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## Moonshot to Malawi

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In his 2016 State of the Union address, President Barack Obama called for a “moonshot” to cure cancer. The announcement energized the cancer community to continue building on the remarkable collective progress made in recent years. The pace of that progress has been dizzying: we already diagnose and treat many cancers differently than we did when I began my medical oncology fellowship in 2010. Cancers for which there had been no treatment advances for decades have seen a surge in new medicines. Drug-approval times have been shrinking, and the embarrassment of riches has renewed the focus on defining the proper sequence and combination of therapies in this field. In some instances, in fact, we have so many established or promising agents that we really don’t know what to do with them all.

These advances are exhilarating not only for scientists but also for society, since cancer provokes existential anxiety in all of us. That anxiety has been effectively harnessed at a societal level to help drive recent progress. Suddenly receiving a diagnosis of cancer, overcoming cancer, and dying of cancer are archetypal experiences in contemporary culture, often depicted and reimagined in our arts and news media. Given the depth of our collective fear of cancer, scientific advances may be received with fanfare more commonly associated with space-program missions, as each new milestone is seen as emblematic of broader human aspirations.

But I now live in Malawi, a small, resource-limited country in southern Africa with a population of 17 million. From here, it can be difficult to appreciate the tangible fruits of a decades-long international war on cancer. Despite small daily victories and immense heroism on the part of patients and their families, the situation here reflects an abject failure of the worldwide cancer community. The neglect spans the continuum from awareness to prevention, diagnosis, treatment, and palliation.

To my constant surprise, I am often asked by clinicians, researchers, funders, and policymakers whether people get cancer in Malawi. They certainly do, as our clinics clearly attest, and the burden is rapidly increasing owing to the growth and aging of the population, as well as to the human immunodeficiency virus (HIV). Public-sector provision of antiretroviral therapy (ART) began in Malawi in 2004, and the HIV prevalence in the

country is now 10%, with 67% ART coverage.<sup>1</sup> These figures will be increasingly important moving forward, since HIV markedly increases the risk of cancer, which is a principal cause of death in HIV-infected populations receiving effective ART.<sup>2</sup> The low external visibility of cancer in Malawi is matched by abysmal levels of awareness within the country. Surveys conducted among random households in the Lilongwe district reveal that more than half of local women have no conceptual understanding of what breast cancer is — a fact that partially explains why nearly half of affected Malawian women have had symptoms for more than a year by the time their cancer is diagnosed.<sup>3</sup>

Although it is preventable, cervical cancer is the leading cancer among Malawian women,<sup>4</sup> but 10 years after a human papillomavirus vaccine was licensed in the United States, vaccination remains unavailable to girls and women here, let alone to boys and men. No diagnostic pathology services existed in Lilongwe, Malawi's capital and home to more than 1 million people, until 2011, when the University of North Carolina helped the Ministry of Health build and staff a pathology laboratory.<sup>5</sup>

In terms of treatment, no radiotherapy is available, and despite repeated demonstrations that cancer can be cured even here if old drugs are consistently available and properly used, we routinely stock out of generic chemotherapy medicines that were licensed in the 1960s or 1970s. There is no broad mechanism, like that in place for HIV, to ensure sustained, reliable access to either old chemotherapy medicines or newer, noncytotoxic, standard-of-care agents. Finally, palliative care often amounts to little more than a few doses of morphine that are woefully inadequate for alleviating symptoms.

I find it unacceptable that the most basic, decades-old elements of oncology care are absent in Malawi, while cancer-related expenditures are skyrocketing in other parts of the world to levels that are unsustainable even in high-income countries. Allowing such disparities to persist is an ethical choice.

Fortunately, investments are gradually increasing, and our work with partners in Malawi is largely supported by the U.S. National Cancer Institute, which, along with other funders, has substantially escalated its commitment to addressing cancer globally. But funding cancer programs solely through research grants can have distorting effects on agendas, skewing activities toward the production of research articles rather than effective treatment or palliation for patients. “Scholarship” can sometimes amount to little more than repeated recitations of the challenges faced or shipping of tumor tissue to international laboratories for assays with little immediate relevance to local populations; however important they may be, mechanistic insights will not benefit Malawians in the short or medium term if medicines against “druggable” targets remain unavailable and the supply of even very old drugs is inconsistent. It is incumbent on us as a scientific community to generate not just citations but better outcomes for the poorest patients in the world.

Moreover, clinicians and scientists are not enough. Science was essential but insufficient to catalyze the international movement that transformed HIV from an existential threat in sub-Saharan African countries to a prototypical global health success story. What was ultimately required was not just research but broad civil-society activism and political will. Malawians

with HIV can now live normal lives, for which we thank protesters who stormed international meetings over many decades to demand action. A similar energy now drives our moonshot dreams for cancer, but I believe we must also commit ourselves to expending a small fraction of that energy to control cancer, using proven methods, in places like Malawi. Shooting for the moon is important, but so is shooting for a world that is just and equitable.

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