

## FACT SHEET

**Contacts**  
**Maryann Verrillo**  
**Diane Shnitzler**  
**(703) 691-1805**

### **Interventional Radiology Treatments for Lung Cancer** ***Minimally Invasive Treatments Help Cancer Patients Extend life and Improve Quality of Life***

Normally, cells grow and divide to form new cells as the body needs them. When cells grow old, they die and new cells take their place. Sometimes this orderly process goes awry—that is, new cells form when the body does not need them, and old cells do not die when they should. These extra cells can form a mass of tissue, or tumor. Cancerous tumors are abnormal and divide without control or order.

As vascular experts, interventional radiologists are uniquely skilled in using the vascular system to deliver targeted cancer treatments via catheter throughout the body.

The lung is the most common site for primary cancer worldwide, and smoking tobacco is the leading risk factor.<sup>1,5</sup> The lung is also a common site of metastases for various malignancies.<sup>1</sup> Metastases occur when a single tumor cell or clump of cells gain access to the blood stream or lymphatic system, travel to a new organ such as the lung, begin to multiply, and then regrow their vascular structure to obtain food.

Interventional radiologists can deliver treatments for lung cancer directly to the cancer without significant side effects or damage to nearby normal tissue. There are two main methods by which interventional radiologists can treat cancer. The first is to use the vascular system to deliver chemotherapy medicine directly to the cancer's vascular supply. This limits damage and toxicity to the rest of the body while delivering the highest dose of the chemotherapy to the cancer. The second method interventional radiologists use to treat cancer is to “cook” or “freeze” the cancer by sticking a small, energy-delivering needle directly into the cancer that heats or freezes the cancer without significant damage to nearby normal tissue. Since these techniques are delivered at the cancer specifically, patients have fewer overall side effects making this especially useful in patients with other significant medical problems. According to the National Cancer Institute, “targeted cancer therapies will give doctors a better way to tailor cancer treatment.”

#### **Prevalence**

- Approximately 173,770 new cases of lung cancer will be diagnosed in 2004, accounting for 13 percent of all new cancer cases.<sup>2</sup>
- An estimated 160,440 Americans will die in 2004 from lung cancer, accounting for 28 percent of all cancer deaths.<sup>2</sup>
- 85-95 percent of lung cancers are smoking related<sup>2</sup>

- More Americans die each year from lung cancer than from breast, prostate and colorectal cancers combined.<sup>2</sup>
- Lung cancer kills more men than prostate cancer and more women than breast cancer
- Between 1960 and 1990, deaths from lung cancer among women increased by more than 400 percent.<sup>2</sup>
- African American men are at least 40 percent more likely to develop lung cancer than white males.<sup>2</sup>

## **Symptoms**

- Coughing that doesn't go away
- Persistent chest pain
- Shortness of breath, wheezing
- Coughing up blood
- Hoarseness
- Swelling of the face and neck
- Loss of appetite and weight
- Fatigue

## **Diagnosis**

Interventional radiologists can also assist with the diagnosis by performing an image-guided needle biopsy of an abnormal tissue mass. Using CT, ultrasound, MR or X-ray imaging for guidance, an interventional radiologist can insert a small needle into the mass and remove a tissue sample, which is given to a pathologist to determine what is the cause of the abnormal tissue—cancer, benign tissue, infection, or scar.

Needle biopsy is typically an outpatient procedure with infrequent complications; for example, less than one percent of patients develop bleeding or infection. In about 90 percent of patients, needle biopsy provides enough tissue for the pathologist to determine the cause of the abnormality.

## **THERMAL ABLATION TREATMENTS**

By the time lung cancer becomes symptomatic, 85 percent of patients are incurable, often due to serious coexisting health conditions or poor respiratory function. Most patients who are diagnosed with non-small cell lung cancer are not surgically resectable at the time of diagnosis.<sup>5</sup> For these patients, minimally invasive interventional radiology procedures can help reduce pain and improve quality of life.

### **Radiofrequency Ablation**

Radiofrequency ablation (RFA) offers a nonsurgical, localized treatment that kills the tumor cells with heat, while sparing nearby healthy lung tissue. Thus, this treatment is much easier on the patient than systemic therapy. Radiofrequency energy can be given without affecting the patient's overall health and most people can resume their usual activities in a few days. It is a safe, minimally invasive tool for local pulmonary tumor control with negligible mortality, little morbidity, short hospital stay, and positive gain in quality of life.<sup>3</sup>

In this procedure, the interventional radiologist guides a small needle through the skin into the tumor. From the tip of the needle, radiofrequency energy (similar to microwaves) is transmitted to the tip of the needle, where it produces heat in the tissues. The dead tumor tissue shrinks and slowly forms a scar. It is ideal for nonsurgical candidates and those with smaller tumors. The FDA has approved RFA for the treatment of tumors in soft tissue that includes the lung.

### **Efficacy**

Depending on the size of the tumor, RFA can shrink or kill the tumor. Because it is a local treatment that does not harm much healthy tissue, the treatment can be repeated as often as needed to keep patients comfortable. It is a relatively safe procedure, with low complication rates.

By decreasing the size of a large mass, or treating new tumors in the lung as they arise, the pain and other debilitating symptoms caused by the tumors are often relieved. While the tumors themselves may not be painful, when they press against nerves or interfere with vital organs, they can cause pain. RFA is effective for small to medium-sized tumors and emerging new technologies should allow the treatment of larger cancers in the future. RFA is a new treatment that has shown early, promising results, but long-term studies have not yet been completed.

### **Benefits of RFA**

- Is most effective when all the cancer is localized in the lung
- Can be used to treat primary lung cancer and tumors that have metastasized (spread) from other areas in the body to the lung
- Usually does not require general anesthesia
- Relatively low cost
- Is well tolerated. Most patients can resume their normal routine the next day and may feel tired for a few days.
- It can be repeated if necessary
- It may be combined with other treatment options
- It can relieve pain and suffering for many cancer patients
- It has a short hospital stay
- It has few complications

### **Cryoablation**

Cryoablation is similar to RFA in that the energy is delivered directly into the tumor by a probe that is inserted through the skin. But rather than killing the tumor with heat, cryoablation uses an extremely cold gas to freeze it. This technique has been used for many years by surgeons in the operating room, but in the last few years, the needles have become small enough to be used by interventional radiologists through a small nick in the skin without the need for an operation. The “ice ball” that is created around the needle grows in size and destroys the frozen tumor cells.

### **Chemoembolization**

Chemoembolization is a minimally invasive treatment for lung cancer that can be used when there is too much tumor to treat with radiofrequency ablation (RFA), when the tumor is in a location that cannot be treated with RFA, or in combination with RFA or other treatments.

Chemoembolization delivers a high dose of cancer-killing drug (chemotherapy) directly to the organ while depriving the tumor of its blood supply by blocking, or embolizing, the arteries feeding the tumor. Using imaging for guidance, the interventional radiologist threads a tiny catheter up the femoral artery in the groin into the blood vessels supplying the lung tumor. The embolic agents keep the chemotherapy drug in the tumor by blocking the flow to other areas of the body. This allows for a higher dose of chemotherapy drug to be used, because less of the drug is able to circulate to the healthy cells in the body. Chemoembolization usually involves a hospital stay of two to four days. Patients typically have lower than normal energy levels for about a month afterwards.

Chemoembolization is a palliative, not a curative, treatment. Chemoembolization has shown promising early results with some types of metastatic tumors. Although the individual materials used in this treatment are FDA approved, the treatment itself is not approved specifically for intra-arterial therapy of lung tumors.

### **About Interventional Radiologists**

Interventional radiologists are doctors who specialize in minimally invasive, targeted treatments that have less risk, less pain and less recovery time compared to open surgery. They use their expertise in interpreting X-rays, ultrasound, MRI and other diagnostic imaging studies to understand, visualize and diagnose the full scope of the disease's pathology and to map out the procedure tailored to the individual patient. Then during the procedure, they image as they go to guide tiny instruments, such as catheters, through blood vessels or skin, to treat diseases at the site of the illness nonsurgically.

Interventional radiology is a recognized medical specialty by the American Board of Medical Specialties. Interventional radiologists complete preliminary training in Diagnostic Radiology and advanced training in Vascular and Interventional Radiology. The American Board of Radiology certifies their specialized training.

### **For Further Information**

For more information on minimally invasive cancer treatments or interventional radiology, visit the SIR Web site at [www.SIRweb.org](http://www.SIRweb.org).

### **References**

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