Symposium Report 14 October 2014

Research in Action

From AIDS to Global Health to Impact

A symposium in recognition of the scientific contributions of Professor Joep Lange

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Introduction

On Tuesday 14 October 2014, 850 family members, friends, colleagues, prominent scientists and dignitaries from all over the world gathered in Amsterdam to pay tribute to the lives and legacies of Joep Lange and Jacqueline van Tongeren.

The remembrance was held at the Amsterdam Medical Centre (AMC), where Joep and Jacqueline met and worked together for many years. The day was organized by the AMC, the Amsterdam Institute for Global Health and Development (AIGHD) and PharmAccess Foundation, which were both founded by Joep. A morning symposium titled Research in Action: From AIDS to Global Health to Impact highlighted Joep's scientific legacy. During the remembrance in the afternoon, a range of speakers shared memories of Joep and Jacqueline. As was the case during their lives, the personal and the professional were closely intertwined throughout the day. As Prof. Peter Piot said, Joep and Jacqueline shared a common perspective on life: "La folie suprême est de voir la vie comme elle est et non comme elle devrait être." If there was one thing that defined them both, it was indeed that they saw life – and lived it – not as it was, but as it should be.

"Joep's place in history is really as the visionary architect of combination therapy," Prof. Piot stated, adding that "it cannot be stressed enough that he was ahead of his time, a true innovator." Joep's contribution didn't stop at science. Dr. Khama Rogo of the World Bank explained that "it's not enough to be a doctor or a researcher if you're not also an activist." Joep fully understood the importance of translating research into action and generating impact for people. Prof. Marcel Levi, chairman of the AMC, summarized the enormity of the impact Joep had on the world with the words "It's rare to know someone who has saved millions of lives."

The scientific symposium traced Joep's career, starting in the early eighties with the treatment of the first AIDS patients and the design of antiretroviral therapy, moving towards the emerging field of global health and ending with his most recent focus: using knowledge derived from scientific research to improve access to quality healthcare in real-world settings. From Prof. Françoise Barré-Sinoussi, who won the Nobel Prize for the discovery of HIV, to Prof. Michael Merson, who founded Duke University's Global Health Institute, the list of presenters reads like a who's who of people involved at key moments in the history of HIV and global health. "And Joep," as Barré-Sinoussi said, "contributed to all eras of HIV."

Click here to read more memories of Joep and Jacqueline shared throughout the day.

Research in Action:
From AIDS to Global Health to Impact

Peter Reiss is Professor of Medicine at the AMC in Amsterdam where he holds a joint appointment in the Division of the Department of Global Health and Infectious Diseases. He was recently appointed Director of the Netherlands HIV Monitoring Foundation, and serves on several Scientific Advisory Boards.

The morning symposium served as a platform to recognize Joep Lange's scientific achievements and to pay tribute to his activism in the field of HIV treatment and global health. It was also an occasion for colleagues to share their feelings and personal anecdotes about working with Joep.

Joep's friend and colleague Professor **Peter Reiss** of the University of Amsterdam opened the symposium, welcoming attendees and encouraging the audience to once again be inspired by Joep's work and to continue his legacy into the future.

A word from the co-chairs

Peter Reiss introduced the two co-chairs of the symposium, Professor Michel Kazatchkine and Dr Debrework Zewdie.

Professor **Michel Kazatchkine** shared his memories of Joep as a man who "was convinced of the power of science to build knowledge and then translate it into action." Kazatchkine emphasized Joep's generosity, compassion, and tolerance, all qualities that are considered essential for a good doctor. Qualities, Kazatchkine added, that Joep fully shared with Jacqueline. While Joep was a tolerant man, he would never accept a policy that wasn't evidence-based. Joep fought for equity, for the right of everyone to access and enjoy the advancements of science.

Dr **Debrework Zewdie** began by saying that "Joep was born a Dutchman, but became a global citizen who felt that the fruits of science should be shared by everyone." For example, the yearly International Workshop on HIV Treatment, Pathogenesis and Prevention Research in Resource-Poor Settings (INTEREST), nicknamed 'the African CROI', provides young African researchers with the opportunity to present their data in the presence of established scientific leaders and to learn from this experience. "I was amazed by Joep and Jacqueline's work in building African scientists and shepherding the INTEREST group. Now, it is up to us to step in and make sure to continue what they started."

The co-chairs introduced the subsequent speakers, who each touched upon different aspects of Joep's career as a scientist and activist.

Debrework Zewdie is a clinical immunologist by training and has spent the last 30 years on research and development work including managing development programs at country, regional and global levels and worked for the World Bank and the Global Fund.

Michel Kazatchkine is the UN Secretary-General's special Envoy on HIV/AIDS in Eastern Europe and central Asia. Previously, he was Head of the Agence Nationale de Recherches sur le Sida (ANRS) in France and Executive Director of the Global Fund to Fight AIDS, Tuberculosis and Malaria.

ARV Therapy: Past, Present and Future

Professor **David Cooper** took the audience back to the 1980s when he, like Joep in the Netherlands, was confronted with the first AIDS cases in Australia [1, 2, 3, 4, 5, 6]. Cooper detailed the important findings made by Joep that plasma levels of viral protein P24 (a then proxy for viral load) were predictive of the stage of HIV infection, with low P24 in the absence of symptoms and high P24 in symptomatic AIDS patients [7]. In addition, Joep was involved in the important research on syncytium inducing versus non-syncytium inducing viruses, with the latter being more virulent [8].

Later on, the molecular basis for this phenomenon was found with the discovery of the secondary receptors for HIV – the chemokine receptors. Non-syncytium inducing viruses are CCR5-tropic while syncytium inducing viruses are CXCR4-tropic, with implications for prognosis [9]. Cooper provided examples of the first clinical trials of antiretroviral therapy that failed due to a transient response related to the development of drug resistance: AZT monotherapy, AZT+3TC dual therapy, and NVP-AZT alternating therapy [10, 11, 12]. These trials convinced Joep that only triple therapy would be the way forward to prevent drug resistance, as revealed by the successful INCAS trial that tested the triple therapy combination of AZT, NVP and ddI, published in JAMA in 1996 [13]. This triple-therapy remains the cornerstone of HIV treatment today that is now scaled-up to provide increasingly early treatment and to reduce the risk of ongoing HIV transmission [14, 15, 16, 17].

‘It is hard to imagine robust economic growth where so many adults are dying in their productive prime, leaving the very young and the very old to cope alone.’

Economist, 12 August 1999

Together with Professor Cooper and Professor Praphan Phanuphak, Joep initiated the HIV Netherlands Australia Thailand Research Collaboration (HIVNAT) in Bangkok in 1996 to build research capacity in Thailand in the field of HIV treatment. To date, HIVNAT encompasses 112 staff and runs long-term studies involving over 2,000 adults and children on antiretroviral therapy.

David Cooper is Scientia Professor of Medicine at the University of New South Wales, a Fellow of the Australian Academy of Science (FAA), and Director of the Kirby Institute for infection and immunity in society based at UNSW Australia.

Cooper observed that Joep was lately returning to his original passion and was involved with various efforts towards a functional cure of HIV. Referring to the continued spread of HIV, Cooper emphasized the thoughts of Joep’s favourite economist JF Rischard that “we are facing a problem of immense complexity, which is getting out of hand in an exponential way. The traditional way of working along a linear time scale will not be able to cope with this.” In addition, he sketched how Joep understood that HIV/AIDS seriously hampers economic growth in many developing nations, and the ensuing need for a concerted global effort, a broad coalition of the public and private sectors, civil society and academia, with clear divisions of tasks and accountability. In his conviction that ‘what works’ should prevail over the notion of what constitutes an ‘ideal society’, Joep often quoted Martin Wolf: “The sight of the affluent young of the west wishing to protect the poor of the world from the processes that delivered their own remarkable prosperity is unutterably depressing.” He saw sustainable financing of healthcare for the masses, not necessarily through the public sector, as a prerequisite for a future without donor dependence.

Cooper ended his talk with what he described as Joep’s legacy: “As there is no vaccine or cure right now, antiretroviral therapy is our major intervention. It would be a tragedy if we fail to get enough people on treatment to reduce incidence and we need to persuade civil society that flat lining of funds is just plain unacceptable. We MUST finish the job.”

Click here to view Cooper’s presentation.

Towards an HIV Cure

Françoise Barré-Sinoussi was awarded the Nobel Prize for Medicine 2008 and is Director of the Regulation of Retroviral Infections Unit, Department of Virology, Institut Pasteur. She is involved in retrovirology research and is particularly recognized for the discovery of HIV.

Subsequently, Nobel Prize laureate Professor **Françoise Barré-Sinoussi**, co-discoverer of HIV [18], acknowledged Joep's long-term commitment to finding a cure and referred to how he was also an advocate for a global scientific strategy: joining forces in an international working group to define the main research priorities and coordinate research efforts. "The time to accelerate HIV research is now." Prof Barré-Sinoussi emphasized the need for basic science for HIV vaccine development and cure of HIV infection. She highlighted that the formation of viral reservoirs immediately after primary infection is very rapid: even if only one out of every 1.7 billion CD4 T-cells is infected, a viral rebound is possible [19]. In order to work towards a cure, it is important to learn more about the properties of latently HIV-infected cells and how viral re-activation pathways can be influenced [20].

> "Joep contributed to all eras of HIV."
>
> Professor Françoise Barré-Sinoussi

In her presentation, Barré-Sinoussi considered complete eradication of HIV in an infected patient (sterilizing cure) less likely than putting HIV in remission (functional cure)[21]. Working towards a functional cure was one of Joep's most recent topics of research in Amsterdam. New research which was taking place at AIGHD under his supervision may lead to a potential breakthrough in the treatment of people with HIV. New insights suggest that immediate treatment of a newly contracted HIV infection can be so effective that it may be possible to effect a functional cure. This would mean that after some time, treatment can cease and the virus will no longer be detectable in the patients' blood. The virus, which would still be present in certain parts of the body, would be so weakened that disease progression would come to a halt and no longer be transmissible.

Click here to view Barré-Sinoussi's presentation.

From HIV to Emerging Infectious Diseases

Menno de Jong is Professor of Clinical Virology and head of the Department of Medical Microbiology at the AMC. He was recruited as a trial physician by Joep Lange under whose supervision he completed his PhD research on the causes and implications of HIV treatment failure in 1996.

Professor **Menno de Jong** started his presentation by recalling how Joep had been his mentor, friend and inspiring colleague. One of the things that Joep felt strongly about was that there was no point in research for research's sake, but that it should always have the aim to generate impact in real-world settings. De Jong then drew a parallel between HIV and his current professional field, explaining that "we can apply the lessons learnt from HIV to other emerging infectious diseases like influenza and Ebola." Mirroring aspects of HIV treatment, the concept of triple therapy has proved promising against H1N1 influenza infection in immune-compromised children [22]. He provided an overview of the important emerging infectious diseases during the past decade, all of which are transmitted from animals to humans (2003 SARS-CoV, 2004 H5N1 influenza, 2009 H1N1 influenza, 2012 MERS-CoV, 2013 H7N9 influenza and 2014 Ebola virus).

One common denominator with HIV is that the emergence of new pathogens usually takes place in regions of the world where the infrastructure and the human capacity to recognize and contain such outbreaks are the lowest [23]. De Jong explained that the early recognition and containment of infectious diseases requires, among other things, laboratory and research capacity. While the importance of building such capacity in Africa is being increasingly recognized, there is much room for improvement. For example, more optimal use could be made of the opportunities for cross-fertilization between research and laboratory capacity in Africa, both in terms of HIV and other important infectious diseases..

According to De Jong, clinical research responses to infectious disease outbreaks are usually fragmented and often too late. There are global regulatory hurdles for timely clinical research during epidemics and as such, important opportunities for gathering essential data in the early stages of an outbreak are often missed. The average time that passes between the development of a clinical research protocol and the recruitment of the first patient, De Jong said, is far too long. Needless to say, an epidemic doesn't wait for paperwork. He argued that it is crucial to develop pre-approved standardized open-access clinical research protocols, translated in many languages, to react as swiftly as possible in case of disease outbreaks. "We need a new paradigm, we need to be prepared and ready to act."

> "Be creative and think big to tackle the real problems."
>
> Professor Menno de Jong recalls how Joep taught him to approach his research

Click here to view De Jong's presentation

From HIV to Global Health

In the early 1990s, Professor **Michael Merson** hired Joep as Chief of Clinical Research and Drug Development for the World Health Organization's Global Programme on AIDS. It was in this capacity that Joep made his first trip to Africa, which proved to be a life-changing event for Joep. In the course of their careers, both Merson and Joep moved from HIV research to global health, which has been defined as 'the area of study, research and practice that places a priority on improving health and achieving equity in health for all people worldwide.'

In his presentation, Merson outlined five key ways in which HIV research contributed to the relatively new discipline of global health [24]. First of all, HIV was the first post-modern pandemic which affected populations globally in both low and high income settings. Second, HIV fostered new collaborative approaches, such as the treatment-prevention model. This method highlighted the importance of multidisciplinary approaches to prevention and care, which has become a hallmark of global health research. Third, HIV led to a global advocacy movement in which scientists joined forces with human rights and other activists to fight stigma and demand better treatment. This alliance of biomedical research and activist communities has served as a model for advocacy around other global issues such as breast cancer, tobacco control, and access to essential medicines, including medications for non-communicable diseases. Fourth, the HIV pandemic secured enormous international funding (Global Fund, World Bank, PEPFAR) that is increasingly moving from 'vertical' (disease-specific) to 'horizontal' (general health system) approaches [25]. When Joep founded PharmAccess in 2000, his primary concern was to bring lifesaving antiretroviral therapy to people in Africa. Soon, he realized that true equity in health required a systems approach, after which PharmAccess pioneered an integrated demand and supply side approach to improving access to affordable and quality healthcare for all. Finally, HIV inspired increased international academic engagement and leadership, something that Merson described as "dear to Joep's heart." Today, global health is a discipline in over 100 universities in the United States of America alone.

"Joep leaves behind a legacy of leadership, vision and always striving for a healthier tomorrow."

Professor Mike Merson

Click here to view Merson's presentation.

Just a few days before the symposium in Amsterdam, the extensive international media coverage on the recent Ebola outbreak often included CDC director Tom Frieden's remark that: "In my 30 years in public health, the only thing that has been like this is AIDS. We have to work now so that this is not the world's next AIDS."

Merson reflected on the parallels between the early days of HIV and the Ebola virus outbreak, which include the stigma involved, the limited knowledge of the disease, the fact that it was originally presumed to be deadly in all cases, the lack of effective treatment and the inadequate global response. As such, he underscored the importance of learning from the consequences of the slow initial response to HIV. Ebola should also be considered a global security threat which requires a prompt and pro-active response.

Michael Merson is the founding director of the Duke Global Health Institute, Vice President and Vice Provost of Global Strategy and Programs and Vice Chancellor for Duke-National University of Singapore (NUS) Affairs at Duke University.

From Research to Action

Click here to view Goosby's presentation.

Professor **Eric Goosby** first met Joep in San Francisco in 1984, where Goosby was treating the first HIV/AIDS patients at San Francisco General Hospital. "Joep had a laser focus on the individual, on honouring the link between the physician and the patient. His authentic way of living continues to reverberate with me and I am honoured to be a part of this collective acknowledgement of Joep's contribution."

Goosby's presentation focused on global health delivery, diplomacy and the long road to sustainable healthcare delivery systems. He addressed the challenge of equity in health and called for the prioritization of the principles of healthcare quality, just as Joep had done. Goosby advocated that there are many diseases we know how to prevent, diagnose and treat effectively, yet efforts are falling short. "We know what works but we are not delivering. The fact that we are not doing so is impacting millions of lives and costing billions of dollars around the world. How can we encourage and promote development when tuberculosis and HIV are still ravaging the young and productive core of many African societies?"

"Programs finish, and whether they fail or succeed they are discontinued... there is scant attention paid to carefully embedding successful programs into sustainable national programs. And no one is outraged."

Professor Eric Goosby

According to Goosby, science has given us the tools, but most development efforts take an inordinate amount of time to implement. "We need to provide countries with external funding, without creating parallel systems of care. We cannot afford to be in a constant state of emergency when dealing with epidemics." Goosby referred to the Ebola outbreak as the canary in the cage to identify weaknesses in the medical delivery system and called for stronger partnerships. "Health systems need all four legs of the 'delivery stool': academia (rigor), the private sector (ef-ficiency), the community (ownership) and the national and local government (management)."

Eric Goosby served in the US State Department as Ambassador-at-Large and US Global AIDS Coordinator, overseeing the implementation of the President's Emergency Plan for AIDS Relief (PEPFAR). He is Director at the Institute for Global Health Delivery and Diplomacy, University of California, San Francisco.

How Public Policy Can Deliver Health Results

John Simon has held a number of US government posts, including Ambassador to the African Union and the Executive VP of the Overseas Private Investment Corporation, and served on the National Security Council staff, White House, and as Deputy Assistant Administrator, US Agency for International Development. He is a Founder/Managing Partner of Total Impact Advisors.

Ambassador **John Simon** underscored his appreciation for Joep's pragmatic approach. "We know what to do, yet it's not getting done. Joep found this unacceptable. He knew that in order to achieve results, you need to influence public policy and to make a difference on the ground, not from behind your desk."

In many developing countries, Ambassador Simon explained, the limited functioning of the state and its institutions hampers the development of healthcare and thus universal access to quality health services. Most of these countries are ruled by a power elite that maintains a state that is designed to serve a limited elite as opposed to overall society. Building on the theoretical framework of Nobel Prize for Economics laureate Douglass North, Simon took the audience through the historic developments of governments moving from being extractive (limited access orders) to becoming inclusive institutions (open access orders).

"With PharmAccess and the Health Insurance Fund, Joep improved healthcare quality and created health insurance schemes that ensured that people are no longer a disease or a mosquito bite away from complete destitution."

Ambassador John Simon

He continued to describe the PharmAccess approach of simultaneous strengthening of demand and supply to turn the vicious cycle of malfunctioning health systems into a virtuous cycle. By combining interventions such as standards for quality improvement, loans for healthcare providers, health insurance plans, mHealth and in-depth impact research, PharmAccess builds trust in the healthcare system.

The Private Sector and Global Health Goals

Fola Laoye is Chair of Hygeia Nigeria Limited. She has an MBA from Harvard Business School and qualified as an Associate member of the Institute of Chartered Accountants of England and Wales in 1995 and of the Institute of Chartered Accountants of Nigeria in 1997.

"Meeting Joep was a life-changing experience for us at Hygeia," said Ms **Fola Laoye**, chair of the Board of Hygeia, Nigeria's largest health maintenance organization. She commended Joep's continuous commitment to involve the private sector in health and healthcare financing. Elaborating on what she called the African contradiction, Laoye explained that when it comes to healthcare, a good deal of spending comes from private pockets. "The private sector has a huge role to play in public health. While we are making progress, being here today and listening to everyone's presentations makes me realize that our work is not done."

Laoye shared several examples from the shared PharmAccess and Hygeia shop floor. Focussing on the Kwara State Health Insurance Program, set up in partnership with the Kwara State Government, she spoke of how this program has improved the quality of healthcare at clinics and increased use of modern healthcare providers, as well as improved health outcomes. "In areas like non-communicable diseases, malaria and maternal health, we have seen indices like we never expected."

The program, which was recently named as one of the finalists in the OECD DAC Prize for Taking Development Innovation to Scale, has had a significant impact on the rural populations of Kwara, one of the poorest states in Nigeria. Impact evaluations conducted by the Amsterdam Institute for Global Health and Development (AIGHD) have resulted in many publications, including a paper in JAMA Internal Medicine showing the positive effect of health insurance and facility quality improvement on blood pressure in adults with hypertension.

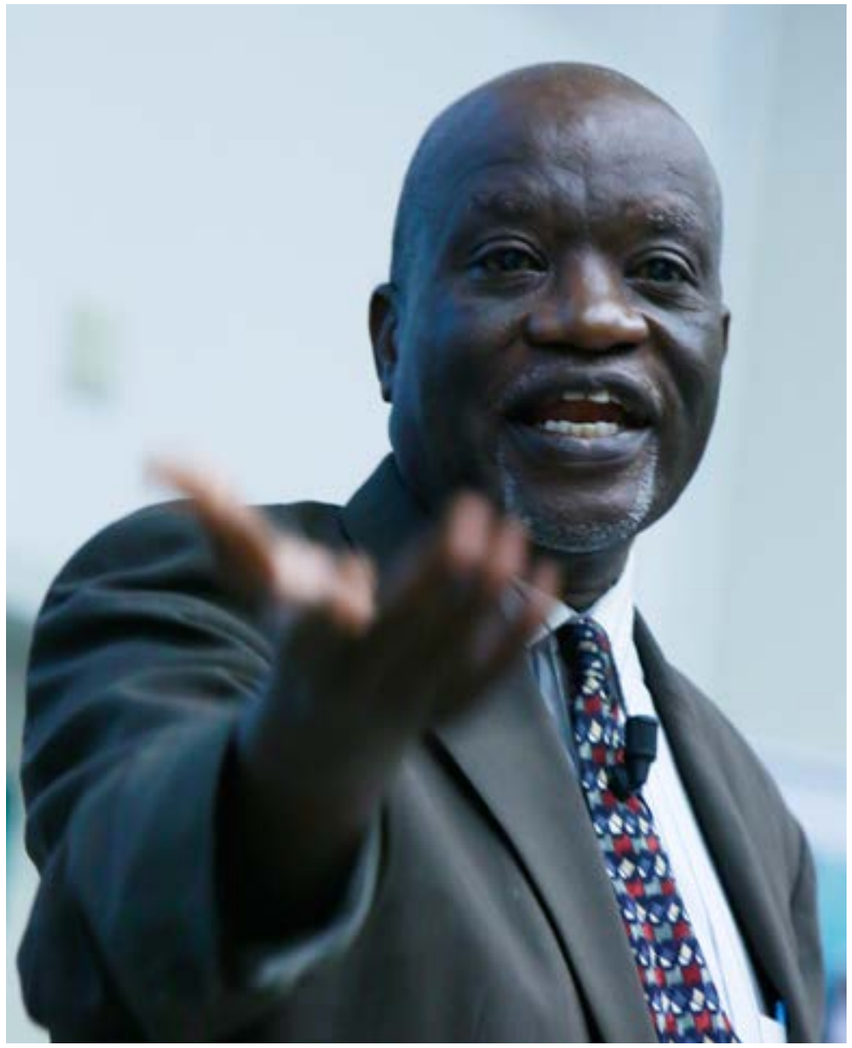
Click here to view Laoye's presentation.

"Joep realized the importance and potential impact of market dynamics and how that can be catalytic in health."

Fola Laoye

Panel discussion

Dr **Khama Rogo** shared with the audience that he saw Joep as a health revolutionary, referring to him as the Che Guevara of global health. “By nature,” he said, “revolutionaries ask questions that are uncomfortable,” and in this tradition Dr Rogo led the panel of eminent speakers in an animated discussion on global health and possible solutions to today’s biggest challenges. After stirring up the discussion with statements such as ‘Of all the ills that kill the poor, none is as lethal as bad government,’ Rogo ended the session with the shared conclusion that we must all work to make sure that health is no longer a footnote in budget discussions and public policies. After all, as he proclaimed, “It’s not enough to be a doctor or a researcher, if you’re not also an activist.”



Khama Rogo is Lead Health Sector Specialist with the World Bank and Head of the World Bank Group’s Health in Africa Initiative. Prior to this, he taught Obstetrics and Gynaecology at the University of Nairobi and was President of Medical Affairs Africa for Ipas.

Closing remarks

Onno Schellekens is the Managing Director of PharmAccess, an organization founded by Joep Lange and one of the pioneers of HIV/AIDS treatment in Africa. The PharmAccess Group is dedicated to improving access to affordable quality healthcare for people in sub-Saharan Africa.

PharmAccess managing director **Onno Schellekens** reflected on Joep’s conviction to drive results, whether the road to such results was politically convenient or not. “He started with mother-to-child HIV transmission studies in 1995, at a time when no one wanted to finance such studies because finding a solution brought with it the responsibility of addressing the problem. He pushed through and insisted on doing the trials and developing a treatment, even though the political buy-in was not yet there.”

When antiretroviral therapy became affordable and the regimens less complex, Joep founded PharmAccess to increase access to treatment for those who needed it most. To Joep, the fact that HIV/AIDS treatment was not available in Africa was - at best - a lack of will mixed with stupidity. At worst, it was pure racism. “Joep was always one step ahead,” Schellekens said. “He taught us that doctors who can talk economics can change the world. While working to change policies at government level, Joep remained determined to deliver care all the way to the local last mile.”

Wrapping up the symposium, chairs Dr. Zewdie and Professor Kazatchkine summarized the day as follows:

From the first case of AIDS Joep Lange saw in 1983 and his first trip to the African continent in 1992 to the first treatment successes in 1996 in providing access to antiretroviral therapy in resource-poor settings, Joep advocated to treat all HIV-affected persons equally. From the public sector to the private sector, from activists to pharmaceutical companies, from scientists to patients, Joep involved all parties.

Commemorating Joep’s awe-inspiring achievements towards universal access to HIV treatment, global health, and universal health coverage, we continue to be inspired by him today. Let us be determined doctors, humanitarians, scientists, activists, economists, provocateurs, and health revolutionaries who get things done in the field of HIV and global health. Let us continue Joep’s legacy.

References

1. Prummel M, ten Berge R, Barrowclough H, Cejka V. Kaposi's sarcoma and fatal opportunistic infections in a homosexual man with immunodeficiency. Ned Tijdschr Geneeskd. 1983;127(19):820–4.
2. Reiss P, Razenberg P, de Geus J, Schellekens P. A patient with a mild form of the acquired immunodeficiency syndrome (AIDS). Ned Tijdschr Geneeskd. 1983;127(19):824–5.
3. Lange J, Goudsmit J. LAV/HTLV-III infection after a one-time sexual contact with an AIDS patient. Ned Tijdschr Geneeskd. 1985;129(40):1933–4.
4. Cooper D, Gold J, Maclean P, Donovan B, Finlayson R, Barnes T, et al. Acute AIDS retrovirus infection. Definition of a clinical illness associated with seroconversion. Lancet. 1985;8428(9th March):537–50.
5. Goudsmit J, Paul D, Lange J. Expression of human immunodeficiency virus antigen (HIV-Ag) in serum and cerebrospinal fluid during acute and chronic infection. Lancet. 1986;8500(26 July):177–80.
6. Cooper DA, Imrie AA, Penny R. Antibody Response to Human Immunodeficiency Virus After Primary Infection. J Infect Dis. 1987;155(6):1113–8.
7. Lange JMA. Serological markers in HIV infection. Amsterdam, the Netherlands: University of Amsterdam; 1987.
8. Tersmette M, Goede R De, Lange J. Association between biological properties of human immunodeficiency virus variants and risk for AIDS and AIDS mortality. Lancet. 1989;8645(6 May):983–5.
9. Dragic T, Litwin V, Allaway GP, Martin SR, Huang Y, Nagashima KA, et al. HIV-1 entry into CD4+ cells is mediated by the chemokine receptor CC-CKR-5. Nature. 1996 Jun 20;381(6584):667–73.
10. CAESAR Coordinating Committee. Randomised trial of addition of lamivudine or lamivudine plus loviride to zidovudine-containing regimens for patients with HIV-1 infection: the CAESAR trial. Lancet. 1997;349 (May 17):1413–21.
11. Mulder J, Cooper D, Mathiesen L, Sandström E, Clumeck N, Gatell J, et al. Zidovudine twice daily in asymptomatic subjects with HIV infection and a high risk of progression to AIDS: a randomized, double-blind placebo-controlled study. The European-Australian Collaborative Group (Study 017). AIDS. 1994;8(3):313–21.
12. Jong MD de, Loewenthal M, Boucher CAB, Ende I van der, Hall D, Schipper P, et al. Alternating Nevirapine and Zidovudine Treatment of Human Immunodeficiency Virus Type 1-Infected Persons Does Not Prolong Nevirapine Activity. J Infect Dis. 1994;169(6):1346–50.
13. Montaner JSG, Reiss P, Cooper D, Vella S, Harris M, Conway B, et al. A randomized, double-blind trial comparing combinations of nevirapine, didanosine, and zidovudine for HIV-infected patients: the INCAS Trial. JAMA J Am Med Assoc. 1998;279(12).
14. Connor E, Sperling R. Reduction of maternal-infant transmission of human immunodeficiency virus type 1 with zidovudine treatment. N Engl J Med. 1994;331(18):1173–9.
15. Cohen M, Chen Y. Prevention of HIV-1 infection with early antiretroviral therapy. N Engl J Med. 2011;365(6):493–505.
16. Tanser F, Bärnighausen T, Grapsa E, Zaidi J, Newell M-L. High coverage of ART associated with decline in risk of HIV acquisition in rural KwaZulu-Natal, South Africa. Science (80-). 2013 Mar 22;339(6122):966–71.
17. Lange JM, Ananworanich J. The discovery and development of antiretroviral agents. Antivir Ther. 2014 Jan;19 Suppl 3:5–14.
18. Barré-Sinoussi F, Chermann J, Rey F. Isolation of a T-lymphotropic retrovirus from a patient at risk for acquired immune deficiency syndrome (AIDS). Science (80-). 1983;220(4599):868–71.
19. Chun T-W, Justement JS, Murray D, Hallahan CW, Maenza J, Collier AC, et al. Rebound of plasma viremia following cessation of antiretroviral therapy despite profoundly low levels of HIV reservoir: implications for eradication. AIDS. 2010 Nov 27;24(18):2803–8.
20. Mbonye U, Karn J. Transcriptional control of HIV latency: cellular signaling pathways, epigenetics, happenstance and the hope for a cure. Virology. Elsevier; 2014 Apr;454-455:328–39.
21. Deeks SG, Autran B, Berkhout B, Benkirane M, Cairns S, Chomont N, et al. Towards an HIV cure: a global scientific strategy. Nat Rev Immunol. Nature Publishing Group; 2012 Aug;12(8):607–14.
22. East S, Infectious A, Clinical D. Effect of double dose oseltamivir on clinical and virological outcomes in children and adults admitted to hospital with severe influenza: double blind randomised controlled trial. BMJ. 2013 Jan;346(May):f3039.
23. Nkengasong JN, Mesele T, Orloff S, Kebede Y, Fonjungo PN, Timperi R, et al. Critical role of developing national strategic plans as a guide to strengthen laboratory health systems in resource-poor settings. Am J Clin Pathol. 2009 Jun;131(6):852–7.
24. Koplan JP, Bond TC, Merson MH, Reddy KS, Rodriguez MH, Sewankambo NK, et al. Towards a common definition of global health. Lancet. 2009 Jun 6;373(9679):1993–5.
25. Piot P. AIDS: from crisis management to sustained strategic response. Lancet. 2006; 368:526–30.

Colophon

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