AACR Cancer Progress Report 2022: Decoding Cancer Complexity, Integrating Science, and Transforming Patient Outcomes

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The American Association for Cancer Research (AACR) Cancer Progress Report 2022 marks the twelfth edition of this annual report, a cornerstone of AACR's mission to educate the public and the Congress about the latest advances against cancer and the importance of medical research, and to advocate for increased federal funding for NIH, NCI, FDA, and CDC.

Continuing the tradition of the previous 11 reports, the current edition highlights how researchers are decoding the biological complexities of cancer using integrative scientific approaches to transform outcomes for patients. This report documents advances made during the 12-month period (August 1, 2021, to July 31, 2022) and, along with all previous editions, is freely available at https://cancerprogressreport.aacr.org/progress/.

The *AACR Cancer Progress Report 2022* has eight main sections. The first section, "Cancer in 2022," gives an overview of the current landscape of cancer incidence and mortality in the United States and around the globe. There has been remarkable progress against cancer, which has led to a decline in the overall U.S. cancer mortality rate by 32% between 1991 and 2019 in the United States, a decline that amounts to 3.5 million deaths avoided. This reduction in cancer-related death rates has translated into more than 18 million cancer survivors living in the United States as of January 1, 2022. This section also highlights some of the ongoing challenges including the economic burden of cancer. For example, the direct medical cost of cancer care was estimated to be $183 billion in 2015 and is expected to rise to $246 billion by 2030. Other challenges to progress against cancer include disparities in access to cancer care experienced by medically underserved populations; rising incidence of certain cancers including kidney, pancreatic, and uterine cancers; and the growing incidence of early onset colorectal cancer in the younger population. The burden of cancer and its economic toll, both on individuals and the U.S. health care system, are expected to rise in the coming decades, highlighting the urgent need for more research to accelerate the pace of progress against cancer.

The second section, "Understanding How Cancer Develops," is a broad overview of our current understanding of basic cancer biology, including genetic, epigenetic, and protein level changes, as well as the cellular and systems level influences, both of which contribute to cancer initiation and progression. The section highlights how progress in these areas, as well as in the areas of genetic sequencing, has greatly contributed to the use of precision medicine in cancer treatment.

In the United States, four out of ten cancer cases are associated with preventable risk factors. The third section, "Preventing Cancers: Identifying Risk Factors," identifies the common modifiable cancer risk factors including smoking, which is associated with 17 different types of cancer in addition to lung cancer. Combinations of other risk factors such as excess body weight, poor diet, physical inactivity, and alcohol consumption are attributable to nearly 20% of new cancer cases and 16% of cancer deaths in U.S. adults. This section explores how modifying behaviors to reduce exposure to cancer risk factors can reduce the risk of developing certain types of cancer.

Breakthroughs in the understanding of cancer initiation and progression are facilitating the development of cancer screening tests that can detect cancer at the earliest stage before it has spread to other organs. The fourth section, "Screening for Early Detection," discusses the early detection methods and U.S. Preventive Services Task Force (USPSTF) guidelines on population-level screening for breast, cervical, colorectal, lung, and prostate cancer. This section details recent advances in technologies including artificial intelligence (AI)-based tools such as Lunit, which was FDA approved in November 2021 for detecting breast cancer lesions in mammograms, and EndoScreener, which was approved in March 2022 for detecting polyps during colonoscopy. The section also discusses liquid biopsies that are being tested in multi-cancer early detection. Widespread implementation of screening through multilevel, multipronged approaches will be necessary to achieve equitable access and optimal adherence to cancer screening. Strategies such as comprehensive public health campaigns; access to health insurance; culturally tailored interventions and engagements; reduction of structural barriers; and improved patient-provider communication will help to increase screening adherence among individuals from all population groups.

The next section of the report, "Decoding Cancer Complexity, Integrating Science, Transforming Patient Outcomes," describes the recent advances across the five pillars of cancer treatment—surgery, radiotherapy, cytotoxic chemotherapy, molecularly targeted therapy, and immunotherapy. This includes approval of eight new anticancer therapeutics and two imaging agents, and expansion of 10 previously approved anticancer therapies to treat new cancer types. The impact of some of these therapies is showcased through the personal journeys of patients with cancer who have benefited from these therapeutics.

The section "Supporting Cancer Patients and Survivors" details the many unique challenges that are associated with a cancer diagnosis, which can continue long after completion of treatment. Broadly, these include side effects from cancer and its treatment, financial toxicity, worsened health-related quality of life, increased risk of new primary cancers, and psychosocial challenges. Approaches to improve health-related quality of life among survivors include promoting healthy behaviors, facilitating palliative care, and improving access to mental health services.

Discussing the new wave of scientific and technological breakthroughs in cancer research and clinical care, the section "Looking to the Future of Cancer Science and Medicine" examines technologies that are on the horizon such as single-cell sequencing, AI, state-of-the-

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art immunotherapies, and liquid biopsies. This section discusses how these technologies, currently at various stages of development and testing for use in the clinic, may lead the way in cancer treatment and patient care in the near future.

The final section, "Impacting the Future of Cancer Research and Patient Care Through Evidence-Based Policies," highlights the vital importance of federal investments that support a diverse research workforce and advance regulatory science initiatives as well as cancer control policies in accelerating the pace of progress against cancer.

Federal support for NIH and NCI has made possible much of the remarkable progress against cancer detailed in the current, as well as the eleven prior editions of the report. The *AACR Cancer Progress Report 2022* concludes with a "Call to Action" to our elected leaders to maintain the bipartisan and unwavering appropriations strategy that continues to provide robust, sustained, and predictable annual funding increases for NIH, NCI, FDA, and CDC.

Authors' Disclosures

No disclosures were reported.

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