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Implementing the Cancer Moonshot and beyond

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When the Cancer Moonshot initiative was launched on Jan 28, 2016, its stated goals included accelerating our understanding of cancer and its prevention, early detection, treatment, and cure; improving patient access and care; and providing increased access to new research, data, and computational capabilities. The aspirational goal of the Cancer Moonshot was putting ourselves on a path to achieve in just 5 years research and treatment gains that otherwise might take at least a decade.¹

From its inception, the Cancer Moonshot was intended to be patient-centred and focused on a few specific areas of the cancer research portfolio that were poised for acceleration, rather than to encompass the entire research field. To identify those areas, a Blue Ribbon Panel (BRP) was convened as a working group of the US National Cancer Institute's National Cancer Advisory Board and charged with surveying the landscape of cancer research, identifying scientific opportunities, and presenting its findings and recommendations to the advisory board. The BRP had broad representation from across the cancer community, including cancer researchers, clinicians, computer scientists, advocates, and members of the private sector.

To rigorously examine the state of the science in specific areas of clear scientific opportunity, the BRP sought greater input from more than 150 subject-matter experts. The US National Cancer Institute also requested ideas from the wider community through meetings, town hall events, and a public website. A total of 1600 responses were received, reviewed, and considered in developing ten recommendations.² In addition to those ten explicit recommendations, the report also highlighted important cross-cutting themes, including cancer health disparities, data-sharing, and partnerships.

The BRP report was delivered to the US National Cancer Institute's National Cancer Advisory Board in September, 2016, and in December, 2016, the US Congress provided US \$1.8 billion over a 7-year period (an average of almost \$260 million per year) to help support the implementation of the BRP's recommendations. Since then, the US National Cancer Institute has been actively implementing the BRP's recommendations. New programmes addressing eight of the recommendations were initiated in fiscal year 2017, and many additional programmes are scheduled to start in fiscal year 2018, which will complete the launch of all ten recommendations.

The programmes specifically developed for the Cancer Moonshot include those to characterise and overcome mechanisms of cancer drug resistance, to identify and care for patients with inherited cancer syndromes, to enhance cancer prevention, and to focus on symptom management. The programmes also include immunotherapy translational networks for adult and childhood cancers, a human tumour atlas network, and an initiative dedicated to the retrospective genomic analysis of biospecimens from patients treated with standard of care. Additional programmes for fiscal year 2019 are being planned. We anticipate that these initiatives will enable substantial progress towards achieving the goals of the Cancer Moonshot to be made in the next few years.

To promote and enhance data-sharing, the US National Cancer Institute established the Genomic Data Commons (GDC). When the GDC was opened in 2016, it contained about 14 000 cases, mainly from The Cancer Genome Atlas. By forming partnerships with others, the GDC has expanded rapidly, both in size and clinical annotation and is expected to comprise more than 50 000 cases by the end of 2018. In another effort to accelerate progress through data-sharing, all reports resulting from Cancer Moonshot activities will be required to adhere to an open-access policy of immediate data release upon publication. The US National Cancer Institute has also developed new partnerships with other government agencies, the private sector, and the international research community to further the goals of the Cancer Moonshot in general and the BRP recommendations in particular.

As the US National Cancer Institute implements the Cancer Moonshot programme, we will continue to strongly support the many other areas of cancer research that were not encompassed by the BRP's recommendations. Some of those areas are discussed in the accompanying *Lancet Oncology Commission, Future Cancer Research Priorities in the USA*,³ which builds on and extends the BRP report. Other areas include training and mentoring the next generation of cancer researchers, supporting basic research and population studies, and See supporting the Outstanding Investigator Award and Research Specialist Award. We will also continue to support core grants for the National Cancer Institute-designated cancer centres, clinical trials, and research on cancer aetiology, pathogenesis, prevention, screening, treatment, survivorship, and cancer health disparities. Progress towards understanding cancer, preventing it, screening for it, treating it, and maximising further reductions in cancer incidence and mortality for our patients will only come from the combined efforts of the entire spectrum of cancer research, not from the Cancer Moonshot alone.

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