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## **Interventional Radiologists: Tough on Liver Cancer, Kind to Patients**

*Journal of Vascular and Interventional Radiology Studies on Yttrium-90 Radioembolization Treatment for Liver Cancer Illustrate Ways to Assist in Treating Even the Most Challenging Cases*

FAIRFAX, Va.—Finding innovative, minimally invasive ways to treat liver cancer—and being able to tailor that treatment individually to patients—are hallmarks of interventional radiologists. Advances in yttrium-90 (Y-90) radioembolization for liver cancer, a leading cause of cancer deaths worldwide, are reported in studies in the October Journal of Vascular and Interventional Radiology.

“Results of these two new studies may be beneficial to patients with liver tumors that cannot be surgically removed,” said Daniel Sze, M.D., Ph.D., FSIR, professor of interventional radiology at Stanford University Medical Center, Stanford, Calif. “These studies address methods to modify the blood vessels of the liver in order to maximize delivery of tumor-killing material to the targets and to make treatment simpler and safer,” he added.

“Blood supply to tumors can be complex and can present challenges for interventional radiologists,” said Riad Salem, M.D., MBA, FSIR, who wrote an accompanying commentary in JVIR. “This research advances the field and provides information that is immediately applicable to all interventional radiologists when treating their cancer patients,” said Salem, professor of radiology, medicine and surgery and director of interventional oncology, division of interventional radiology, in the department of radiology at Northwestern University in Chicago, Ill. “Such research allows interventional radiologists to tailor treatments to help even the sickest patients achieve a better quality of life,” he explained.

Worldwide, primary liver cancer accounts for an estimated 600,000 deaths annually. Last year, it was estimated that 24,120 new cases of primary liver cancer and intrahepatic (within the liver) bile duct cancer would be diagnosed and 18,910 people would die of these cancers in the United States. Primary liver cancer shows the most rapidly increasing incidence of all cancers in this country. In addition, roughly ten times as many patients succumb to liver cancers that spread from other sites.

Many of these patients may be treated with Y-90 radioembolization. With Y-90 radioembolization treatment, radioactive microspheres (tiny beads) are injected through a catheter from the groin into the liver artery supplying the tumor. The beads become lodged within the tumor vessels, where they emit radiation locally that causes tumor cells to die. This technique allows for a very high local dose of radiation to be delivered, with little danger from radiation to the healthy tissues in the body, said Salem.

While radioembolization is palliative—not curative—the treatment benefits patients by extending lives and by improving symptoms and is associated with fewer side effects than traditional treatments for cancer. Interventional radiologists have long studied the use of intra-arterial (delivery of treatment via an artery) therapies for cancer and pioneered yttrium-90 radioembolization since its introduction in 2000 to treat liver cancer.

One study showed promising results in a group of 35 patients in whom the “thirsty tumors” had recruited blood vessels from outside the liver, a situation that interferes with complete delivery of Y-90 microspheres to the tumors, explained Sze. “These ‘parasitized’ blood vessels were successfully embolized, or closed off, before administration of Y-90 microspheres, reestablishing the blood supply from within the liver to enable the successful delivery of the microspheres to the targeted tumors,” said Sze, senior author of “Embolization of Parasitized Extrahepatic Arteries to Reestablish Intrahepatic Arterial Supply to Tumors Before Yttrium-90 Radioembolization.”

“While large, multicenter studies will be necessary to further confirm the proof of the concept, it is notable because the Stanford University researchers investigated the idea of simplifying blood supply in order to permit a direct injection of microspheres into the tumor,” said Salem.

In a related report, “Consolidation of Hepatic Arterial Inflow by Embolization of Variant Hepatic Arteries in Preparation for Yttrium-90 Radioembolization,” the same team was able to make treatment simpler and safer by blocking extra (variant) arteries that almost half of normal people have and utilizing collateral (detour) vessels inside the liver to assist in microsphere delivery. “After blocking these variant arteries, we were able to treat nearly 100 percent of tumors through the main hepatic artery—taking advantage of the networks of blood vessels within the liver,” reported Sze.

“By embolizing small, less important vessels to the tumors, one main arterial channel was created that could treat the entire area in a technically simple and practical way,” Salem explained. He also noted that

these principles may be applicable to other embolization procedures, such as drug-eluting bead chemoembolization using microspheres that have been impregnated with a chemotherapy agent rather than radioactivity. “Based on this research, more people who are not good candidates for surgery will benefit in several ways,” he explained. “Whenever we can administer chemotherapy directly to a tumor, we limit the drug’s entrance into the patient’s bloodstream and thus lessen the spread throughout the body and the associated consequences and side effects. This method of delivering chemotherapy provides an additional advantage by releasing the drug slowly, destroying the tumor over a greater period of time. The new techniques applied to radioembolization may also be applied to chemoembolization,” said Salem.

In “Toxicities Following Radioembolization With Yttrium-90 SIR-Spheres: Incidence and Contributing Risk Factors at a Single Center,” Thomas Jefferson University researchers examined the results of liver function tests from 29–571 days following treatment in 81 patients who received 122 Y-90 infusions to treat primary or metastatic liver tumors. “Radioembolization with resin microspheres is a safe treatment for patients with unresectable, or inoperable, hepatic malignancies,” concluded Daniel B. Brown, M.D., FSIR, an interventional radiologist and chief of interventional radiology and interventional oncology at Thomas Jefferson University Hospital in Philadelphia, Pa. “More than 90 percent of the individuals in our study who received infusions showed no, or few, changes in liver function. And, generally speaking, almost all patients receiving Y-90 infusions to treat primary or metastatic liver tumors were asymptomatic after treatment,” he added.

“JVIR is committed to publishing important research that could be practice-changing,” noted JVIR editor-in-chief Ziv J Haskal, M.D., FSIR. “Studies such as these allow interventional radiologists, whose hallmark is minimally invasive, targeted treatment of disease, to tailor treatments to help even those who are not candidates for surgery live longer and achieve a better quality of life,” added Haskal, who is also professor of radiology and surgery at the University of Maryland School of Medicine and vice chair of strategic development and chief of vascular and interventional radiology, image-guided therapy and interventional oncology at the University of Maryland Medical Center, both in Baltimore.

More information about the Society of Interventional Radiology and the Journal of Vascular and Interventional Radiology can be found online at [www.SIRweb.org](http://www.SIRweb.org).

*“Embolization of Parasitized Extrahepatic Arteries to Reestablish Intrahepatic Arterial Supply to Tumors Before Yttrium-90 Radioembolization” and “Consolidation of Hepatic Arterial Inflow by Embolization of Variant Hepatic Arteries in Preparation for Yttrium-90 Radioembolization,” Mohamed H.K. Abdelmaksoud, M.D. , M.S.; Lawrence V. Hofmann, M.D. ; Gloria L. Hwang, M.D.; Nishita Kothary, M.D. , FSIR; John D. Louie, M.D. ; David M. Hovsepian, M.D.; William T. Kuo, M.D., FSIR; Daniel Y. Sze, M.D., Ph.D., FSIR, all Division of Interventional Radiology, Stanford University, Stanford, Calif.*

*“Toxicities After Radioembolization With Yttrium-90 SIR-Spheres: Incidence and Contributing Risk Factors at a Single Center,” Peachy Mae Piana, B.S., Thomas Jefferson Medical College; Carin F. Gonsalves, M.D. , Daniel B. Brown, M.D.; David J. Eschelmann, M.D. , all Interventional Radiology Division, Department of Radiology; Voichita Bar Ad, M.D.; Takami Sato, M.D. , Ph.D., both Department of Medical Oncology; Laura Doyle, M.S.; P. Rani Anne, M.D., both Department of Radiation Oncology; all Thomas Jefferson University, Kimmel Cancer Center; Laurence Parker, Ph.D.; Jeffrey W. McCann, MBBCh, Interventional Radiology Division, Department of Radiology; all Thomas Jefferson University, Philadelphia, Pa.*

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### **About the Society of Interventional Radiology**

Interventional radiologists are physicians who specialize in minimally invasive, targeted treatments. They offer the most in-depth knowledge of the least invasive treatments available coupled with diagnostic and clinical experience across all specialties. They use X-ray, MRI and other imaging to advance a catheter in the body, such as in an artery, to treat at the source of the disease internally. As the inventors of angioplasty and the catheter-delivered stent, which were first used in the legs to treat peripheral arterial disease, interventional radiologists pioneered minimally invasive modern medicine. Today, interventional oncology is a growing specialty area of interventional radiology. Interventional radiologists can deliver treatments for cancer directly to the tumor without significant side effects or damage to nearby normal tissue.

Many conditions that once required surgery can be treated less invasively by interventional radiologists. Interventional radiology treatments offer less risk, less pain and less recovery time compared to open surgery. Visit [www.SIRweb.org](http://www.SIRweb.org).

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