

Jimmy carter's recovery highlights power of new cancer treatments

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Specialized radiation, immunotherapy drug have removed signs of lesions on former president's brain.

(HealthDay)—Former President Jimmy Carter's remarkable response to his treatment for brain cancer can be chalked up in part to significant recent advances in medicine, cancer experts say.

Carter, 91, announced on Sunday that brain scans have shown there are no longer any signs of the melanoma cancer that had spread to his brain. That does not mean, however, that he has been cured of the cancer, and he will continue to undergo medical treatment.

His successful treatment benefited from improvements in radiation therapy and immunotherapy, said Dr. Alexis Demopoulos, director of neuro-oncology at North Shore-LIJ's Brain Tumor Center in Lake Success, N.Y.

"I'm not surprised he did as well as he did," said Demopoulos. "We're on the edge of a revolution in oncology."

Early detection of Carter's brain lesions also helped, as did the relatively small size and fortuitous location of the tumors, said Dr. Len Lichtenfeld, deputy chief medical officer for the American Cancer Society.

"He had a relatively low tumor burden that was treatable," Lichtenfeld said.

The good news comes roughly three months after Carter began treatment for four small lesions in his brain and had surgery to remove part of his liver.

Carter said in a statement Sunday that he will continue to take Keytruda, an immunotherapy drug that helps his body recognize and fight any stray [cancer cells](#).

"My most recent MRI brain scan did not reveal any signs of the original cancer spots nor any new ones," Carter said in the statement.

Carter first announced in August that he had been diagnosed with melanoma that had spread to his brain, sharing the news on the day of his first radiation treatment for the [brain lesions](#).

He underwent four rounds of [radiation therapy](#) and Keytruda every three weeks. Experts said both those treatments represent significant advances in medicine.

Radiation therapy for brain cancer has benefited from the development of a procedure called stereotactic radiosurgery, which uses computers to tightly focus the beams of radiation onto tumors while sparing nearby

healthy brain tissue, Demopoulos said.

"It's become very common to have excellent control of brain metastases with radiation treatment," he said.

Keytruda and other immunotherapy drugs also have improved treatment of brain cancer by unleashing the immune system to attack cancer cells, experts said.

Chemotherapy has traditionally been ineffective against [brain cancer](#) because the cancer-killing chemicals have a difficult time crossing the blood-brain barrier to attack tumor cells, Lichtenfeld said.

Because immune cells readily pass through the blood-brain barrier, immunotherapy drugs have shown promise in both killing cancer cells in the brain and preventing cancer from spreading further throughout the body, Lichtenfeld and Demopoulos said.

Cancer cells develop receptors that basically cloak them from the immune system, preventing the body from recognizing and targeting the abnormal cells, Demopoulos said.

"Keytruda blocks the cancer from telling the immune system to go away, by binding those receptors and preventing the cancer from flipping that off-switch," he said.

Lichtenfeld cautioned that no one is sure what specific parts of Carter's treatment caused such a dramatic response, and added that the tumors themselves were caught at a very treatable stage.

"In the president's situation, the doctors were able to find tumors at a very small size," about 2 millimeters, he said. "When you talk about melanoma in the [brain](#) and you find it at a small size, the treatments can

be more effective."

It's also unclear whether Carter will wind up suffering a recurrence of his cancer, Lichtenfeld added.

"He did not say he was cured. He said he had no evidence of [cancer](#)," Lichtenfeld said. "It is certainly possible he could go on for a significant period of time without any new metastases. It is also possible that the melanoma could recur in a shorter period of time. We don't know what the future holds for him."

During his treatment, Carter continued to do volunteer work, according to the *Associated Press*.

"I've reacted well to the treatments," Carter told the wire service in November. "I haven't been uncomfortable or ill after the treatments were over. So that part of it has been a relief to me and I think to the doctors."

Keytruda is a pricey drug, with a year's supply costing about \$150,000.

But Demopoulos noted that Keytruda also is a very new drug, with the first results of its clinical trial published in *The Lancet* in 2014.

"These drugs are expensive to test. They're expensive to develop. And it's expensive to have large trials," Demopoulos said. "When they first published the data, they did not have more than 8 months of follow-up in the patients they were treating. That's how fast things are changing."

After 15 months of follow-up, the trials have shown that seven out of 10 melanoma patients respond to the drug, and six out of 10 had a survival rate of two years or more, he said.

"Yes, these drugs are expensive, but they save a lot of lives,"

Demopoulos said.

More information: For more on brain cancer, visit the [U.S. National Cancer Institute](#).

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