

Global Investment in HIV CURE Research and Development in 2021: A Decade of Progress





The search for an HIV cure remains a critical priority despite the availability of antiretroviral treatments (ART) for people living with HIV (PLWH). Of the 38.4 million people currently living with HIV, only 75% are accessing treatment.¹ Despite effective treatment, HIV contributes to the development of non-AIDS morbidity. Ongoing stigma and structural barriers create challenges for people living with HIV to accessing antiretroviral therapy.

Advances in HIV research have demonstrated that HIV cure or control can be achieved. Fifteen years after Timothy Brown's cure through stem cell transplantation, there have been four similar cases reported. Researchers have identified that the quality of the viral reservoir, where it integrates and it is intact, matters more than just the size. Some HIV controllers show enhanced immune control of the virus off therapy, identifying new pathways to cure HIV.

Our understanding and knowledge of the mechanisms of HIV persistence and latent viral reservoirs has improved. Recent years have seen important new developments and continued progress in research toward HIV eradication and control:

- Continued advances in understanding the latency continuum that can contribute to developing better latency reversing agents and identify ways to permanently suppress the virus.
- Continued research into tools to measure the reservoir.
- Continued progress understanding how broadly neutralizing antibodies could be used to train the immune system to control HIV and, when used in combination with other strategies, cure HIV.
- Continued characterization of the reservoir that includes a deepening understanding of HIV integration into the genome and characterization of resting CD4+ memory T-cells with HIV.

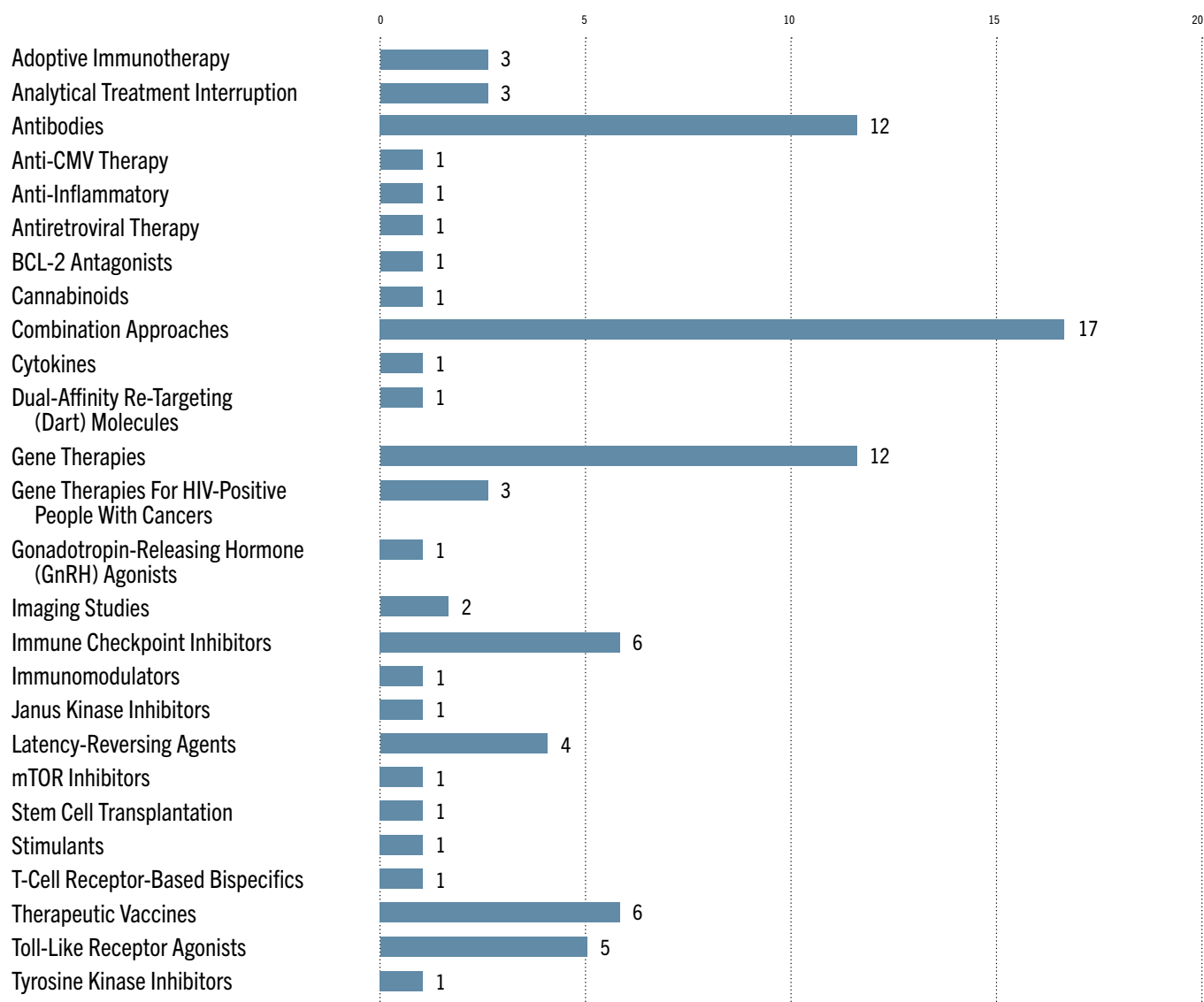
The Research Priorities for an HIV Cure: IAS Global Scientific Strategy 2021 identifies the following scientific focal areas: characterization HIV reservoirs; HIV reservoir measurement; mechanisms of virus control; targeting the HIV provirus; targeting the immune system; cell and gene therapy; pediatric remission and cure; and social, behavioral, and ethical aspects of cure research. This third IAS Global Scientific Strategy offers a comprehensive roadmap to guide the field toward a widely accessible, acceptable and affordable cure.²

- Increased recognition of the importance of diversity in HIV cure research. This includes the need to investigate different clades, sexes, ages, etc.

A recent analysis by the Treatment Action Group³ found a broad distribution of research in HIV cure clinical trials, particularly focused on gene therapy, antibodies (in combination and alone) and observational studies.

To ensure effective future outcomes for cure research, the IAS—the International AIDS Society—has developed

Distribution of Clinical Cure Trials in 2022 by Research Focus



Data courtesy of Richard Jefferys (Treatment Action Group)

the Research Priorities for an HIV Cure: IAS Global Scientific Strategy (2021)⁴ building on earlier strategies in 2011 and 2016. The new IAS Global Scientific Strategy highlights critical gaps and promising progress in HIV cure research, providing strategic recommendations to researchers, donors, advocates and other stakeholders for the next five years. It also supports the establishment of an international multi-disciplinary research alliance and global coordination of existing consortia towards an HIV cure.

The 2021 IAS Global Scientific Strategy places an important focus on equity, representation, scalability and meaningful community engagement in HIV cure research, noting that:

“Community engagement in HIV cure research is still suboptimal in many settings... Capacity to discuss HIV cure research and to evaluate its potential implications for local and global communities must be built within diverse community groups. Communities should be empowered and supported through education and engagement at all levels of the research process to help shape the HIV cure research agenda and allow for potential study participants to have a voice in trial design.”

A recent summary by the Treatment Action Group, found a disconnect between the participants in cure research and the demographics of PLWH⁵. For example, only six percent of research sponsors reporting participant data were located in Africa even though Africa is home to 68% of PLWH. Similarly, 54% of PLWH are cis-women but comprise only 20% of cure research participants. Finally, less than one percent of trial participants are transgender.

There is a growing recognition that research needs to be conducted in Sub-Saharan Africa to ensure cure will be available for all. The establishment of the HIV Cure Africa Acceleration Partnership (HCAAP) will hopefully enable broader engagement and facilitate rapid implementation of any successes into low- and middle-income settings.

In addition, the US NIH-funded Martin Delaney Collaboratories for HIV Cure Research expanded in 2021. First launched in 2011 with the funding of three Collaboratories, the program was further expanded in 2021 to include a total of 10 Collaboratories (CARE, DARE, BEAT-HIV, I4C, REACH, ERASE-HIV, CRISPR for Cure, PAVE, RID-HIV, and HOPE), with one of them (PAVE) focused specifically on HIV cure research in infants and children. The combined program supports a network of approximately 300 Collaboratory members around the world. Other significant cure research is supported by investments by amfAR in the United States, NL4 cure in the Netherlands, canCURE in Canada and the Melbourne HIV Cure Consortium in Australia.

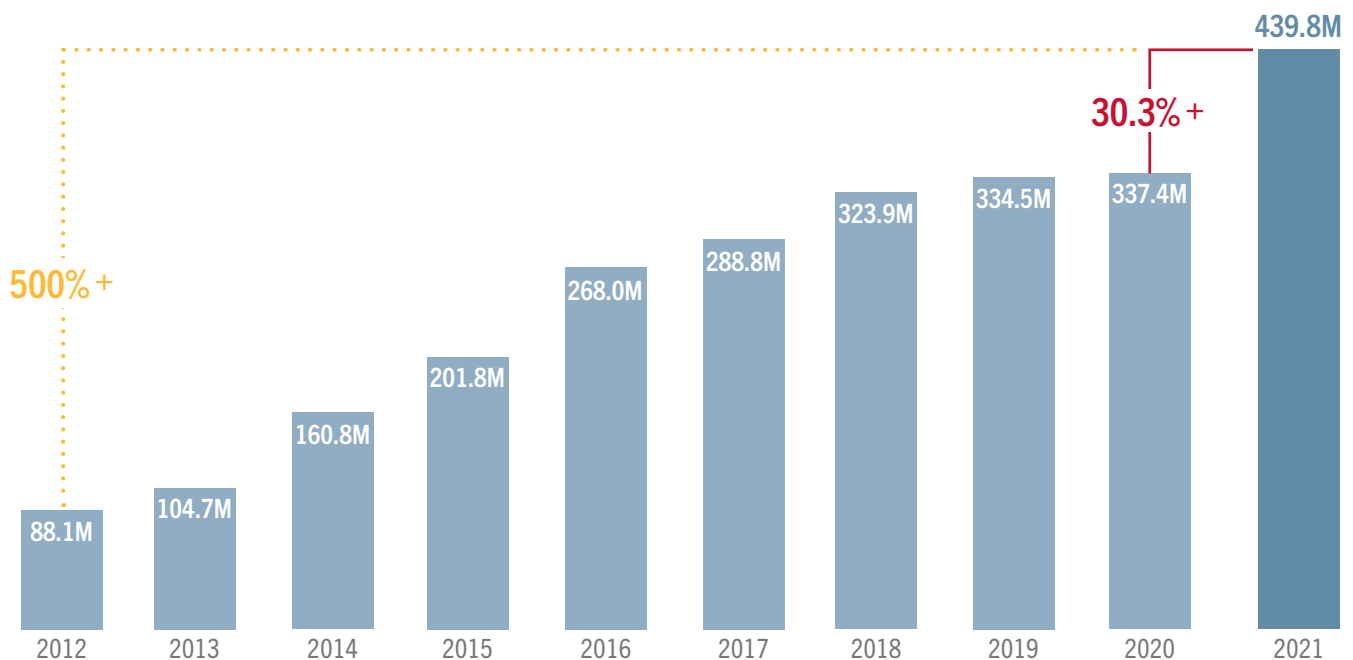
In 2021, Cure research funding increased by 30.3% as compared to 2020

This report on research and development investment in 2021 into a cure for HIV is prepared by AVAC together with the IAS Towards an HIV Cure initiative (together “The Working Group”).

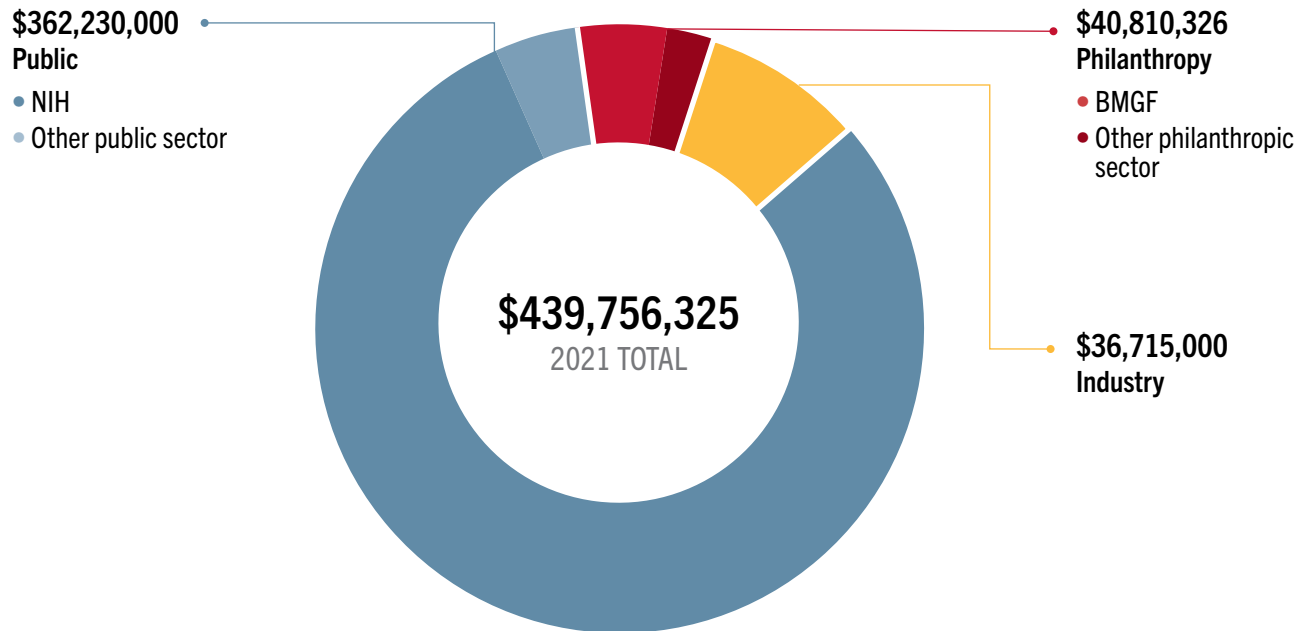
The Working Group estimates that in 2021, US\$439.8 million was invested in cure research, representing a

30.3% increase over the US\$337.4 million invested in 2020, and a five-fold increase over the US\$88.1 million invested in 2012. Cure research funding is approaching a half a billion dollars in annual investment as the field continues to grow. In contrast HIV prevention R&D funding declined 12.8% and HIV vaccine R&D funding declined 9.2 percent over the 2012-2021 period.

HIV Cure Investment 2012-2021



HIV Cure Investment 2021 by Sector



The majority of investments (US\$362.2 million) came from the public sector, with US\$40.8 million invested by philanthropies such as Aidsfonds, amfAR, the Bill and Melinda Gates Foundation, the Campbell Foundation, the Pasteur Institute, Sidaction and the Wellcome Trust. In 2021, surveys were sent to several potential cure research funders in industry. Only a few companies responded to the survey, reflecting US\$36.7 million in investment, which is most likely a significant underestimation for commercial investment in cure research.

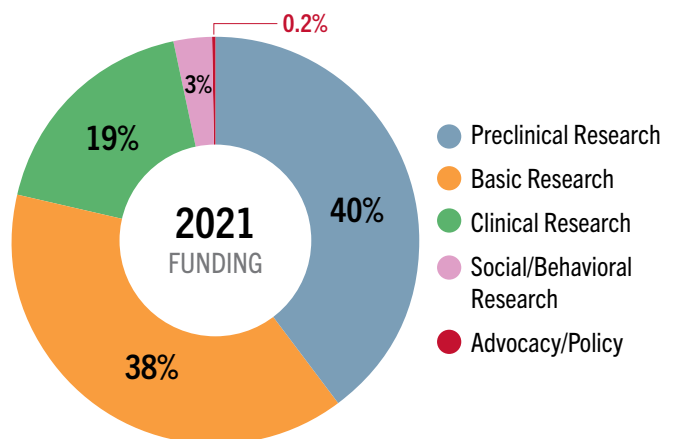
In 2021, the United States through the US National Institutes of Health contributed the majority of public funding. Major funders apart from the US included Canadian Institutes of Health Research, European and Developing Countries Clinical Trials Partnership, National Health and Medical Research Council, California Institute for Regenerative Medicine, Italian Ministry of Health, Instituto Superiore di Sanità and Unitaid also contributing to HIV cure research.

For the first time, the Working Group has been able to assess the research stages of cure research which was overwhelmingly concentrated in 2021 in the areas of basic and preclinical research. In 2021 funding for HIV cure research was allocated to the following areas: basic research (38%), preclinical (41%), clinical (18%), social/behavioral (6%) and advocacy and policy (0.2%). A recent survey by TAG⁶ found clinical research focused

on Phase I and Phase II studies, although at large proportion were also observational and epidemiological trials. Roughly 10% of these trials were held in African countries, focused heavily in pediatric studies.

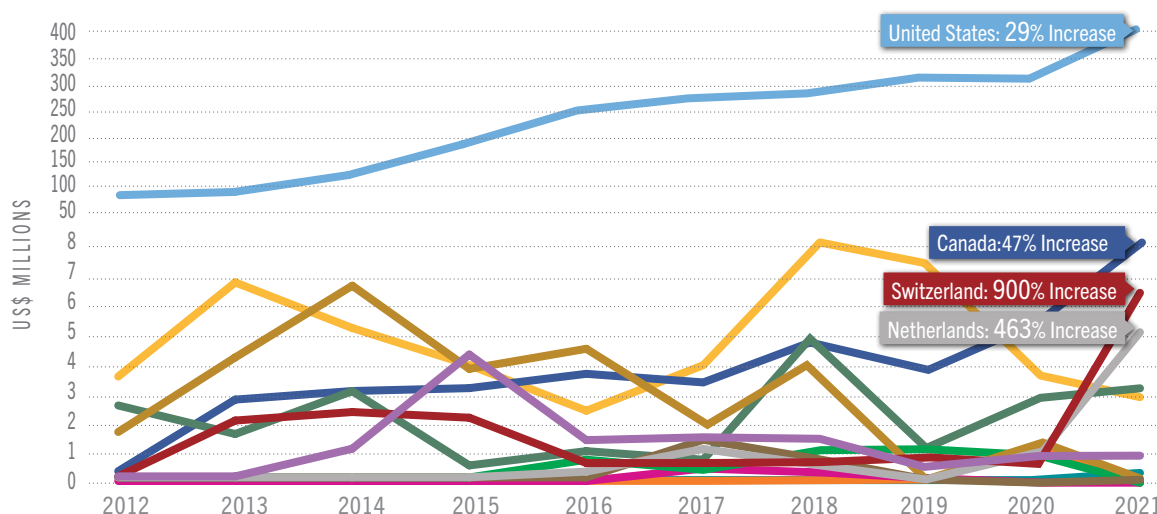
In 2021, cure research saw an important geographic distribution of research funds with investments by Australia, Canada, the European Commission, France, Italy, The Netherlands, Spain, Switzerland, the United Kingdom and United States. Over the past ten years there has been a consistent investment by these countries as well as Belgium and Cuba.

HIV Cure Investment by Research Stage



HIV Cure R&D Investments by Country, 2012–2021

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Australia	2.6	1.6	3.1	0.5	1.0	0.7	5.0	1.1	3.0	3.3
Belgium	0	0	0	0	0	0	0	0	1.3	0
Canada	0.4	2.9	3.2	3.3	3.8	3.5	4.9	4.0	5.8	8.5
Cuba	0	0	0	0	0	0.5	0.4	0.1	0	0
European Commission	1.6	4.2	6.7	3.8	4.5	2.0	4.0	0	1.3	0.1
France	3.5	6.8	5.2	3.9	2.3	3.9	8.2	7.5	3.7	3.0
Germany	0	0	0	0	0.7	0.3	1.2	1.1	1.0	0
Italy	0	0	0	0	0	1.4	0.5	0	0.6	0.3
The Netherlands	0	0	0	0	0.2	1.0	0.4	0.3	1.1	5.1
Spain	0	0	0	0	0	0	0	0	0	0.5
Switzerland	0.03	2.0	2.3	2.1	0.5	0.5	0.6	0.9	0.7	6.4
United Kingdom	0.03	0.03	1.0	4.3	1.3	1.4	1.6	0.7	1.0	0.9
United States	79.4	85.9	120.4	183.2	252.1	273.6	296.0	318.7	317.8	411.3



Methodology

In 2013, the IAS HIV Cure resource tracking group joined forces with AVAC to estimate global investments in HIV cure research. To date, this collaboration has yielded ten years of estimates for cure research investment from 2012 to 2021. Data collection was undertaken by AVAC on behalf of the Resource Tracking for HIV Prevention R&D accessing public information and collecting information through direct appeals to funding agencies. Requests were made to the public, industry and philanthropic sector funders requesting information on cure research grants awarded in 2021 using the cure definition developed by the US National Institutes of Health’s Office of AIDS Research. Responses from funders may not be comparable due to subjective determinations of whether specific grants fall within the OAR definition of cure

research. Some funders also decline to provide information, and some did not always provide grant-specific detail. In reviewing responses, AVAC accepted funders’ determination that specific research programs or grants are within the OAR definition unless clearly inconsistent with our methodology.

Acknowledgements

The IAS Towards an HIV Cure initiative and AVAC would like to thank Resource Tracking for HIV Prevention R&D, for which AVAC acts as Secretariat, and also includes IAVI and the Joint United Nations Programme on HIV/AIDS (UNAIDS) as members. AVAC is recipient of support from three of the Martin Delaney Collaboratories for HIV Cure Research, funded by the National Institutes of Health.

¹ <https://www.unaids.org/en/resources/fact-sheet>

² <https://www.nature.com/articles/s41591-021-01590-5>

³ <https://www.treatmentactiongroup.org/cure/trials/>

⁴ <https://www.nature.com/articles/s41591-021-01590-5>

⁵ <https://www.treatmentactiongroup.org/cure/resource-on-the-demographics-of-participation-in-hiv-cure-related-clinical-research/>

⁶ <https://www.treatmentactiongroup.org/cure/trials/>