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What can we learn from Steve Jobs about complementary and alternative therapies?

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The untimely death of Steve Jobs from pancreatic cancer at the age of 56 in October 2011 was highly publicized (Kane and Fowler, 2011; Markoff, 2011). Jobs was one of two founders of Apple computers and is credited for revolutionizing personal computing. At the time of his diagnosis in 2003, Jobs did what most cancer patients do: he made a decision on how to approach his treatment based on the best evidence available to him at the time. Jobs was diagnosed with a rare form of pancreatic cancer, called an islet cell tumor or gastroenteropancreatic neuroendocrine tumor (GEP-NET), which is a different form of pancreatic cancer than the highly aggressive and often rapidly fatal pancreatic adenocarcinoma. GEP-NETs are slow growing tumors that have the potential to be cured surgically if the tumor is removed prior to metastasis. There are limited clinical trial data on GEP-NETs and highly effective chemotherapy agents to treat GEP-NETs have not been identified. In the face of medical uncertainty at the time of his diagnosis, Jobs still had to make a decision on how to proceed.

Many journalists mentioned and even focused on Jobs' initial decision to forego conventional treatments and instead use complementary and alternative medical (CAM) therapies, including acupuncture, botanicals, and dietary changes (Grady, 2011). This was chronicled in his biography and corroborated via interviews with his friends and colleagues (Isaacson, 2011). However, what many journalists failed to note is that the evidence supporting any specific conventional treatment approach (surgery, chemotherapy, radiation therapy) for GEP-NETs comprises a slim literature, and the evidence base for use of CAM therapeutic approaches for GEP-NETs is virtually non-existent. After a delay of nine months after diagnosis, in 2004, Jobs opted for surgery. He died 7 years later.

There has been widespread speculation about whether Jobs' decision to use CAM approaches hastened his death by postponing initiation of potentially life-prolonging conventional treatments (Grady, 2011). However, the details of Jobs' diagnosis and specific treatments received, both conventional and unconventional, have not been made public. Therefore, we cannot comment on whether or not he made the best decisions on his cancer treatment, nor can we comment on whether he would have had different outcomes had he chosen a different treatment approach. It is unknown whether Jobs' outcomes would have been different if he had pursued surgery at the time of his diagnosis, or if had followed a

specific chemotherapy protocol. And it is unknown how effective any of his acupuncture, botanical and dietary approaches may have been before or after his surgery.

So, what can we learn from Steve Jobs about CAM? Jobs was a highly intelligent, extremely wealthy, and very well-connected man. He had access to the world's best and brightest medical advisors and had no financial barriers to receiving any treatment. It can be assumed that Jobs and his physicians sought out the best available medical evidence to guide the management of his disease. Jobs, just like anyone else with his diagnosis, would have benefited from more rigorous basic science, more clinical trials with the option of participating in a trial, and more observational research examining the effects of both conventional and CAM therapies on cancer outcomes, such as studying the effects of radical dietary changes. If Jobs and his clinicians had had more information to guide his treatment, perhaps he would have made different decisions along the way that could have influenced his outcomes. Indeed, Jobs is not alone in his use of CAM therapies after a cancer diagnosis. An estimated 43–67% of US cancer patients use CAM therapies after a cancer diagnosis and the effects of many of these therapies are poorly understood (Mao et al., 2011). Individuals use CAM therapies after a cancer diagnosis for a variety of reasons: to treat cancer without the use of conventional treatments (this is called “alternative medicine”), to treat cancer in concert with conventional treatments (this is called “complementary or integrative medicine”), to prevent or treat side effects of treatment, to prevent and treat other co-morbidities, and to promote and/or maintain general wellness. Most are motivated by the notion that CAM is “natural” and therefore devoid of risk (Ernst and Hung, 2011). This assumption may, however, not always be correct (Ernst, 2011).

In 2011, the US National Institutes of Health has an annual budget of approximately \$300 million focused on CAM research, with about half of the funds focused on cancer prevention, cancer treatment, preventing the side effects of treatment, and improving quality of life post-treatment. This is only a small fraction of the entire NIH budget, but the figure nevertheless demonstrates that work is ongoing to better evaluate the effects of the most promising CAM approaches. We are at the earliest stages of developing clinical guidelines for CAM use after a cancer diagnosis, such as those published by the Society for Integrative Oncology (Deng et al., 2009).

In this Special Section of *Preventive Medicine*, we aim to expand the CAM literature by increasing our understanding of populations most likely to use CAM therapies. We publish six articles in response to a call for papers on the use of CAM for chronic disease prevention and treatment, including cancer. The articles all make use of observational data to describe and explore CAM use among different populations and for different purposes. Such evidence can help us understand characteristics of populations most likely to use CAM and might be useful in guiding clinicians and public health leaders in providing effective CAM therapies to individuals who would benefit, as well as in identifying populations who may be likely to delay using effective conventional treatments while seeking more “natural” therapies. Three of the articles focus on specific diseases, including cancer (Walshe et al., 2012), asthma (Shen and Oraka, 2012), and arthritis (Hoerster et al., 2012); two articles focus on the characteristics of CAM providers and their patient populations (Davis et al.,

2012; Hawk et al., 2012); and one article explores spirituality and CAM use (Ellison et al., 2012).

After a cancer diagnosis, most patients want to follow a course of treatment that will extend their life as long as possible while maintaining the highest quality of life possible. Steve Jobs' decision to try an unproven therapeutic approach in the face of medical uncertainty was no different from similar decisions routinely made by many cancer patients. Jobs' example teaches that even those individuals with access to the most resources cannot make informed decisions about the use of conventional and/or CAM therapies if the information does not exist.

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