

## FACT SHEET

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### **Nonsurgical Treatments for Metastatic Cancer in Bones** *Interventional Radiologists Help Reduce Pain and Improve Quality of Life*

Bones are the third most common location where cancer cells spread and metastasize.<sup>3</sup> Each year, about 100,000 cases of bone metastasis are reported in the United States.<sup>2</sup> Bone metastases occur when cancer cells gain access to the blood stream, reach the bone marrow, begin to multiply and then grow new blood vessels to obtain oxygen and food—which in turn causes the cancer cells to grow more and spread.

Some bone metastases become painful because the tumor eats away at the bone, creating holes that make the bone thin and weak. As the bones are replaced with tumor, nerve endings in and around the bone send pain signals to the brain. If left untreated, bone metastases can eventually cause the bone to fracture—seriously affecting a patient’s quality of life.<sup>2</sup> This is particularly true for long bones of the extremities where a fracture may render a limb nonfunctional. These patients may require surgical intervention to restore the function of their limbs. More commonly, metastases involve the ribs, pelvis, and spine.

For the most part, the goal of treating bone tumors is not curative, but rather palliative by reducing pain, preventing additional bone destruction, and improving function.

In treating cancer patients with painful bone metastases, interventional radiologists may use one of the two different thermal ablation techniques—radiofrequency ablation and cryoablation. This form of therapy is aimed at desensitizing the bone by killing the nerve endings in the vicinity of the metastasis. They can also treat painful vertebral metastases or fractures with vertebroplasty.

#### **Prevalence**

- Bone is the third most common site of metastatic cancer.<sup>3</sup>
- About 100,000 cases of bone metastasis are reported each year in the United States.<sup>2</sup> Of those reported, 75 percent are caused by tumors in the breast, prostate, lung and kidney.<sup>2</sup>

#### **Symptoms**

- Bone pain affects 70 percent of patients with bone metastases<sup>4</sup>
- Bone fracture<sup>3</sup>
- Spinal cord compression<sup>3</sup>

## **THERMAL ABLATION TREATMENTS**

### **Radiofrequency Ablation**

Radiofrequency ablation (RFA) offers a nonsurgical, localized treatment that kills the targeted tissue with heat, while sparing the healthy tissue. Because of the localized nature of this treatment, RFA does not have any systemic side effects. Radiofrequency ablation can be performed without affecting the patient's overall health and most people can resume their usual activities in a few days.

In this procedure, the interventional radiologist uses imaging to guide a small needle through the skin into the tumor. From the tip of the needle, radiofrequency energy is transmitted into the target tissue, where it produces heat and kills the tumor. Although the dead tumor tissue shrinks, the bone that is already eaten away will not grow back.

### **Efficacy**

Preliminary studies have demonstrated that RFA significantly reduced bone pain from metastatic disease in over 90 percent of patients who had failed or were not suitable candidates for conventional therapy.<sup>12,13</sup> In these studies, there were only few patients who suffered any side effects or complications. Therefore, RFA was demonstrated to be safe and effective in selected patients. A multicenter clinical trial is underway to further investigate the role of RFA in management of painful bone metastases. A direct comparison of RFA and radiation therapy may be warranted in the future.

### **More facts on RFA:**

- May be performed under conscious sedation or general anesthesia
- Is well tolerated. Most patients can resume their normal routines the next day and may feel tired only for a few days.
- Can be repeated if necessary
- May be combined with other treatment options
- Can relieve pain and suffering for many cancer patients

### **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.

### **Vertebroplasty**

The spine is one of the most common sites of metastasis. Vertebral bodies involved by the tumor may become painful and may eventually fracture. Surgical intervention with reconstruction of the spinal column is indicated only if the tumor causes compression of the spinal cord or instability of the spine. Vertebroplasty is an outpatient procedure

performed using conscious sedation. An interventional radiologist inserts a needle through a small incision in the back, directing it under fluoroscopy (continuous, moving X-ray imaging) into the fractured vertebra. The physician then injects a medical-grade bone cement into the vertebra. The cement hardens within about 15 minutes and stabilizes the fracture. This treatment improves pain, prevents further collapse of the vertebra, and restores mobility. Vertebroplasty dramatically improves back pain within hours of the procedure, provides long-term pain relief and has a low complication rate, as demonstrated in multiple studies.<sup>5-11</sup>

### **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**

1. Ahrar K. The role and limitations of radiofrequency ablation in treatment of bone and soft tissue tumors. *Curr Oncol Rep* 2004; 6:315-20.
2. The University of Texas M.D. Anderson Cancer Center Web site. Pain from Bone Matastasis: Surgical Strategies. *Partners in Knowledge, News in Cancer*. April 2001.
3. BoneTumor.org
4. Vinholes J, et al. Effects of bone metastases on bone metabolism: implications for diagnosis, imaging and assessment of response to cancer treatment. *Cancer Treatment Reviews* 1996; 22:289-331.
5. McGraw KJ, Lippert JA, Minkus KD, Rami PM, Davis TM, Budzik RF. Prospective evaluation of pain relief in 100 patients undergoing percutaneous vertebroplasty: results and follow-up. *JVIR* 2002; 13:883-886.
6. Deramond H, Depriester C, Galibert P, LeGars D. Percutaneous vertebroplasty with polymethacrylate. Technique, indications, and results. *Radiol Clin North Am* 1998; 36:533-546.
7. Martin JB, Jean B, Sugiu K, et al. Vertebroplasty: clinical experience and follow-up results. *Bone* 1999; 25 (2 suppl):11-15.
8. Jensen ME, Evans AJ, Mathis JM, Kallmes DF, Cloft HJ, Dion JE. Percutaneous polymethylmethacrylate vertebroplasty in the treatment of osteoporotic vertebral body compression fractures: technical aspects. *Am J Neuroradiol* 1997; 19:1897-1904.
9. Bard JD, Barr MS, Lemley TJ, McCann RM. Percutaneous vertebroplasty for pain relief and spinal stabilization. *Spine* 2000; 25:923-928
10. Zoarski GH, Snow P, Olan WJ, et al. Percutaneous vertebroplasty for osteoporotic compression fractures: quantitative prospective evaluation of long-term outcomes. *JVIR* 2002; 13:139-148.

11. Vasconcelos, C, Gailloud P, Beauchamp, NJ, Heck DV, Murphy KJ. Is percutaneous vertebroplasty without pretreatment venography safe? Evaluation of 205 consecutive procedures. *Am J Neuroradiol* 2002; 23:913-917.
12. Goetz, et al. *J clin oncol*. 2004; 22:300-6.
13. Callstrom, et al. *Radiology* 2002; 224:87-97.