Future Cancer Research Priorities in the USA (Lancet Oncology Commission)

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The Policy

Synopsis

Future Cancer Research Priorities in the USA, a report commissioned by The Lancet, was released in November 2017 by the Lancet Oncology Commission to provide insights into the future of cancer research and care. The current report builds on earlier recommendations authored by the same group in 2016 while bolstering these insights with implementation details. The Commission was comprised of 54 cancer clinicians and researchers, and was led by key figures from the 2016 task force, the Blue Ribbon Panel (BRP). The findings of this new report are applicable to a wide audience as it calls for support from stakeholders including federal agencies, members of industry, funders, regulators, and patients to fight cancer with a united front. The research priorities examined in the report are:

- Precision cancer prevention;
- Early detection and public health;
- Drug discovery and development;
- Precision tumor assessments;
- Expediting patient access to new drugs with expanded clinical trials;
- Immunotherapy;
- Pediatric oncology;
- Supportive oncology;
- Radiation oncology;
- Nuclear medicine and imaging;
The Lancet Oncology Commission report offers recommendations on how to use this money to best push research forward.

The United States spends more [25] on healthcare than any other country in the world, but, compared to other countries [26], its citizens have yet to benefit from a significantly improved cancer prognosis. According to a study in CA: A Cancer Journal for Clinicians, around 600,000 individuals [27] are projected to die from cancer in 2018.

The Science

Science Synopsis

Cancer [28] was the second leading cause of death [29], trailing only behind cardiovascular disease, in the United States from 2009 to 2014. While cancer has been a major focus of biomedical research for many years, the five-year survival rate [30] of common cancers [31] was only 66% in 2012, according to a National Institutes of Health annual report. In contrast to the progress achieved in controlling cardiovascular diseases related deaths [32], and despite increased funding over the recent years [33], the cancer survival rate remains grim. One reason for this is that cancer is a general term for cells that divide uncontrollably, and thus can take on many forms [28] as disease develops. Additionally, cancer is a resilient disease that frequently relapses [34] and develops into more treatment-resistant forms. New drugs are desperately needed to target relapsed and metastasized [35] tumors.

Historically, cancer was often lethal because it was not detected until it had progressed to a later stage, making it difficult to successfully treat; however, scientists have discovered patterns associated with increased risk of cancer, allowing doctors to closely monitor these high-risk patients and diagnose cancer sooner. According to a 2016 Harvard study [36], over half of cancer deaths could be prevented by lifestyle factors. If physicians can better identify these lifestyle factors and launch public health campaigns to target specific populations with exposure to such risks, many incidences of cancer could be avoided. Furthermore, if a cancer predisposing...
mutation [37] is detected in the family, healthcare providers can integrate this information together with lifestyle factors risks with the hopes of eventually achieving precision cancer prevention [14].

The integration of multiple streams of data analysis (i.e. big data [38]) enables personalized treatment against diseases. This type of approach, also known as precision medicine [39], uses the genetic profile [40] and other characteristics from each patient to guide individualized care. For example, an oncologist may have five different drug choices to treat lung cancer, but they do not know how a particular patient will respond. One way to determine the best treatment is to utilize pharmacogenomics [41], a type of precision medicine. In this approach, one would determine the genetic profile of the tumor through DNA sequencing [42]. A computer cluster would then analyze and cross reference these datasets to produce an optimal treatment plan. The desired drug would ideally kill cancer cells while remaining minimally toxic given the patient’s unique genetic profile.

Immunotherapy [16] is an exciting field in cancer research that captures the power of an individual’s immune system [43] to fight cancer. Under normal circumstances, our immune system is continually and actively surveilling the body. If a cell is detected as malignant [44], the immune cells react by inducing cell death in the misbehaving, or malignant, cell. However, certain cells can develop mutations to escape immune system surveillance. Further, the immune system can even help cancer cells develop by secreting inflammatory factors [45] that exacerbate cancer progression. An example of this insidious collaboration involves macrophages [46], a cell type that normally helps the body defend against foreign pathogens. However, in some situations tumor associated macrophages [47] are recruited by cancer cells to help them grow and spread throughout the body, or metastasize. Despite these potential mishaps, the immune system remains an extremely well-trained ally to fight cancer. Rather than harming the immune system, as is done in some forms of cancer treatment (e.g. chemotherapy or bone irradiation), immunotherapy harnesses the power of the immune system to fight cancer cells.

CAR-T therapy [48], a type of immunotherapy, removes T cells [43], a type of immune cell, from the body and trains them to attack cancer cells by introducing a chimeric antigen receptor [49] (CAR). When these engineered cells are put back into the patient’s body, they use their newly acquired receptor to recognize and eliminate cancer cells. This therapy was approved [50] for use by the Food and Drug Administration in the summer of 2017.

The Debate

Endorsements & Opposition

Endorsement

- The Trump administration has recently endorsed [51] a public private partnership against cancer. The $215 million initiative is part of the Cancer Moonshot Initiative [21].
- Jared Kushner, press conference [51], October 12, 2017: “[The initiative represents the] type of collaboration and partnership between the private sector and government that this administration is trying to foster across many sectors.”
- Eric Hargan, Secretary for the Department of Health and Human Services, press conference [51], October 12, 2017: “Under President Trump, we are going to continue making significant investments in cancer cures. Advancing great American medicine and science is a top, top priority for this administration.”

Opposition:

At present, there have not been any publicly reported opposition to this report.

Potential Impacts

Since President Nixon’s National Cancer Act of 1971 [52], cancer research has received continuous, robust funding from the federal government. Despite this financial investment, the overall death rate for cancer has only slightly decreased [53] compared to the death rate for cardiovascular disease (17.9% reduction in death rate for cancer from 1969 to 2013; 67.5% for heart disease). Such disparity highlights the need for refined priorities and new research directions for treating cancer. The targeted metrics and insights in the new report aims to provide guidelines for cancer researchers and clinicians to best allocate their resources for maximum impact.

The launch of the Cancer Moonshot Initiative [21] (SciPol brief [54]) in 2016 heightened public awareness and catalyzed a new round of funding dedicated towards cancer research. However, key stakeholders interested in effectively improving cancer diagnosis and treatment methods needed a unifying document to define objectives and deliverables for focused research efforts. Unlike a traditional
review paper, which often focus exclusively on cancer biology, this report recognizes and emphasizes that the path to curing cancer cannot be undertaken by researchers alone. The Commission highlights the need for collaboration among the entire community to implement these recommendations and secure a brighter and healthier future of cancer treatment.

**Status**

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