

## Deeply religious Jimmy Carter embraces cutting edge science in cancer battle

Listening to the 90-year-old Jimmy Carter's [press conference](#) last month concerning his battle with cancer, one might assume his pre-political career to have been in medicine, rather than nuclear physics for the U.S. Navy's early nuclear submarine program. Not only did the former president explain his surgery in terms of the precise volume of liver tissue resected and the size of the four metastatic lesions in his brain shown on his MRI, but he also outlined the treatment plan.

Importantly, in response to more than one question regarding whether, due to his religion beliefs, age, or other reasons, he ever considered something other than what his doctors — topic specialists in oncology, surgical oncology, and radiation oncology — were recommending, he replied with a resounding “no”. Despite talking frequently about his religious faith, despite teaching Bible classes to kids on Sundays in his hometown church, Carter will do what he can to prevent nature from running its malignant course. He will resort to alternative, faith-based medicine; quite the contrary, he has put his fate in the hands of modern science. In his case, that means immunotherapy, which currently is showing promise for just a handful of cancerous conditions, but that includes the one he has, melanoma. It also radiation therapy, targeted very precisely to the four lesions in his brain.

What the treatment will mean for Carter's prognosis is not something that can be answered with great precision, given the small amount of information that's been released about his condition thus far. What is both public and improves his prospects is the fact that the four brain metastases are tiny, approximately 2 mm each, and the fact that it's a cancer that responds to the immunotherapy drug that he's getting. On the other hand is a concern that other metastases may yet turn up in other parts of his body. Either way, however, Jimmy Carter apparently plans to make his battle with cancer very public, and potentially this can do a lot for cancer awareness that ultimately can save many lives.

### **Carter's diagnosis**

In recent years, health-centered media have done a fairly good job at making people aware of malignant melanoma. For this reason, the public has a fairly accurate image of melanoma as a type of skin cancer, in fact the most deadly type. Many people are aware that a change in a mole or the appearance of a new, dark mark on the skin is not something to ignore, but something to have examined by a dermatologist and biopsied. But what's not well known is that approximately 2 percent of melanomas begin deep inside the body, not in the skin. These internal melanomas come from melanocytes, the same types of cells that cause cutaneous melanoma. But, unlike cutaneous melanoma on Sun-exposed areas, you cannot prevent internal melanomas by controlling your Sun exposure, nor can you see them in an early stage with your own eyes.

In President Carter's case, the only reason why doctors found his melanoma, initially in the liver, is that he had an abdominal magnetic resonance imaging (MRI) scan as part of a comprehensive exam after developing a very bad cold. After approximately 10 percent of his liver was resected biopsied, it was confirmed that the liver lesion was cancer, and specifically it was melanoma. However, the testing also showed that it had been removed with clear margins of healthy tissue around it, meaning that the rest of

the organ was in good shape.

In a certain sense, the melanoma diagnosis after surgery was a relief for Carter, because initial presentation had looked as though it could have been pancreatic cancer, which runs in Carter's family. His father, two sisters, and brother all died from it, and the liver is commonly a presentation site, even though it starts in the pancreas. But Carter's doctors had a high level of suspicion that the melanoma had not started in the liver, that the liver lesion was a metastasis from another site. Consequently, they ordered more MRI scanning. This revealed the four spots in his brain and it's the reason why some media outlets have [referred to Carter's condition rather inaccurately as "brain cancer"](#).

### **Different types of cancer affect the brain**

What President Carter has is not "brain cancer". It's metastasis to the brain from somewhere else. Metastasis by cancers starting somewhere else actually is the most common kind of cancer to have in the brain. However, it's important to distinguish brain metastasis from malignant tumors that arise in the brain itself. One category of primary brain malignancies is glioblastoma, which kills approximately 15,000 adults in the US each year and is the brain malignancy that Vice President Biden's son, the late [Beau Biden, may have had, based on reasonable speculation by the Washington Post](#).

It's particularly important to raise awareness about brain malignancy and where state-of-the art medicine is at present, in light of a [scientifically illiterate and extremely paranoid accusation](#) made last June by writer Mike Adams of the pseudoscience publication Natural News. After outlining his opinion that the younger Biden was "killed by a combination of chemotherapy, radiation, and glyphosate", Adams went on to slam the field of oncology with a string of accusations and insults:

Oncologists who prescribe chemotherapy drugs earn massive profits from those drugs, all while failing to disclose their own conflicts of interest to their patients. Unfortunately, chemotherapy kills far more people than it saves because its primary side effect is recurring cancer. Yes, chemotherapy causes cancer. And the ignorant oncologists who prescribe it actively encourage patients to avoid protecting their healthy cells with nutritional therapies such as medicinal mushrooms, anti-cancer foods and healthy oils such as cod liver oil. In fact, oncology as practiced today is a barbaric medical practice that quite literally kills people by the hundreds of thousands each year...Beau, it seems, was handed over to the conventional cancer industry which, sadly, told him he had a "clean bill of health" just 18 months before the cancer surged back... almost certainly worsened by the chemotherapy itself.

After attributing Beau Biden's death to chemotherapy, Adams goes on to blame the herbicide glyphosate (an analog of the amino acid glycine) — and indirectly Hillary Clinton and others who support biotechnology companies — for Biden's developing the malignancy in the first place. The possibility of a glyphosate-cancer connection has been [addressed, and shown to be highly speculative, on the Genetic Literacy Project and other news outlets](#), but here we can address Adams' alarmist assertions regarding conventional oncology treatments, and chemotherapy in particular.

## **Chemotherapy saves lives**

There are two things that Adams got right, although he wrote about them so far out of context that they can do nothing but mislead the readers. First of all, people do receive chemotherapy and then die, and often this happens after they initially start to get better after following a cancer diagnosis; they go into what is called remission, but often the remission does not turn into a cure. That happens because many types of cancer respond well at first to certain cancer drugs, and then more resistant cancer cells take over.

What Adams didn't say is that with many types of cancer, today the incidence of the cancer coming back after initial remission is reduced compared with a half century ago, because of increasing understanding of how the chemotherapy drugs work, increased capabilities of new chemotherapy drugs, and because of the development of systematic protocols for using particular chemotherapeutic "cocktails" of different agents. Adams also didn't say that reason why patients die when cancer comes back after a remission is not that chemotherapy causes new cancer. He implied that in his article, but it's completely false. What comes back is the same cancer that the patient had before.

The second thing that Adams got right is that many chemotherapy drugs can themselves cause cancer. As explained above, it's not the same cancer that comes back within weeks or months in cases when chemotherapy doesn't get rid of a cancer. Instead, the correct but out-of-context fact is that there are cancer drugs that can cause secondary malignancies decades later. This is particularly true of a category of anti-cancer drugs called alkylating agents. This is a huge issue in oncology, particularly in cases of people who are treated with those drugs for childhood cancers, who are then at elevated risk for other cancers decades later.

But what Adams did not say—what makes it extremely out of context—is the reason why we know about secondary malignancies caused by certain chemotherapy agents. We know about it because there is an increasing number of survivors of childhood, teenage, and young adult cancers who are walking around today and sometimes developing cancer 20, 30, or 40 years after chemotherapy, radiation, and surgery cured them of the cancer they had in their youth, that otherwise would have killed them.

In the 1940s and 50s, cancers, such as acute lymphoblastic leukemia (ALL) in children and Hodgkin lymphoma in teenagers and young adults, were nearly complete death sentences. But today, most of the kids diagnosed with these two conditions survive, and they survive because of chemotherapy. How did this happen? By the 1960s, oncologists had just a handful of chemotherapeutic agents. Sometimes, they worked a little for certain cancers. People got better, or went into remission for a little while, and a small fraction were actually cured. Overall, the cure rate was dismal, but then researchers started noticing that the cure rates varied a great deal from medical center to medical center. Different oncology teams were using and dosing the different drugs in slightly different ways. Some were combining more than one drug but the combinations also varied between institution.

Thus, in the 1960s and 70s, oncologists and scientists started having cancer teams report their cases and treatments very systematically, and they started looking at the outcomes of different drugs, alone and in combination with other drugs, for different types of cancers.

What grew out of this approach was a knowledge base founded on the collective experience of oncologists around the world. This led to very particular protocols for combined chemotherapy cocktails for specific types of cancer. As the various cocktails were being developed, various new drugs were also introduced to mitigate the side effects, thereby allowing for more aggressive doses. Depending on the type of cancer, and the locations within the body, the chemotherapy protocols are also combined with radiation therapy and surgery, along with other types of drugs.

All of this together has given oncologists the ability to kill off cancer to the point that it does not come back, because any cell that happens to be resistant to one agent is killed by another agent, or by the radiation, or, if the tumor mass gets low enough, by the patient's own immune system. Thus, while chemotherapy armaments today do include many old drugs used unsuccessfully 70 years ago, the way they are used today is very different, and for a bunch of cancers the rate of survival has increased significantly. At the same time, radiation oncology has also gone through major advances. Not only is the power of radiation that can be delivered to a tumor gone up steadily, but the targeting has gotten better, due to precise imaging with technologies such as MRI and computed tomography (CT) and nuclear medicine techniques. Also, the shielding has improved, which makes a huge difference, allowing delivery of powerful radiation only where it is needed while sparing healthy tissues.

Importantly, one of the main factors affecting survival is matching the precise staging of the cancer (where and to what extent it has spread in the body) to the appropriate treatment. Today, the staging is more precise than it used to be, because of improved diagnostic capability, and that is improving survival as well.

### **President Carter's Treatment Plan**

Based on what information is available, President Carter is now receiving radiation to the four metastases in his brain. There is a very good chance that all four lesions will be eliminated from his brain with minimal side effects, because of the small size of the lesions, the precise targeting, the high tech shielding, and because of one other reason: special agents can be given that will make the brain metastases more sensitive to radiation. Carter is also getting treatment with pembrolizumab, which is being called a [breakthrough drug](#). It works by boosting the immune system, and therefore is part of an emerging type of therapy known as immunotherapy. Currently, immunotherapy has limited use for cancer across the board, but melanoma is one type of cancer where immunotherapy is showing particular promise.

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