

Moonshot Medicine

I'll see you on the dark side of the moon.

—Pink Floyd, *Brain Damage*

During his 2016 State of the Union address, President Barack Obama announced that, of his \$4.1 trillion budget, he would dedicate almost \$1 billion (.025% of that budget!) to the War on Cancer in the form of a cancer moonshot. The money is supposed to fund big programs in detection, prevention (including vaccine development), and treatment (with a focus on immunotherapy). Other areas of interest will be genomic analysis, data sharing and informatics, pediatric cancer, and expanding the disease-specific Centers of Excellence program. This moonshot will be supervised by Vice President Joe Biden, whose son died of brain cancer in 2015, and Greg Simon, a survivor of chronic lymphocytic leukemia. Monies will go to multiple government agencies, including the National Institutes of Health, the Department of Veterans Affairs, and the Department of Defense. The goal is to identify where we should be in 10 years, and to get there in five.

Given the magnitude of the cancer threat and the hyperbole of the initiative, \$1 billion seems like a modest amount. Although we are happy to take all the funds we can get, we need to put this token into perspective. Remember, this is not the first time a president has promised to fund the War on Cancer and cure the disease (really, hundreds of diseases) in our lifetime. Some of us still recall 1971, when Mary Lasker stuffed a pen in Richard Nixon's claw and compelled him to sign the National Cancer Act. The annual research budget for cancer increased from \$180 million in 1971 to \$400 million in 1972, and to nearly \$1 billion by 1976. Now, \$1 billion in those days went a whole lot farther than \$1 billion today. But, did the National Cancer Act achieve its goal? Why should we be optimistic about another program proposed by 2 guys who will be unemployed in less than a year? Another part of the plan dictates a major change in culture: investigators will all join hands and sing "Kumbaya" while working together on these projects, sharing resources and data. And, let us not forget that they will be proposing this budget to a rather recalcitrant Republican-heavy Congress (remember the response to Merrick Garland?).

I recently read *The Death of Cancer*, a memoir by Vincent T. DeVita, Jr, the former director of the National Cancer Institute. In it, Dr DeVita describes his trials and

tribulations in fighting cancer, first professionally and then personally. He is the chap who gave us MOPP (mechlorethamine, vincristine, prednisone, and procarbazine) for Hodgkin lymphoma, the first curative cancer therapy for a relapsed malignancy (which also stuck us for decades with 6 cycles of treatment for whatever disease, for no good reason). Vince clearly would argue with my cynicism about what the National Cancer Act has accomplished. He cites a number of examples of new, targeted therapies that have helped improve the survival rates of patients with cancers: trastuzumab, imatinib, checkpoint inhibitors, epidermal growth factor receptor inhibitors, and others. But how many were actually identified as a result of those War on Cancer dollars? Most of the new therapies are being developed by, or in close collaboration with, pharmaceutical and biotechnology companies. Industry is funding the majority of the trials pushing the survival curves upward and onward.

When I first went to the National Cancer Institute, we were the largest drug company in the world. Every investigator came to us for the drugs for their phase 1, 2, and 3 studies. Now, the pendulum has shifted totally toward pharma. Moreover, the idea that we will cure cancer fails to recognize the diversity of those diseases that fall under that single horrifying term. Tumors are smarter than we are, and we have tended to chase them in a rather Whac-a-Mole fashion. Are we making progress? Absolutely—we are leaping as if on the gravity-free surface of the moon. Should we be optimistic? You bet! It makes me sad to think of the many patients I could have saved only a few years ago with the drugs we have today.

Vince concludes that we are winning the War on Cancer, and states that it is the beginning of the end. The problem is that we are *always* at the beginning of the end. Until we are preventing more cases, diagnosing cancer earlier, and curing every remaining patient with nontoxic treatments, the end is as far away as the dark side of the moon.

Until the next lunar month...



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