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**Professor, Cardiac & Thoracic Surgery**

### The Role of the Surgeon in Diagnosing and Treating Lung Cancer

Since the first successful resections were performed for lung cancer 75 years ago, substantial progress has been made in the surgical management of lung cancer. As a result, despite numerous advances in our understanding of the pathobiology of this disease and the resultant development of therapies, surgery remains one of the mainstays of curative therapy for lung cancer.

Techniques such as flexible fiberoptic bronchoscopy and sputum cytology remain the basic tools for lung cancer diagnosis. Advances in radiology have led to the introduction of low dose helical computed tomography for screening for lung cancer, which is effective in identifying small lung nodules not evident on plain chest radiographs. Such nodules are not amenable to bronchoscopic biopsy, percutaneous aspiration for cytology, or further characterization by PET scanning. As a result, the identification of a small peripheral nodule often requires the input of surgeons for diagnostic assistance. Thoracoscopic biopsy techniques, sometimes directed by fluoroscopic identification of radiopaque markers placed under CT guidance, offer the ability to diagnose and treat some such early stage cancers. The benefit and cost-effectiveness of this technique are currently under investigation.

An additional new screening measure that is being introduced in some medical centers is LIFE (light-induced fluorescence endoscopy) bronchoscopy. This technique relies on excitation of natural autofluorescence in precancerous or cancerous tissues by specific wavelengths of light. It permits detection of carcinoma-in-situ or early stage cancers in patients who at high risk for new cancer development after successful treatment of early stage lung cancer.

Minimally invasive techniques are being used with increasing frequency for lung cancer diagnosis and staging. The recent introduction of endoscopic ultrasonography for biopsying mediastinal lymph nodes complements the use of trans-bronchial biopsy and thoracoscopy. Mediastinoscopy continues to be a mainstay of mediastinal staging for lung cancer owing to its ability to assess mediastinal tumor invasion as well as reliably stage individual lymph node stations.

Surgery continues to be the best initial treatment for early stage (I, II) non-small cell lung cancers (NSCLC). Standard therapy is lobectomy, with lesser resections (wedge resection, segmentectomy) reserved for patients with limited pulmonary reserve or co-morbid factors that increase the risk of major lung resection. Pneumonectomy is avoided whenever possible owing to the increased risk of the operation and its long-term detrimental effects on quality of life and possibly on survival. Minimally invasive techniques are being investigated for their role in resection of early stage lung cancer; no definite benefit has yet been established. Recent information suggests that all resected NSCLC patients except those in the earliest disease stage (Ia) benefit from postoperative adjuvant therapy. These findings have important implications for ongoing studies of neoadjuvant chemotherapy for such patients.

The role of resection for patients with more advanced stages of disease is controversial. Recent information suggests that patients who have microscopic single mediastinal nodal station involvement do well after initial resection. However, the accurate identification of this subset of patients prior to resection is problematic. Patients with known ipsilateral mediastinal nodal involvement undergo neoadjuvant chemotherapy and possibly radiation therapy; patients who do not experience tumor progression are recommended to undergo resection.

Patients with NSCLC associated with contralateral mediastinal adenopathy, malignant pleural effusion, or distant metastases generally are not candidates for surgical intervention except to palliate symptoms related to their disease. This is particularly true for symptoms of dyspnea related to airway obstruction or pleural effusion. The exception to this guideline is the presence of oligometastatic disease, especially an isolated brain metastasis, in the presence of otherwise early stage disease. In such rare instances formal lung resection may be considered if the metastatic disease is eradicated.



## PHILIP C. HOFFMAN, M.D.

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### The Role of the Medical Oncologist in the Treatment of Lung Cancer

The treatment of lung cancer is a multidisciplinary effort, involving thoracic surgery, radiation oncology and medical oncology in formulating a treatment plan for each patient. Although the medical oncologist consults on many different aspects of lung cancer treatment, the major treatment modality used is chemotherapy, which is playing an increasingly significant role in lung cancer management. Newer chemotherapy drugs that have activity in lung cancer include paclitaxel, docetaxel, gemcitabine, vinorelbine and irinotecan. In general, they are more active against the cancer than older drugs, and are also generally better tolerated in terms of short-term side effects.

Patients with small cell lung cancer, who represent about 20% of all patients with lung cancer, are routinely treated with combination chemotherapy. Chemotherapy has been the mainstay of treatment for small cell cancer for 30 years. Tumor response rates are very high, including frequent complete remissions. Patients often feel significantly improved after only a few weeks of treatment. A small percentage of patients with limited-stage small cell cancer appear to have long-term remissions, lasting more than 5 years.

Chemotherapy has been playing an increasing role in the management of non-small cell cancer. Patients with advanced disease are typically treated with platinum-based chemotherapy. Response rates are around 40%, with an additional 30-40% of patients having stable disease for a period of time. A high percentage of patients will have relief of one or more of their major symptoms with chemotherapy. Patients with stage III disease, or locally advanced lung cancer, are now routinely treated with chemotherapy along with radiation therapy, as the combination, particularly when given concomitantly, appears to afford better and longer remissions than radiation alone.

At the recent meeting of the American Society of Clinical Oncology, a major trial was reported using postoperative adjuvant chemotherapy for earlier-stage patients after their initial surgery. The trial was a positive one, leading to about 5% increase in 5-year survivals in favor of the patients who received chemotherapy. Accordingly, we are offering adjuvant chemotherapy to more patients in this setting.

The major realm of research currently in advanced lung cancer is in the use of small targeted molecules, which aim to disable the cancer cell by honing in on a particular step in its growth. There is also interest in anti-angiogenesis (inhibiting blood vessel formation by the tumor) drugs. Both of these types of drugs are given in conjunction with chemotherapy drugs in a number of our clinical trials. One drug that was recently approved by the FDA for treatment of refractory lung cancer is gefitinib (Iressa). This is a well-tolerated drug which is a small targeted molecule. Although response rates are not high to gefitinib, some patients respond very dramatically, and can feel considerably better.

Although progress has certainly been made, considerable improvement is still needed in the chemotherapy management of lung cancer. We have an active Phase II clinical trials network, as well as a Phase I contract to test new drugs. This allows us to have drugs available to offer patients who sometimes have little hope of benefit from existing drugs. While many of these investigational drugs do not ultimately prove beneficial, all of the drugs currently on the market were once in a testing phase, and therefore some will turn out to be active in a variety of tested cancers. These clinical research efforts continue in hopes of improving our fight against lung cancer.



## DANIEL HARAF, M.D.

**Clinical Director and Professor, Radiation and Cellular Oncology**

### The Role of the Radiation Oncologist in Treating Lung Cancer

The role of the radiation oncologist in the treatment of lung cancer can take many forms. The precise role depends on the stage of disease, histology of the cancer, and condition of the patient. In some patients the role is to administer potentially curative therapy. In others the role may be to palliate symptoms and address quality of life issues. There are situations when the radiation oncologist will act alone in treating the patient. Frequently the role of the radiation oncologist will be as part of a multidisciplinary team treating the cancer.

The role of the radiation oncologist is limited in most patients with early stage (Stage I and II) non-small cell lung cancer (NSCLC). Most of these patients are better served by surgical resection of the tumor. However, not all patients are medically fit for a major surgery. In those patients with early stage disease who are technically resectable but medically inoperable, the role of the radiation oncologist is to administer radiation therapy with curative intent.

Some patients with NSCLC may present with what seems to be early stage disease but are found to have more advanced (Stage IIIa or IIIb) disease at the time of surgery. These patients are at high risk of local and distant failure. In this situation role of the radiation oncologist is to administer adjuvant radiation to the mediastinum and draining lymph nodes to reduce the chances of a local failure. The radiation is often delivered in conjunction with chemotherapy as part of a combined modality approach to address the potential for distant failure as well.

Those patients presenting with locally advanced (Stage IIIa and IIIb) NSCLC are frequently considered unresectable. Most of these patients receive combined modality therapy consisting of radiation and chemotherapy. The role of the radiation oncologist is to deliver potentially lethal doses of radiation to the primary tumor and involved lymph nodes while sparing as much normal tissue as possible. The chemotherapeutic agents given with radiation tend to enhance the effectiveness of radiation while addressing the potential of distant metastatic disease.

The radiation oncologist has played a major role in the treatment of small cell lung cancer. Unlike NSCLC, patients with small cell lung cancer are not usually considered to be surgical candidates due to the high risk of occult distant metastases. The integral role of radiation in this lung cancer histology is reflected in a commonly used staging system that divides patients into two groups (limited and extensive disease). This division is based on the determination of the radiation oncologist. Patients are considered to have limited disease if the gross tumor can be encompassed in a single radiation port. The standard treatment for patients with limited stage small cell lung cancer is radiation with concomitant chemotherapy.

Patients with limited stage small cell lung cancer achieving a complete response to treatment have a high risk of developing brain metastases as the first and often the only site of failure. In this situation the role of the radiation oncologist is to administer prophylactic cranial radiation. By treating the brain with a brief course of low dose radiation, many of these metastases can be prevented.

Patients with lung cancer often present with or develop metastatic (stage IV) disease. Metastatic lesions in the bone can result in pain or weaken the bone over time running the risk of pathologic fracture. Radiation therapy has been and remains the standard treatment in these situations. A short intense course of radiation will decrease or eliminate the pain resulting for bone metastases in 80% of patients. A similar course of radiation will reduce the risk of a pathologic fracture in a weight bearing bone.

Other patients with lung cancer may develop neurological symptoms when they develop brain metastases or when the tumor encroaches upon the spinal cord. Most of these patients are referred for radiation treatment. In these cases radiation therapy can stabilize or reverse the symptoms patients experience.

In summary, the radiation oncologist has multiple important roles in the treatment of lung cancer. These roles vary depending on the stage and histology of the lung cancer. Radiation may be used: 1) as a single modality with curative intent; 2) as part of a combined curative intent treatment with chemotherapy; 3) to palliate symptoms in patients with advanced cancer.

**LIVIA SZETO, RN, BSN**

## **The Role of Nursing in Lung Cancer**

Nursing care can be very challenging when a patient is diagnosed with lung cancer. The majority of lung cancer patients present with an advanced stage at the time of their diagnosis. Median survival is only 7 to 12 months. Patients and family need a lot of support, education and prompt care.

Smoking is one of the biggest risk factor in lung cancer, patients who smoke, sometimes get labeled as “you’re the one to blame for your lung cancer” from family and friends. For the second-hand smoker patients, usually it is their significant ones who are the smokers; they feel guilty, because they cause the cancer for the love one. Emotional support is very crucial for patients and family. Guilt, shock and denial are often the emotions that nurses encounter when meeting lung cancer patient for the first time. The role of listener is what nurses do best at this encounter.

We are the key people to support and educate patients and family about their diagnosis and treatment of lung cancer. We make referrals to social work department, behavioral medicine division, and nutritional service, home care service when applicable.

Since lung cancer treatment does not have a very good cure rate in advanced stages, it is very important to teach patients and family that the planned treatment may not be a cure. The goal is to relieve symptoms and to improve or maintain their quality of life. When treatment is no longer feasible; we will initiate hospice care.

The lung cancer research nurse role is to identify, screen and enroll patients onto clinical trials. We monitor, intervene and report side effects of the treatment. We act as a liaison for the multidisciplinary teams, patients, oncologist, radiation oncologist, and surgeons. We coordinate treatment plan and facilitate communication within the team. This is all done in an effort to give the best care to patients and their families.

