cancer, although more research is being done comparing PDT to treatment with the Nd:YAG laser (Mathur et al., 2003). To date, the Nd:YAG laser has been found to be more effective for palliation of obstructive tumors rather than curative treatment (Mathur et al.). Collecting data on these treatments is difficult because of the scarcity of lung tumors that are diagnosed at an early stage. Accurate staging is the strongest indicator for a positive outcome from laser therapy (Van Boxem, Westerga, Vennmans, Postmus, & Sutedja, 2001).

A study that compared brachytherapy to PDT in the treatment of early-stage lung cancer found that cure rates of both treatments were comparable; however, brachytherapy was more costly (Mathur et al., 2003). Although electrocautery and cryotherapy are widely available and less expensive than brachytherapy and PDT, insufficient evidence supports their success in the treatment of early-stage lung cancer (Mathur et al.). Airway obstruction from tumor invasion of the trachea or main stem bronchi is seen commonly in patients with advanced lung cancer. This obstruction causes severe symptoms, including cough, wheeze, stridor, dyspnea, and dysphagia. Immediate palliative relief with minimal invasion and risk often is necessary not only for quality of life but also for survival in patients with advanced lung cancer. The Nd:YAG laser and PDT have provided a means of opening the bronchi quickly and safely (Morris, Budde, Godette, Kerwin, & Miller, 2002). Approximately 70%–75% of patients with partial tracheal obstruction achieve relief from hemoptysis and dyspnea, and approximately 50% of patients with partial obstruction obtain symptom relief from the use of endoscopic laser therapy (Hetzel, 1995). The major limitation to this treatment is regrowth of the tumor within a two- to three-month period post-treatment (Cavaliere, Ettorre, Mostovych, Mutrie, Erdogan, & Mathisen, 2000).
et al., 1994). Endobronchial lasers also are being investigated for their potential as a diagnostic tool for detecting early malignancies. Studies using the light-induced fluorescence endoscopy system (LIFE™) developed by Xillix Corporation® (Richmond, Canada) have been conducted (Lam et al., 1998). The system consists of a bronchoscope that emits a blue light with a specially designed camera attached. This blue light, or fluorescence, reflects differently on normal versus dysplastic tissue. The camera takes a picture that displays the contrast between these two types of tissue, providing a photograph of possible malignancy. Although a bronchoscopic procedure is not appropriate as a general screening tool, eventually it may prove to be useful for following high-risk patients (Dougherty, 2002; Mantovani et al., 2000).

With the availability of this technology, the development of new strategies for lung cancer management is possible. Laser therapy can provide more sensitive detection and localization of lung cancer cells, resulting in early diagnosis, nonsurgical curative treatment, and chemopreventive treatments that can be administered in an outpatient setting (Lam et al., 1998). Laser therapy has the potential to positively impact life expectancy and overall quality of life for patients with lung cancer.

Author Contact: Dana Inzeo, RN, MA, AOCN®, can be reached at inzeod@mskcc.org.

References


