
RSNA Press Release

Radiofrequency, Chemotherapy Prove Effective Duo in Destroying Tumors

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NEW YORK - Radiofrequency ablation (RFA) combined with chemotherapy is currently being used to treat malignant liver tumors at a Boston hospital on the basis of results from a new study appearing in the July issue of the journal *Radiology*.

The minimally invasive, outpatient procedure is performed on primary liver cancer or colon cancer tumors that have spread to the liver of patients at Beth Israel Deaconess Medical Center.

"It's exciting that a simple, image-guided technique, along with chemotherapy, can enhance the area of tumor killed," said Jonathan B. Kruskal, M.D., Ph.D., section chief of abdominal imaging at Beth Israel Deaconess and associate professor of radiology at Harvard Medical School in Boston. "Our research shows that we are now able to treat larger tumors with this combined therapy."

RFA uses heat to destroy malignant tumors. After sedating the patient, radiologists locate the tumor with computed tomography (CT) or magnetic resonance (MR) imaging. A four- to 10-inch-long electrode, similar to a biopsy needle, is guided into the center of a tumor via imaging. The electrode delivers radiofrequency current to heat and destroy the tumor tissue.

Dr. Kruskal co-authored the *Radiology* study, which indicated that with the addition of chemotherapy, tumors larger than five centimeters can be treated with RFA and that partially destroying tumors with RFA slows tumor growth and improves survival.

"Large tumors are typically not considered amenable to RFA treatment. Our results suggest that they may well be," he said.

The research, performed by Giuseppe D'Ippolito, M.D., and colleagues under the direction of S. Nahum Goldberg, M.D., the senior author of the study, was the first randomized controlled study on combined RFA and chemotherapy treatments in animals. Dr. Kruskal presented it today during a Radiological Society of North America (RSNA) media briefing

At A Glance

- Rats survived three times longer when their cancer tumors were treated with combined chemotherapy and radio-frequency ablation (RFA).
- Doctors have seen a 25 percent increase in liver tumor destruction among 25 patients treated with combined RFA/chemotherapy at Beth Israel Deaconess Medical Center.

on image-guided therapies.

Liposomal doxorubicin (a chemotherapeutic agent) and RFA were used to treat breast tumors implanted into 49 rats and grown from 10 days to two weeks. The animals were divided into four treatment groups: RFA only, doxorubicin only, RFA combined with doxorubicin, and a control group receiving no treatment.

Doxorubicin is dispensed in fat droplets, which circulate through the body and find the tumor, helping to destroy it. When doxorubicin was combined with RFA, results showed a reduction in tumor growth rates and a tripling in the average survival rate compared with the group receiving no treatment.

"The survival of animals increased from nine days in the control group to 27 days with the combined therapy," Dr. Kruskal said. "This study opens up the possibilities of using other drug cocktails with RFA to kill tumors and to treat tumors outside of the liver."

RFA is a good option for treating liver tumors. Many people with liver tumors are not appropriate candidates for surgery because their tumors are too widespread or inaccessible or because of their poor physical health. They also may not be candidates for a liver transplant.

A liver tumor can be ablated with radiofrequency in about 30 to 60 minutes, without affecting the liver's normal tissue. RFA is a one- to three-hour outpatient procedure that can be used to treat recurrent liver tumors. It is less risky than surgery, can be performed without general anesthesia and causes minimal discomfort. Patients can most often go home the same day.

Risks associated with RFA include bleeding and injury to other organs and "post-ablation" syndrome, which includes flu-like symptoms.

Beth Israel Deaconess is currently the only hospital providing combined RFA and liposomal chemotherapy, according to Dr. Kruskal. Approximately 25 patients have been treated with the combined therapy by Dr. Goldberg, director of the tumor ablation program at Beth Israel Deaconess, and they are seeing a 25 percent increase in the volume of tumor destruction. Based on these results, Drs. Goldberg and Kruskal are planning further studies, including a large clinical study comparing RFA alone to RFA combined with liposomal chemotherapy.

"RFA has been used worldwide for the last five or six years to treat tumors up to five centimeters," Dr. Kruskal said. "With the new combined therapy, where patients are given doxorubicin intravenously prior to the start of RFA, physicians will be able to treat larger tumors, up to eight centimeters."

The purpose of this study, partly funded by the National Cancer Institute and the National Institutes of Health, was to determine whether combined intravenous liposomal doxorubicin and RFA decreased tumor growth and increased endpoint survival - that is, from the start of treatment until the tumor reached three centimeters. Following treatment, tumors were measured every two to three days until they reached three centimeters.

The rats that received RFA and doxorubicin had a mean endpoint survival of 27 days. Rats receiving either RFA or injections of doxorubicin had an endpoint survival of 16 days. The control group, with no treatment, reached endpoint survival at 10 days.

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Radiology is a monthly scientific journal devoted to clinical radiology and allied sciences. The journal is edited by Anthony V. Proto, M.D., School of Medicine, Virginia Commonwealth University, Richmond, Va. *Radiology* is owned and published by the Radiological Society of North America Inc. (<http://radiology.rsna.org>)

The RSNA is an association of more than 33,000 radiologists, radiation oncologists and related scientists committed to promoting excellence through education and by fostering research, with the ultimate goal of improving patient care. The Society's headquarters are located at 820 Jorie Blvd., Oak Brook, Ill. 60523-2251. (<http://www.rsna.org>)

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"Percutaneous Tumor Ablation: Reduced Tumor Growth with Combined Radio-Frequency Ablation and Liposomal Doxorubicin in a Rat Breast Tumor Model." Collaborating with Dr. Kruskal on this study were Nahum Goldberg, M.D.; Giuseppe D'Ippolito, M.D.; Muneeb Ahmed, M.D.; Geoffrey D. Girnun, Ph.D.; Keith E. Stuart, M.D.; and Elkan F. Halpern, Ph.D.