

“Global Investment in **HIV** Cure Research and Development in 2012”

Evolution toward greater investment and collaboration.



Towards an HIV Cure



ANTIRETROVIRAL TREATMENT (ART) HAS RADICALLY CHANGED THE FACE OF HIV INFECTION, FROM A LETHAL DISEASE INTO A MANAGEABLE CHRONIC CONDITION.

As the total number of people eligible for treatment continues to expand, most of the 34 million people currently living with HIV will require treatment within the next decade. Nevertheless, daily antiretroviral regimens are costly and difficult for patients and most importantly not curative, as HIV persists despite even the best treatment.

As such, it is time to strengthen our investments in the search for an HIV cure. Over the last decade, our understanding and knowledge of the mechanisms of HIV persistence and latent viral reservoirs has greatly improved. Many members of the scientific community now agree that the search for a functional cure for HIV/AIDS may be within reach.

To ensure effective outcomes for cure research, the International AIDS Society (IAS) developed a Global Scientific Strategy: Towards an HIV Cure, which was released in July 2012. The Global Scientific Strategy supports the establishment of an international research alliance and global coordination of existing consortia towards an HIV cure. It also provides a strategic analysis of the state of research in the area of HIV persistence and eradication in order to develop recommendations for future studies and to promote international and cross-disciplinary research cooperation.

“ Many members of the scientific community now agree that the search for a functional cure for HIV/AIDS may be within reach ”

To make substantial progress towards a cure for HIV, the IAS Global Scientific Strategy: Towards an HIV Cure, identifies the following priority research areas:

- Cellular and viral mechanisms that maintain HIV persistence
- Tissue and cellular sources of persistent SIV/HIV in animal models and long term ART-treated individuals
- Immune activation and dysfunction in the presence of ART
- Natural models of HIV/SIV control
- Assays to measure persistent infection
- Therapeutic and immunological approaches for eliminating persistent HIV infection
- Enhancement of immune response to control viral replication

Increased investments in these areas will aid in the search of an HIV cure, but can also contribute to increased knowledge of HIV pathogenesis and control, advances in the HIV vaccine field and benefit public health globally, such as finding innovative treatments for people with cancer, Alzheimer's disease, other infectious diseases and immune disorders.

TOWARD A CURE PROGRAM DEFINITION: US NIH ERADICATION OF VIRAL RESERVOIRS*

Research conducted on viral latency, elimination of viral reservoirs, immune system and other biological approaches, as well as therapeutic strategies that may lead to either a functional (control of virus rather than elimination, without requirement for therapy) or sterilizing (permanent remission in absence of requirement for therapy) cure of HIV infection.

PATHOGENESIS STUDIES

Basic research on viral reservoirs, viral latency, and viral persistence, including studies on genetic factors associated with reactivation of the virus, and other barriers to HIV eradication.

ANIMAL MODELS

Identification and testing of various animal and cellular models to mimic the establishment and maintenance of viral reservoirs. These studies are critical for testing novel or unique strategies for HIV reactivation and eradication.

DRUG DEVELOPMENT AND PRECLINICAL TESTING

Programs to develop and preclinically test new and better antiretroviral compounds capable of entering viral reservoirs, including the central nervous system.

CLINICAL TRIALS

Studies to evaluate lead compounds,

drug regimens, and immune-based strategies capable of a sustained response to HIV, including clinical studies of drugs and novel approaches capable of eradicating HIV-infected cells and tissues.

THERAPEUTIC VACCINES

Design and testing of vaccines that would be capable of suppressing viral replication and preventing disease progression.

ADHERENCE/COMPLIANCE:

Development and testing of strategies to maintain adherence/compliance to treatment, in order to improve treatment outcomes and reduce the risk of developing HIV drug resistance.

* Department of Health and Human Services National Institutes Of Health Office of AIDS Research, Trans-NIH AIDS Research Budget FY2014. http://www.oar.nih.gov/budget/pdf/2014_OAR_CJ_Trans-NIH.pdf

Investment in Cure Research in 2012

The global investments reported in this document reflect only those that can be categorized within the narrow definition of HIV cure research provided, but it is important to realise that the total research investment that will potentially contribute to a cure is in fact much more significant since cure research could and may ultimately implicate many aspects of all current HIV/AIDS research.

IN 2013, THE IAS HIV CURE RESOURCE TRACKING GROUP JOINED FORCES WITH THE HIV VACCINES AND MICROBICIDES RESOURCE TRACKING WORKING GROUP TO ESTIMATE GLOBAL INVESTMENTS IN HIV CURE RESEARCH.

The Working Group estimates that in 2012, US\$78.2 million was invested in the cure research. The majority of investment US\$66.5 million was invested by the public sector with US\$9.8 million invested by commercial sources and US\$2.8 million by philanthropies such as amfAR and the Bill & Melinda Gates Foundation. This estimate likely underestimates commercial investment in cure research, and in particular vaccines for vital control, since the Working Group received no investment data from several companies known to be active in cure research programs such as Merck, Janssen and Gilead.

The United States through the US National Institutes of Health contributed the majority of funding, with Australia and France also being significant contributors to HIV cure research. The Working Group identified fifteen different funders of cure research in 2012 from across the globe.

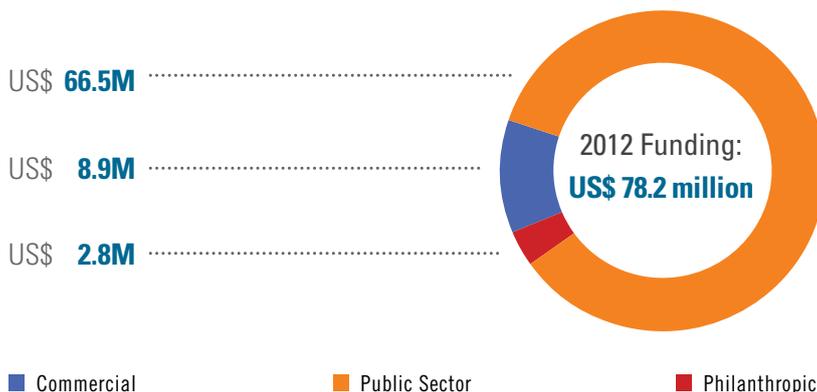
The Working Group also performed a preliminary analysis of the scientific

focus of US\$62.3 million of the US\$78.2 million in cure funding for which scientific allocations could be estimated. Of that US\$62.3 million, approximately 34% went to the study of viral latency and reservoir elimination, 37% went to approaches (immune, biological, therapeutic) toward functional or sterilizing cure, 22% toward gene therapy approaches, 5% went toward vaccines for viral control and 2% toward therapy intensification.

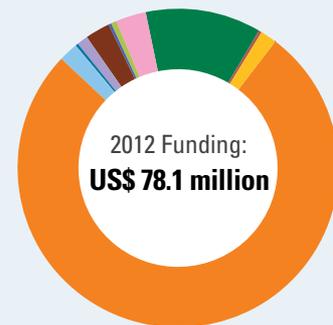
The successful implementation of the Global Scientific Strategy plan will also require improved scientific collaborative research teams and institutions at the international level to ensure an optimal use of resources. Encouragingly there has been investment in several international collaborations such as the Collaborative HIV Eradication of viral Reservoirs (CHERUB), the amfAR Research Consortium on HIV Eradication (ARCHE), the IAS/ANRS Young Investigator Award Program and the Martin Delaney Collaboratories.

Under no circumstances should the inclusion of "cure" in the global response direct funding away from treatment, prevention and care programmes, or from biomedical research on HIV and its consequences, including vaccine and other prevention research. However, it is imperative that donors, governments and the AIDS community make a viable economic investment in HIV cure research, and right now.

INVESTMENT IN CURE RESEARCH IN 2012



INVESTMENT IN HIV CURE RESEARCH IN 2012 BY FUNDER

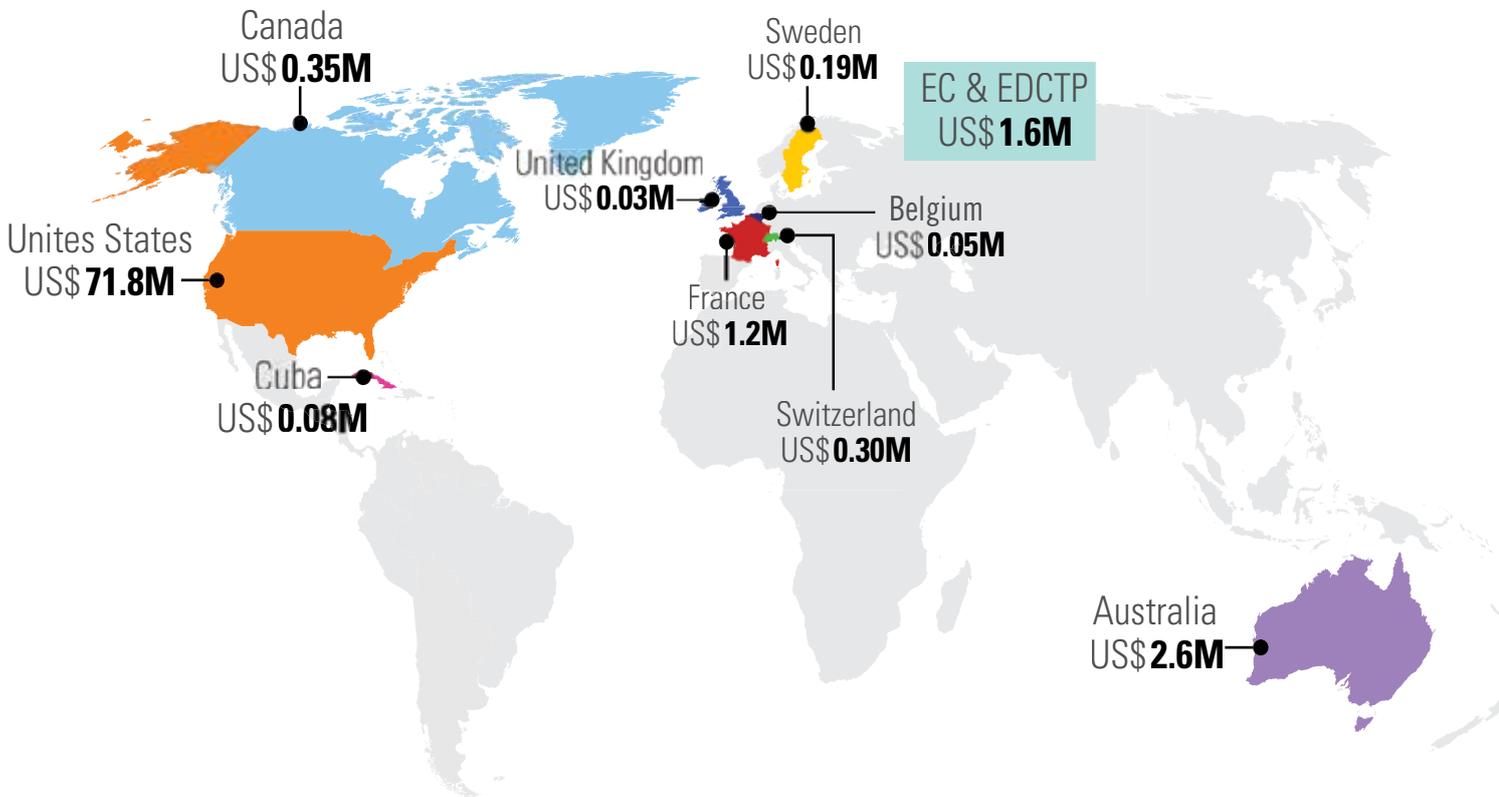


amfAR	2.40
Australian National Health and Medical Research Council (NHMRC)	1.90
Australian Research Council (ARC)	0.68
Bill & Melinda Gates Foundation	0.30
Canadian HIV Vaccine Initiative (CHVI)	0.20
Canadian Institutes of Health Research (CIHR)	0.10
Center for Genetic Engineering and Biotechnology of Cuba (IGBC)	0.08
European Commission (EC) and European & Developing Countries Clinical Trials Partnership (EDCTP)	1.60
French National Agency for Research on AIDS and Viral Hepatitis (ANRS)	1.20
Research Foundation Flanders (FWO)	0.05
Sangamo BioSciences, Inc.	8.90
Swedish Research Council (SRC)	0.19
Swiss National Science Foundation (SNSF)	0.30
UK Medical Research Council (MRC)	0.28
US National Institutes of Health (NIH)	60.00

* Participating CHVI Government of Canada departments and agencies are: the Canadian International Development Agency (CIDA), the Public Health Agency of Canada (PHAC), Industry Canada, the Canadian Institutes of Health Research (CIHR), and Health Canada. CIHR grants are reported separately.

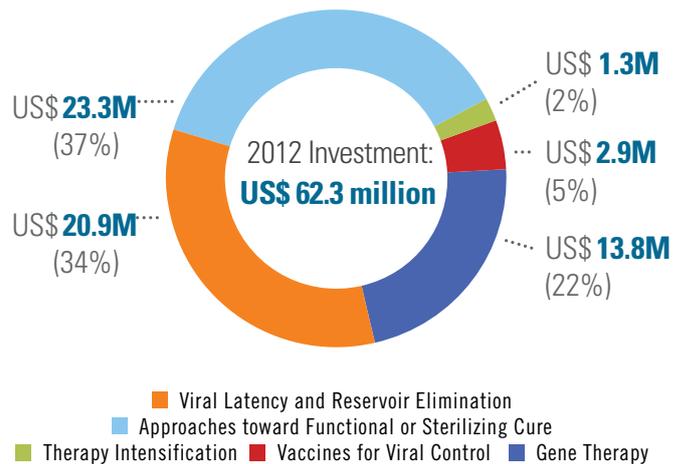
Investment in Cure Research in 2012

HIV CURE INVESTMENT BY COUNTRY



HIV Vaccines and Microbicides Research Working Group estimate is based upon the definition of cure research developed by the US National Institutes of Health's Office of AIDS Research. The OAR definition is somewhat narrower than the broader research priorities in the Global Scientific Strategy. Specifically the OAR definition excludes research into natural models of HIV/SIV control that are not included in investment estimates because it is unclear at present how to identify the specifically cure related applications in this broad area of research which also has application for HIV vaccine development.

INVESTMENT IN 2012 UNDER THE GLOBAL SCIENTIFIC STRATEGY



ACKNOWLEDGEMENTS

The IAS Towards an HIV Cure initiative would like to thank all members of the HIV Cure resource tracking working group, in particular TAG.

The HIV Vaccines and Microbicides Resource Tracking Working Group, for which AVAC acts as Secretariat, also includes the International AIDS Vaccine Initiative and the Joint United Nations Programme on HIV/AIDS.