7TH IAS CONFERENCE
ON HIV PATHOGENISIS,
TREATMENT AND PREVENTION

CONFERENCE SUMMARY REPORT

IAS 2013
7th IAS CONFERENCE ON HIV PATHOGENESIS,
TREATMENT AND PREVENTION
30 June - 03 July 2013 - Kuala Lumpur, Malaysia

WWW.IAS2013.ORG

ORGANIZING PARTNERS

International AIDS Society
Stronger Together Against HIV

ceria

Major Industry Sponsors

abbvie

Bristol-Myers Squibb

GILEAD
Advancing Therapeutics. Improving Lives.

MSD

ViiV Healthcare

Donors

anRS
French National Agency for Research on AIDS and Viral Hepatitis
An autonomous agency of Inserm

Chevron
Human Energy

Daktari Diagnostics

Emcure

Mylan
Seeing is believing

POSITIVE ACTION

World Health Organization

Online Scientific Coverage Partners

nam www.aidsmap.com

CLINICAL CARE OPTIONS HIV

With Support from

Science AAAS

INTERNATIONAL MEDICAL PRESS

THE LANCET
THE LANCET Infectious Diseases

MINISTRY OF TOURISM AND CULTURE MALAYSIA

Malaysia Convention & Exhibition Bureau

visit MALAYSIA 2014
Truly Asia

KUALA LUMPUR CITY HALL

maxis.

POZ

WILEY

Wolters Kluwer Health | Lippincott Williams & Wilkins

Official Airline

STAR ALLIANCE
THE WAY THE EARTH CONNECTS

Official Transport Agent

DB SCHENKER

TABLE OF CONTENTS

Delegates at IAS 2013.

INTRODUCTION

Françoise Barré-Sinoussi, IAS 2013 International Chair, at the IAS 2013 Closing Session.
© IAS / Steve Forrest / Workers' Photos

The 7th IAS Conference on HIV Pathogenesis, Treatment and Prevention (IAS 2013) was the first IAS Conference held in Asia. Attended by 5,220 participants from 127 countries, the conference featured many topics specific to the Asian region, such as addressing problems associated with injecting drug users and those co-infected with HIV and tuberculosis or hepatitis C. Kuala Lumpur, Malaysia was described as a perfect venue for IAS 2013 because for decades the country has shown leadership in the region in providing antiretroviral therapy (ART) and, despite having strict drug laws, initiated a needle-exchange programme for drug users in 2005 that led to reductions in HIV infections rates.

IAS 2013 AT A GLANCE

- 5,220 participants
- 127 countries represented
- 118 scholarship recipients (18 community scholarship recipients)
- 183 volunteers
- 2,131 abstracts submitted; 896 accepted
- 71 sessions (39 non-abstract-driven sessions, 32 abstract-driven sessions)
- 9 plenary presentations
- 35 exhibits
- 17 satellite meetings
- 7 scientific prizes and awards

Audience at the IAS 2013 Monday Plenary Session.
© IAS / Marcus Rose / Workers' Photos

Focusing more globally, IAS 2013 delegates heard the latest developments in accelerated research towards an HIV cure – with a shift from eradicating free virus (the goal when antiretrovirals became available) to the goal of targeting latent virus. In addition, considerable discussion addressed unique issues facing adolescents with HIV, a growing population as individuals infected either *in utero* or at birth head towards their teenager and young adult years. Another area of interest throughout the conference was the announcement, on the first day, of the new World Health Organization (WHO) antiretroviral guidelines, recommending early antiretroviral initiation at a CD4 count less than or equal to 500 cells/mm^3, up from 350 cells/mm^3, as well as a suite of other recommendations pertaining to ART.

Steven Deeks from the University of California, San Francisco and San Francisco General Hospital gave the keynote address on HIV as a chronic disease rather than the inevitably fatal illness it was two decades ago. Now that people are living with HIV long term, they are developing non-AIDS chronic diseases, such as cancer and cardiovascular disease; as a result, long-term HIV treatment must switch its focus from acute to chronic care.

This report provides highlights of research presented in:
Track A, Basic Sciences;
Track B, Clinical Sciences;
Track C, Prevention Science and
Track D, Operations and Implementation Research.

In addition to summarizing the highlights of the IAS 2013 programme, this report analyzes their implications for future research, policy and programming.

In the past year the hope for an HIV cure has increased with the announcements of the "Mississippi baby" case – the first functional cure of an infant following ART started at 30 hours after birth – and the VISCONTI cohort of 14 patients in France who have maintained control of their HIV infection for a median of 7.5 years after ART interruption. The cure theme continued as conference delegates heard details of two HIV-positive Boston cancer patients who have no trace of the virus after receiving stem-cell transplants and later stopping ART.

However, the overall emphasis of the meeting was a focus on addressing the limitations of ART and making ART available to all who need it globally, in particular to pregnant women to prevent mother-to-child transmission (PMTCT). Delegates heard that only around 30% of pregnant women are offered an HIV test in East, South and Southeast Asia, and that across the three same regions only around 16% of HIV-infected pregnant women receive antiretrovirals to prevent MTCT of HIV.

NEW WHO GUIDELINES ANNOUNCED

The HIV and AIDS epidemic, which has killed 25 million people in the 30 years since HIV was discovered, is showing some signs of being turned around. The Joint United Nations Programme on HIV and AIDS says deaths from the disease fell to 1.7 million in 2011, down from a peak of 2.3 million in 2005 and from 1.8 million in 2010. And access to treatment is far broader, with new World Health Organization (WHO) data showing 9.7 million people with HIV taking antiretrovirals in 2012 compared with just 300,000 people a decade earlier.[1]

The number of people gaining access to antiretroviral treatment (ART) will increase further following release of new WHO guidelines – announced at IAS 2013 – encouraging health authorities worldwide to start treatment in adults with HIV as soon as CD4 cell counts fall to of 500 cells/mm^3 or less.[1] The previous WHO standard was to offer treatment at a CD4 count of 350 cells/mm^3 or less, effectively, when the virus has already started to damage the patient's immune system. Under the new guidelines, some 26 million HIV-positive people – or around 80% of all those with the virus – should be getting ART.

The guidelines also recommend that all pregnant or breastfeeding women and all children under five years old with HIV should start treatment immediately, whatever their CD4 count, and that all HIV patients should be regularly monitored to assess their viral load. This monitoring allows health workers to check whether the medicines are reducing the amount of virus in blood. It also encourages patients to keep taking their medicine because they can see it having positive results.

Delegates heard that getting antiretrovirals to the additional patients targeted by the new guidelines would require another 10% on top of the $24 billion a year currently needed to fund the global fight against HIV and AIDS. However, the conference also heard that 3 million more lives would be saved globally by 2025 if antiretrovirals are offered soon after they test positive for the virus.

The guidelines, which set a global standard for when people with HIV should start ART, were drawn up after numerous studies found that treating HIV patients earlier can keep them healthy for many years and also lower the amount of virus in blood, significantly cutting their risk of infecting someone else.

EXECUTIVE SUMMARY

New WHO guidelines[1] were released recommending starting antiretroviral treatment as soon as the CD4 cell count falls to 500 cells/mm^3 or less. The previous WHO standard was to offer treatment at a CD4 count of 350 cells/mm^3 or less, effectively, when the virus has already started to damage the patient's immune system. Under the new guidelines, some 26 million HIV-positive people – or around 80% of all those with the virus – should be getting antiretroviral therapy. The guidelines also recommend that all pregnant or breastfeeding women and all children under five years old with HIV should start treatment immediately, whatever their CD4 count, and that all HIV patients should be regularly monitored to assess their viral load.

Two cancer patients also infected with HIV have no trace of the virus in the cells and tissues examined after receiving stem-cell transplants and later stopping antiretrovirals therapy, a finding suggesting they may have be on track to achieving long-term control of their AIDS-causing infection. These two HIV-infected patients received reduced-intensity conditioning allogenic hematopoetic stem cell transplantation (RIC-alloHSCT) from wild-type CCR5 donors while continuing ART.[4,5] The two patients, referred to as the "Boston patients," stopped HIV treatment after the transplants, which in other cases has led to the virus returning. At the time of the presentation, one patient had no sign of the virus 15 weeks after stopping treatment, while the other had gone seven weeks without HIV rebounding.

The Bangkok Tenofovir Study assessed whether people who inject drugs can adhere to daily pre-exposure prophylaxis.[49] Previous trials of tenofovir-based oral PrEP yielded divergent results, with adherence proving a critical determinant in successful protection from HIV infection. The Bangkok Tenofovir Study is the first randomized, placebo-controlled trial to test PrEP of any sort in IDUs. After seven years researchers found that study participants took tenofovir as PrEP 84% of the time, which was associated with a significant reduction in HIV infection: with 17 new infections in the study group compared to 33 in the placebo group – or a 49% reduction in HIV infection risk.

The HIV NAT 152 PEARL study from Thailand showed that 70% of the standard dose of lopinavir/ritonavir (the protease inhibitors used most often to treat children) is as effective in achieving and maintaining viral suppression as the standard dose – with the added advantage that lower doses led to lower mean levels of total cholesterol and triglycerides. The 48-week analysis of the five-country ARIEL study of antiretroviral-experienced children between three and six years and weighing between 10kg and 20kg found that children in this cohort receiving darunavir/ritonavir and an optimized background regimen had a high virologic response rate and favourable safety findings, with no resistance developing. These findings led to a recommendation of doses for this age group.[19]

Research is focusing on sites where HIV reservoirs might remain hidden and prevent a functional cure. T follicular helper cells may act as one of these reservoirs. One study determined that players in the p21/RNR2/E2F1 cascade may represent therapeutic targets, and another study found that the neutralizing antibody 3B3, if bound to a toxin before mice are treated with ART, led to a significant reduction in viral load.

A number of studies focused on the development of diseases in people with HIV who have consistent access and a positive response to ART. These people are now developing a range of age-related co-morbidities, including cardiovascular disease, and increased levels of multiple markers of inflammation. A study in western India confirmed that people with HIV undergoing treatment with tenofovir have a higher rate of nephrotoxicity than patients taking non-tenofovir regimens; the study site is important because tenofovir is becoming a drug of choice in

Speakers of the IAS 2013 Satellite Session "WHO Global Update on HIV Treatment: Results, Impact and Opportunities".

resource-limited countries. Another study confirmed that HIV infection affects bone mineral density and a large population-based study found a five-fold increased risk of hip fracture in HIV-infected patients independent of gender, age, body mass index, smoking, alcohol consumption and other co-morbidities.

Researchers looked at innovative ways to promote HIV testing as a crucial precursor to getting people with HIV into care rapidly. One study assessed the impact of mobile testing services in Bangkok, and two studies looked at the use of incentives to increase testing: providing lottery tickets to those tested in a study in Lesotho[38] and offering small cash incentives to hard-to-reach substance abusers in Canada: $10 for taking an HIV test and $15 if participants return for their results within four weeks.[39] A Kenyan study looked at the advantages of home-based testing of pregnant women as a way to promote testing of partners and other family members.[40]

Four studies examined ways to increase uptake of male circumcision as a way to reduce HIV transmission across sub-Saharan Africa. The Systematic Monitoring of Voluntary Medical Male Circumcision (SYMMACS) study looked at voluntary medical male circumcision services across a number of sites in South Africa,[54] and three studies looked at the efficacy of promoting Shang Rings as an alternative to standard medical circumcision.[49, 54, 55]

Data were presented showing that non-African middle-income countries are paying an average 400% more for ART than African countries with similar gross national incomes (GNI). The study – done by researchers in South Africa, Thailand and the UK and looking at five frequently prescribed antiretrovirals – found that antiretroviral prices remain stable in African countries regardless of GNI, while non-African countries have widely varying prices unrelated to GNI.[64]

Adeeba Kamarulzaman, IAS 2013 Local Co-Chair, at the IAS 2013 Opening Session.
© IAS / Steve Forrest / Workers' Photos

Aziza Ahmed, IAS 2013 Plenary Speaker, at the Monday Plenary Session.
© IAS / Steve Forrest / Workers' Photos

TRACK A

Timothy Henrich at the IAS 2013 Late Breaker Track A session.
© IAS/ Steve Forrest/Workers' Photos

BASIC SCIENCES

STEPS TOWARDS HIV CURE STRATEGIES

While a number of studies presented at IAS 2013 revealed the efficacy of ART soon after infection and diagnosis with HIV, certain studies showed HIV RNA or DNA levels below detectable limits in the tissue and cell reservoirs assessed, effectively, a functional cure. In 2013 there had already been two major announcements of potential functional cures (control of HIV replication without ART): The Mississippi baby appeared to be the first functional cure of an infant after ART began 30 hours after birth later stopped,[2] and the VISCONTI cohort offered evidence on 14 adult patients in France who maintained control of their HIV infection for a median of 7.5 years after interrupting ART begun during primary infection.[3]

Timothy Henrich of Harvard Medical School and Brigham and Women's Hospital presented new data in a late-breaker session about two HIV-positive cancer patients who have no trace of the virus in peripheral blood and certain viral reservoirs after receiving stem-cell transplants, findings suggesting they have achieved undetectable levels of the AIDS-causing infection. While continuing ART, these two HIV-infected patients received RIC-alloHSCT from wild-type CCR5 donors, that is, without the genetic change that protects CD4 cells from HIV infection.[4,5]

(from left to right): Daniel Kuritzkes, Deborah Persaud, Françoise Barré-Sinoussi, Sharon Lewin and John Frater at the "Towards an HIV Cure" press conference.
© IAS/ Steve Forrest/Workers' Photos

The two men, referred to as the "Boston patients," later stopped HIV treatment, which almost invariably leads to a rebound in plasma viremia. At the time of the presentation, one patient had no sign of the virus in the blood or other compartments assessed 15 weeks after treatment stopped, while the other patient had gone seven weeks without HIV rebounding.

Henrich said it is too early to conclude the two men have been cured and that HIV may be lingering in their brains or gut. Still, their cases are similar to that of Timothy Brown, the so-called Berlin patient, who was the first person cured of HIV infection after getting a bone marrow transplant in 2007.[6]

Another case of prolonged control of HIV replication after stopping ART was presented by Jan van Lunzen of the University Medical Centre Hamburg-Eppendorf.[7] The case involved a German man who likely contracted HIV in 1999. When diagnosed, he had a viral load above 1 million copies/mL and a CD4 cell count below 500 cells/mm^3. He started ART less than three months after exposure and within a month of seroconverting. His viral load was rapidly suppressed below detection levels and, in 2004, he chose to undergo treatment interruption. HIV has remained undetectable since that interruption during which there was a small viral rebound.

The organizers of the VISCONTI cohort[3] have called for researchers to identify people with HIV who appear to have undergone "functional cures" or have undetectable levels of HIV after ceasing treatment – so it is possible that the number of such patients identified may soon increase.

One session highlighted major obstacles in understanding CD4 T-cell loss during HIV infection and potential mechanisms involved in immune reconstitution during ART. Richard Koup, from the US National Institutes of Health, identified cells within the peripheral blood that actively transcribe HIV and may be critical for cure strategies. The group identified a subset of low-frequency cells called 'CD4 null' that had high viral RNA transcription and could be targets for eradication.[8]

A French group from INSERM detailed a large analysis of HIV elite controllers and three comparison groups, which showed persistent inflammation in elite controllers along with T-cell activation that correlated with falling CD4 counts.[9] Elite controllers are HIV-positive people who have an undetectable viral load even though they are not on antiretroviral therapy. But growing evidence suggests HIV disease progression even in elite controllers. This study compared markers of inflammation and T-cell activation in 70 elite controllers, 32 untreated HIV-positive people with a detectable viral load, 31 antiretroviral-treated people, and 40 healthy HIV-negative volunteers. Elite controllers had higher levels of three inflammation markers (IP10, TNFα and sCD14) than did HIV-negative volunteers.

Levels of five inflammation markers (IP10, IL6, MCP1, sCD163 and IL10) were lower in elite controllers than in untreated HIV-positive people and similar to levels in antiretroviral-treated people. In elite controllers a higher IP10 level meant a higher proportion of activated CD4 and CD8 T cells and a greater HIV-specific CD8 response. Higher levels of two markers (IP10 and sCD163) correlated with lower CD4 counts after 1 year of follow-up. The researchers concluded that increased inflammatory markers in the HIV elite controllers could have implications for treatment in these patients.

A group from Argentina presented data showing that antibody-dependent cellular cytotoxicity (ADCC) appears to make an important contribution to the natural immune response to HIV infection.[11] To assess the impact of ADCC on acute and ongoing HIV infection, researchers collected plasma samples from 20 people with acute HIV infection, 10 HAART-naïve chronically infected patients and 7 elite controllers. The researchers found that ADCC responses arose early after infection and increased during the first year post-infection. They also found that initiation of HAART during the first year post-infection modifies ADCC responses – and that there was no association found between the magnitude of ADCC responses and the evolution of acute infection or early disease progression.

ROLE OF LYMPH NODES IN ASSISTING HIV REPLICATION

Lymph Nodes and other secondary lymphoid tissues are where adaptive immune responses are triggered and promoted. They are also a major site of HIV/SIVmac replication resulting in changes to the structure of LN and its cells. Scientists have discovered more about how HIV and the immune system interact at LN in relation to potential viral reservoirs, immunopathogenesis of HIV infection, and triggering of immune responses. In particular researchers focused on the subsets of LN cells susceptible to infection, including recent data on infection of T follicular helper cells.

A German group, headed by Jan van Lunzen, asked where HIV replicates in LN (12). Focusing on T follicular helper cells (TFH) they found that:

- These cells are expanded in chronic infection.
- Their expansion correlates with a skewing of B-cell subsets in chronic HIV infection.
- TFH cells serve as a viral reservoir that promotes HIV infection.

Van Lunzen concluded that TFH cells represent the primary obstacle for achieving a functional HIV cure.

TARGETING THE HIV-INFECTED CELL RESERVOIR

As described above, lymph nodes are increasingly seen as HIV reservoirs and therefore targets for eradication strategies. Simply killing activated cells and promoting immune surveillance may not be enough to effectively deplete the HIV-infected reservoirs hidden in lymph nodes and other organs and tissues.

Victor Garcia of the University of North Carolina studied such a potential cell-killing missile. The molecule is a broadly neutralizing antibody called 3B3 that attaches itself exclusively to HIV surface proteins.[14] Garcia engineered the 3B3 antibody to attach a *Pseudomonas*-derived toxin, PE38, to activated cells from which HIV is budding, and the toxin then enters the cells and kills them.

This molecule was injected into mice that had been genetically altered so they could be infected with human HIV. Three weeks after the mice were infected with HIV they began a course of ART, and four weeks after that they were given two weekly doses of 3B3-PE38, a smaller then a larger dose.

The bacterial toxin produced up to a 3.2-log (1000-fold) greater drop in HIV RNA inside cells than ART. More importantly, the absolute number of cells expressing HIV RNA decreased from between 1,100 and 20,000 per gram of tissue to between 600 and 3,000 per gram, an approximately six-fold drop in the presumed size of the reservoir. This area of research is important because – although ART dramatically suppresses production of HIV within immune cells – it is incapable of getting to all HIV-infected cells.

Audience at IAS 2013.
© IAS/Steve Forrest/Workers' Photos

As ART use becomes more refined it is crucial that other treatments be developed that can "fill in the gaps" that ART cannot penetrate in attempts to eradicate HIV.

In a similar vein, researchers from Cambridge, Massachusetts targeted HIV-1 persistence in CD4 T memory stem cells by a new class of drugs called beta-catenin inhibitors.[15] Beta-catenin is a protein that halts differentiation of stem cells into memory cells. Inhibitors of this protein would allow these cells to be revealed to the immune system. Mathias Lichterfeld of Massachusetts General Hospital found that beta-catenin inhibitors turned three-quarters of former stem cells into effector-memory cells (stimulated cells actively producing HIV) in test-tube trials. Combining beta-catenin inhibitors with panobinostat appeared to roughly double their cell-stimulating effect. Beta-catenin inhibitors multiplied by 20-fold the production of HIV RNA within cells from two people with no reaction to panobinostat alone and doubled HIV RNA production in cells from a patient whose cells had become less activated by panobinostat.

NATURAL KILLER CELL STRATEGY

Uriel Moreno Nieves of the Institut Pasteur in France highlighted the immune system cells called natural killer (NK) cells – commonly known as the body's first line of defense against viruses.[16] Moreno Nieves incubated dendritic cells with a candidate vaccine of the MVA type in which HIV proteins are wrapped up inside the shell of another, harmless virus called modified Vaccinia Ankara.

These dendritic cells were then mixed with NK cells from the same people. The NK cells, now sensitized to HIV and able to recognize and kill cells expressing HIV proteins, were then mixed with CD4 cells and other dendritic cells. HIV was then introduced. The presence of the sensitized NK cells reduced the proportion of dendritic cells infected with HIV from 45% to 25% and of CD4 cells from 35% to 20%. Because these HIV sensitized NK cells appear to be less targeted at specific variants of HIV, it is possible that fewer HIV infected cells will be able to evade its immune control.

This research was one of a growing number of studies in early stages designed to drive ongoing HIV infection down to the absolute minimum and perhaps ultimately allowing suspension of ART for long periods in chronically infected people. However, the investigators urged delegates to remember that these experiments are in very early clinical or preclinical stages and that it may be years before they are turned into an effective strategy.

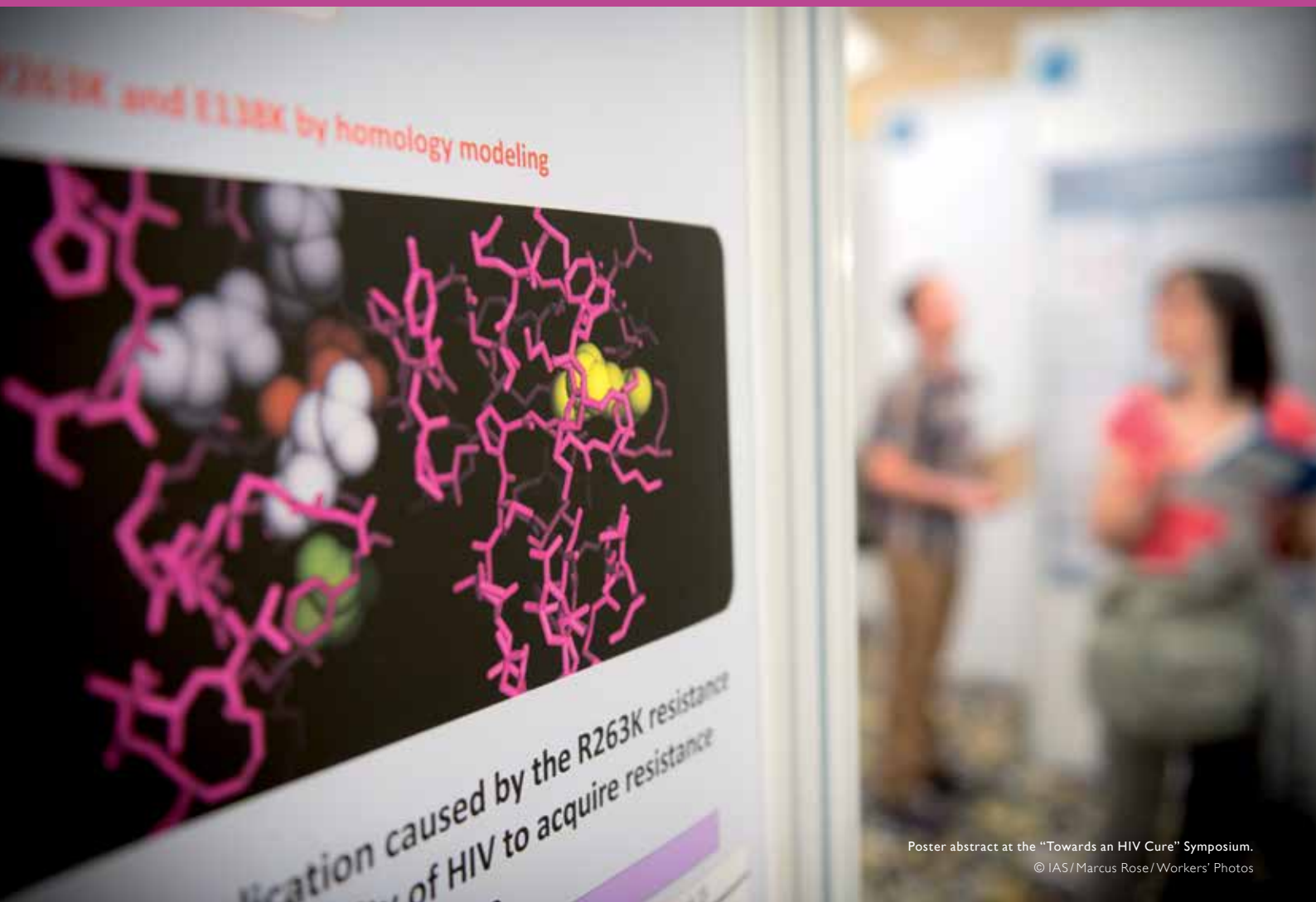
TRACK B

CLINICAL SCIENCES

HIV INFECTION IN CHILDREN AND TEENAGERS

As the lead researcher behind what has become known as the "Mississippi baby" case, Deborah Persaud from Johns Hopkins University in the United States spoke about recent progress in the search for a cure for HIV, and in particular the paediatric perspective of these developments. The "Mississippi baby" was apparently cured of HIV infection after very early antiretroviral therapy,[2] an outcome suggesting that immediate treatment may prevent establishment of latent HIV infection in infants, which is an obstacle to curing people with chronic HIV infection. In the Mississippi infant case report, standard antiretroviral therapy lowered circulating HIV to undetectable levels, but treatment stopped when the mother and infant dropped out of care. When care resumed, HIV capable of replicating could not be detected in the infant.

Deborah Persaud at the IAS 2013 Symposia Session Track B: "Growing up with HIV: transitioning adolescents to adult care".
© IAS / Marcus Rose / Workers' Photos



Poster abstract at the "Towards an HIV Cure" Symposium.
© IAS / Marcus Rose / Workers' Photos

At IAS 2013 Persaud focused on mechanisms of HIV persistence in viral reservoirs in children, arguing that an HIV cure has been an elusive goal because a persistent HIV reservoir becomes established early in the course of infection and children diagnosed at an older age appear to establish reservoirs in a similar manner to adults. Insights from the "Berlin patient"[6] and the "Mississippi baby"[2] have changed the framework of what is conceived as possible with relation to a sterilizing cure, or a clearance of infection and a functional cure characterized as a persistent infection controlled by host-related mechanisms. In paediatrics, it appears that very early therapy may afford the opportunity to prevent long-lived reservoir establishment, similar to evidence from adult studies like the VISCONTI cohort.[3] An exciting cure research agenda is underway, including plans for early treatment protocols for HIV-infected infants using standard antiretroviral therapy within the first days of life while HIV infection is being confirmed.

As the cohort of babies and young infants infected through maternal transmission of HIV become teenagers and young adults, research is focused on differences in the way the infection manifests itself in these younger people compared with adults.

Cardiovascular disease (CVD) affects a higher proportion of HIV-positive adults than HIV-negative adults.[17] However, because CVD rates and risk are less well understood in children and adolescents, who face lifelong antiretroviral therapy, researchers in Thailand compared results of echocardiography and carotid artery intima media thickness (cIMT, a signal of atherosclerosis) in 100 HIV-positive adolescents who took antiretrovirals for at least 6 months and 50 healthy adolescents without HIV.[18]

While overall echocardiography and cIMT findings were similar in the HIV-positive and HIV-negative groups, cIMT was significantly greater (worse) in HIV-positive adolescents receiving treatment with protease inhibitors for more than 6 months. The investigators concluded that continuing follow-up in this group and others will be needed to further explore the impact of HIV and protease inhibitors on CVD in adolescents.

Lopinavir/ritonavir (LPV/r) are the protease inhibitors used most often to treat children. Research from another Thai study showed that low doses – down to 70% of the standard dose – achieve and maintain viral suppression as well as the full dose.[19] The researchers evaluated maintenance of virologic efficacy of low-dose versus standard-dose LPV/r among children who had already achieved virologic suppression at 11 sites across Thailand. Significantly lower mean levels of total cholesterol and triglycerides were noted in the low-dose group. The researchers noted that the study can only be generalized to children with controlled, undetectable viral load and not to children just starting ART with a high viral load.

At the CROI meeting in 2011, Avy Violari from Johannesburg presented the primary 24-week analysis of the ARIEL study that led to approval of darunavir/ritonavir (DRV/r) in treatment-experienced children aged three to under six years and weighing less than 10kg (20). This study was important because it showed that 57% of children in this single-arm trial had viral loads under 50 copies/mL at week 24 with a safety profile comparable to adults. This outcome compared with a 75% success rate (i.e., under 50 copies/mL at 24 weeks) among six- to 12-year-olds and 39% among 12- to 18-year-olds.

At the Kuala Lumpur meeting, Violari presented the 48-week analysis of the ARIEL trial of DRV/r in treatment-experienced children aged three to under six years of age and weighing 10 to 20kg at 10 sites in Argentina, Brazil, India, Kenya, and South Africa.[21] The 48-week analysis found that treatment-experienced children in this age group receiving DRV/r and an optimized background regimen maintained a high virologic response rate and a favourable safety profile.

IS A.R.T. BECOMING MORE SUCCESSFUL?

Triple combination ART has been used to treat patients with HIV since its advent in 1996. Researchers are now fine-tuning treatment to deplete HIV-1 reservoirs and restore T cell counts earlier in the course of infection, in part propelled by results of the VISCONTI study suggesting there are virologic and immune benefits to starting ART during early HIV infection in adults.[3] The observational VISCONTI study identified 14 people in France who started ART soon after becoming infected with HIV and later stopped their antiretrovirals and maintained a viral load below 50 copies/mL for a median of 7.5 years.

The French OPTIPRIM-ANRS147 trial described at the IAS 2013 meeting involved 90 adults who started 12 months of ART within a median of 35 days after HIV infection. HIV DNA in peripheral blood mononuclear cells (PBMCs) – one of the viral reservoirs that must be limited to allow suspension of ART – fell sharply by 0.75 log copies/million PBMCs after 3 months of treatment, by 1.12 log after 6 months, and by 1.37 log after 12 months. (One log equals a 10-fold change.) By month 12 half of study participants had an HIV DNA level below 2.3 log copies/million PBMCs (that is, below 200 copies/million PBMCs). The researchers suggested that this "rapid and intense decrease in cell-associated HIV DNA within one year" of treatment "probably results from initiation of ART very early after HIV infection".[22]

Antiretroviral guidelines in the United States now recommend starting treatment in people who test positive, regardless of CD4 count (23). To examine possible immunologic (T-cell-related) benefits of that strategy, researchers at Orleans Hospital in France conducted a prospective cohort study of 283 people starting ART, including 28 starting at a CD4 count above 500 cells/mm^3, 26 starting at 350 to 500 cells/mm^3, 113 starting at 200 to 350 cells/mm^3, and 116 starting below 200 cells/mm^3 (24). The study period ran from 2005 to 2012 and median follow-up was 4 years. Compared with starting ART at a CD4 count below 500 cells/mm^3, starting treatment above that level did better in restoring CD4-cell counts to a normal level of 900 cells/mm^3 or greater, re-establishing a normal CD4/CD8 ratio, and attaining a low cellular HIV DNA level. The authors concluded that their results support early treatment,

IAS 2013 International and Media Scholarship recipients.

even in patients with a high CD4 count, to promote optimal CD4 T-cell reconstitution and limit the size of the latently HIV-infected PBMC reservoir.

One of the goals of ART is to develop long-acting antiretrovirals to encourage good adherence. A US study revealed the potential for a maintenance or PrEP option that could be taken monthly or perhaps less often by combining two antiretrovirals formulated as long-acting nanosuspensions. A group from GlaxoSmithKline tested GSK1265744 (an integrase inhibitor) and TMC278 (a nonnucleoside), which can be injected perhaps as infrequently as monthly or quarterly. The study assessed drug levels of GSK1265744 with or without TMC278 at various doses in 47 healthy HIV-negative volunteers, 40 of whom received at least one injection. Everyone took GSK1265744 by mouth for 14 days then got randomized to one of four different monthly or quarterly injection schedules. Two of the groups also received two monthly injections of TMC278. In all dose cohorts plasma drug concentrations reached therapeutic levels within three days. Levels of both the GSK1265744 and TMC278 between doses remained above the 90% inhibitory concentration and GSK1265744 reached concentrations which have been shown to reduce viral load in previous studies of people with HIV. The results suggested that this drug may provide a PrEP option that could be taken once a month.[25]

An Australian study also supports the trend towards less frequently dosed antiretrovirals.[26] US Department of Health and Human Services antiretroviral guidelines for adults and adolescents recommend several "preferred" and "alternative" regimens for initial ART.[23] Despite significant advances in ART, a large proportion of people still fail to achieve full HIV suppression and many stop ART for a series of reasons. This large meta-analysis scrutinized 114 trials with 216 arms involving 40,124 people and assessing virologic and safety outcome differences between the preferred and alternative regimens with up to 144 weeks of follow-up. The analysis involved 216 study arms spanning the period 1994 – 2010. The primary endpoint was proportion of patients with undetectable viral load for the reported duration of the study. Virologic response rates rose steadily over the years, a finding underlining steady improvements in antiretroviral efficacy, safety and tolerability.

Multivariate statistical analysis determined that preferred or alternative regimens with fewer pills per day had a significantly greater chance of controlling HIV. Also of note, US guideline-recommended "preferred regimens" demonstrated significantly better efficacy than "alternative regimens." This study is important because, despite the huge number of clinical trials conducted on ART, there are few that reveal a broad overview of how ART is performing. This study provides these insights in a way that could help further inform treatment guidelines.

IMPACT OF A.R.T. ON KIDNEY FUNCTION AND BONE DENSITY

As raised by Steven Deeks on the first day of IAS 2013, ART has potentially harmful long-term consequences. Now that people with HIV have been taking ART for many years, determining the impact of long-term complications has gained urgency. An area of continuing interest is the effect of tenofovir on kidney function. To date most studies evaluating tenofovir-related kidney toxicity have been done in Europe and the US. At IAS 2013 a study of tenofovir-treated people in western India found a higher rate of nephrotoxicity than seen in western populations.[27] The study is important because tenofovir is commonly used in resource-limited and middle-income countries.

A study from British Columbia, Canada looked at the renal impact of switching from a tenofovir-based regimen with or without atazanavir to an abacavir regimen.[28] This retrospective study of 225 patients found significant improvements in renal function (creatinine, estimated glomerular filtration rate, phosphatemia, and urine albumin to creatinine ratio) after the switch to abacavir, without significant changes in plasma HIV RNA. In addition CD4 cell counts increased and lipid profiles remained stable after the switch to abacavir. Similar trends were observed whether or not the third drug in the regimen was atazanavir. The authors concluded that switching from tenofovir to abacavir-based ART is effective and safe and improves renal function parameters among patients who are responding to tenofovir-based ART regardless of whether they are also on atazanavir.

A number of studies looked at bone changes during second-line therapy, fractures, and HIV- and HCV-related bone loss. A study by Roger Bedimo at the University of Texas evaluated bone mineral density (BMD) changes in patients with HIV and HCV.[29] Overall, HIV and HCV independently lowered BMD and T-scores (smaller contribution for HCV) with no interaction seen between the two infections. A population-based study of HIV-positive and negative people in Spain showed that HIV infection is associated with increased risk of hip fracture.[30] Compared with HIV-negative people, those with HIV infection had almost a 5-fold higher hip fracture risk, independently of gender, age, body mass index, smoking, alcohol consumption and other co-morbidities. An overall 75% higher risk of all clinical fractures among HIV-infected patients underlined the need for more bone research in this patient population.

SECOND LINE A.R.T. – THE EARNEST TRIAL

There are over 6 million people taking ART in sub-Saharan Africa. In a late-breaker session researchers discussed results from the Europe-Africa Research Network for Evaluation of Second-line Therapy (EARNEST) Trial – a randomized trial of three second-line antiretroviral strategies at 14 sub-Saharan sites.[32] The EARNEST study examined second-line therapy by randomizing 1,277 African patients failing first-line therapy to one of three second-line treatment options: (A) lopinavir/ritonavir plus two or three investigator-selected

Rebekah Puls at the IAS 2013 Late Breaker Track B session.
© IAS / Steve Forrest / Workers' Photos

nucleosides, (B) lopinavir/ritonavir plus raltegravir, or (C) lopinavir/ritonavir alone after a 12-week lead-in with raltegravir. After 96 weeks of treatment, 86% in group A versus 61% in group C had a viral load below 400 copies/mL, a highly significant difference. Virologic response rates did not differ significantly between group A and group B. Among viral samples analyzed so far in people with virologic failure, a significant proportion in group C (17%) than in group A (3%) or group B (1%) had intermediate or high-level resistance to lopinavir.

The EARNEST team concluded that boosted protease inhibitor monotherapy is unsuitable for typical rollout programme settings that lack regular/reliable viral load monitoring and that nucleosides retain substantial virologic activity in second-line boosted protease inhibitor regimens.

SINGLE VERSUS MULTI-TABLET A.R.T. REGIMENS

Once-daily single-tablet antiretroviral regimens such as Atripla, Complera, and Stribild may increase adherence, but it is not clear whether people on a single-tablet regimen continue that regimen longer than those on a multi-tablet daily regimen.

A non-randomized 586-person Canadian study compared outcomes in people starting their first antiretroviral therapy as a single-tablet regimen (Atripla) or one of three recommended multi-tablet regimens (two nucleosides plus either raltegravir, atazanavir/ritonavir, or darunavir/ritonavir).[33] The researchers found that, after almost 3 years of follow-up, about one third of people in either the single-tablet group or the multi-tablet group stopped their regimen. However, statistical analysis that weighed the impact of several factors that may affect stopping a regimen found that people on a twice-daily 3-pill combination were less likely to stop their regimen than people taking a single, daily tablet.

A.R.T. AND ADOLESCENTS

Focusing on the unique needs of HIV-infected teens and children, researchers looked at current paediatric antiretroviral therapies and presented new paediatric data on more recently introduced agents. In an attempt to determine the most effective antiretroviral regime for children amongst the most commonly available, researchers for the Collaborative HIV Paediatric Study (CHIPS) looked at children starting their first antiretroviral regimen. The UK and Irish researchers assessed factors at ART initiation associated with (i) virological suppression less than 400 copies/ml by 12 months and (ii) virological failure defined as the earliest of either: confirmed rebound more than 400 copies/ml by 12 months; unconfirmed rebound more than 400 copies/ml; unconfirmed rebound then treatment modification, or viral load of more than 400 copies/ml after 12 months on ART without previous suppression. The study concluded that three-drug efavirenz regimens and four-drug non-nucleoside regimens appeared at least as effective as three-drug protease inhibitor-based regimens in maintaining virologic suppression.[34]

HCV CO-INFECTION – ROLE OF TRIPLE THERAPY AND DIRECT-ACTING ANTIVIRALS

People with HIV/HCV co-infection experience more rapid liver disease progression, on average, than people with HCV alone and generally do not respond as well to interferon-based therapy. This population has an urgent need for better treatment options, but adding the HCV protease inhibitors boceprevir (Victrelis) or telaprevir (Incivek or Incivo) can increase the risk of side effects and drug-drug interactions with antiretrovirals.

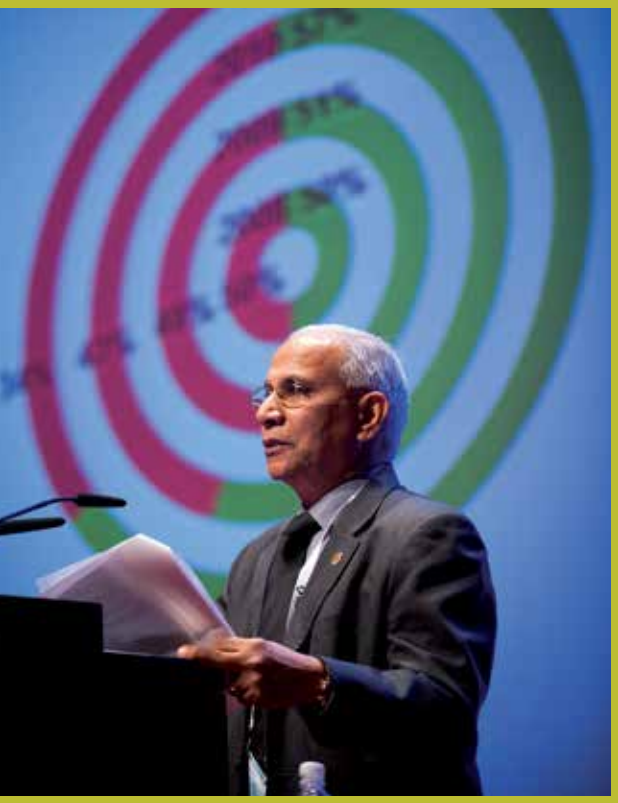
The first-generation anti-HCV protease inhibitors have been available in France since 2011. Dominique Salmon from Cochin Hospital in Paris and fellow investigators with the ANRS CO13 HEPAVIH cohort study looked at treatment access and outcomes among co-infected patients in a "real-life" clinical practice setting.[35] In clinical trials of patients infected with HCV genotype 1, triple therapy with boceprevir or telaprevir improved response rates by approximately 30% over pegylated interferon/ribavirin alone, she noted, but trials often have restrictive entry criteria that exclude many people who need treatment in the real world.

The prospective HEPAVIH cohort included 1324 co-infected individuals with genotype 1 HCV who were followed at 24 clinical centres in France between January 2011 and June 2013. The researchers compared outcomes among 320 eligible patients – 114 (36%) who started triple therapy and 206 (64%) who did not – looking at contraindications, early treatment response, and adverse events.

Nearly three-quarters of people in this cohort achieved end-of-treatment virologic response to hepatitis C treatment with telaprevir plus pegylated interferon/ribavirin, even though one-third had potential contraindications to this type of therapy, mainly psychiatric disorders.

Karine Lacombe, IAS 2013 Plenary Speaker, at the Wednesday Plenary Session.
© IAS/Steve Forrest/Workers' Photos

TRACK C



J.V. R. Prasada Rao, IAS 2013 Plenary Speaker, at the Tuesday Plenary Session.
© IAS / Steve Forrest / Workers' Photos

PREVENTION SCIENCE

DEALING WITH IV DRUG USERS – SPECIAL NEEDS

The Bangkok Tenofovir Study assessed whether people who inject drugs can adhere to daily pre-exposure prophylaxis.[49] Previous trials of tenofovir-based oral PrEP yielded divergent results, with adherence proving a critical determinant in successful protection from HIV infection.[49] The Bangkok Tenofovir Study is the first randomized, placebo-controlled trial to test PrEP of any sort in IDUs. Starting in June 2005, researchers enrolled 2,413 IDUs and randomized them to daily oral tenofovir or placebo. Participants could choose either daily follow-up with directly observed therapy (DOT) or monthly follow-up without DOT. (With DOT, a health worker observes a trial participant taking study drug.) At the end of follow-up on June 2012, researchers found that study participants took tenofovir 84% of the time, which was associated with a significant reduction in HIV infection: with 17 new infections in the study group compared to 33 in the placebo group – or a 49% reduction in HIV infection risk. It was noted that adherence was better in older participants than in younger participants and in women than in men, but adherence did not differ by treatment group.

Speakers at The IAS 2013 Special Session: "Evidence based drug policies for an effective HIV response".
© IAS / Marcus Rose / Workers' Photos

TESTING: THE FIRST STEP IN THE CASCADE OF HIV PREVENTION AND CARE

HIV testing for people at risk is the crucial first step in the cascade of HIV prevention and care. A number of studies at IAS 2013 looked at innovative ways to increase testing as a way to identify HIV-infected people as well as their family members.

Kenyan health authorities estimate that more than 50% of HIV-positive people in the country do not know they are infected, and almost one quarter do not know the HIV status of their sex partners. A University of Maryland study enrolled more than 7000 HIV-positive Kenyan adults ("index patients") in a systematic family-centered HIV testing programme.[36] Almost two thirds of index patient partners got tested for HIV, and almost three quarters of those tested had HIV infection.

Among more than 7,000 children tested for HIV, over 10% tested positive. More than 8,000 relatives of HIV-positive index patients got tested, and more than half tested positive. The researchers concluded that family-centered HIV testing and counselling is a productive strategy for identifying related adults and children with a high risk of HIV infection by:

- using the index HIV-infected client enrolled in HIV care as an entry point for HIV testing of family members
- identifying concordant HIV-infected sex partners, and supporting their linkage to care
- identifying HIV-serodiscordant partnerships and supporting disclosure to promote initiation of HIV prevention interventions
- identifying and enrolling HIV-infected children and extended-family members of the index client into care.

Two studies looked at the efficacy of a range of incentives to increase testing. A Thai study provided a mobile HIV counselling and testing service over a two-day period in the Bangkok metropolitan area.[37] Free HIV tests were offered to clients asked to voluntarily register with their national identification cards. During the two-day period 677 people decided to have the HIV test.

A Swedish group studied the impact of short-term financial incentives on incidence of HIV and other sexually transmitted infections (STIs) in young people in Lesotho.[38] A randomized trial linked the receipt of lottery tickets to negative results for rapid tests for two curable STIs: syphilis and *Trichomonas vaginalis*. The study involved 3,426 men and women aged between 18 and 32 living in 29 villages across Lesotho who were divided into high value lottery; low value lottery and a control arm. All were tested for STIs and received treatment if required as well as four monthly counselling for 2 years. The participants were also tested for HIV at 0, 16, 20 and 24 months after the start of the trial. The researchers found that young men were not influenced by the lottery incentive but the intervention was effective for young women reducing infection rates by a third, for both high and low value lottery arms with even greater (39%) reduction in new HIV infections in the high value arm of the study.

Bertrand Audoin, IAS Executive Director, at the IAS Members' Meeting: "None left behind".
© IAS / Steve Forrest / Workers' Photos

Because substance users are hard to reach regarding access and adherence to various HIV-related health services like testing, counselling and ART, a study in Vancouver tried to evaluate the effectiveness of linkage to HIV testing and post-test counselling through the offer of $10 if participants had an HIV test and an additional $15 if they came back for test results within 4 weeks.[39] While 83% of incentive-arm participants completed all scheduled visits, only 11% in the non-incentive arm did so, a result showing that modest incentives were a powerful way to increase the proportion of drug users linking to testing and post-test counselling.

A randomized trial in Kenya evaluated the feasibility of testing partners of young pregnant women to identify HIV-positive men unaware of their HIV status.[40] The trial randomized 300 women who came to their first antenatal visit without their partner to **(1)** home-based couples HIV testing or **(2)** clinic-based couples testing. Women in the home-testing group were immediately accompanied home so they could have their HIV test with their partner; women in the clinic-testing group were given an invitation note to bring their partner back to the clinic for testing. The study found that home-based testing reached 89% of male partners with 85% being tested for HIV, whereas clinic-based testing reached 37%, with 36% being tested. The researchers believe home-based couples testing "could have [a] major public health impact and contribute to elimination of mother-to-child transmission by potentially decreasing maternal HIV-1 incidence and enhancing prevention of mother-to-child transmission," with an added benefit of 67% of the women in the home visit arm reporting improved relationship with their partner compared to 28% in the clinic visit arm. There was a slightly higher incidence of physical; threats in the clinic visit (19%) compared to 16% in the home visit arm.

TREATMENT AS PREVENTION (TasP)

There is increasing evidence that beginning ART earlier in course of infection lowers the risk of HIV transmission. At IAS 2013 a Côte d'Ivoire study found that starting ART above the 350 cell/mm^3 threshold then recommended by the World Health Organization cut the estimated risk of HIV transmission 90% in 957 volunteers, about 70% of whom were sexually active.[41] The finding is similar to the 96% transmission risk reduction in the HPTN 052 trial, but there are important differences between HPTN 052 and the Côte d'Ivoire study: HPTN was a randomized trial involving steady HIV-discordant couples in which the investigators counted actual HIV transmissions; the Côte d´Ivoire study relied on statistical projection to estimate transmission risk and participants had multiple sex partners. The researchers argued that their results provide evidence that early ART offered to a wider segment of the HIV-infected population may have a significant public health impact.

Another group of researchers developed 12 independent mathematical models to evaluate the health impact and cost of starting ART at any CD4 count below 500 cells/mm^3 versus focusing on universal ART access with current start guidelines.[42] The researchers applied the models in South Africa, Zambia, India and Vietnam. Among the many findings was an estimated 4% to 35% drop in new HIV infections over 20 years in South Africa and Zambia by starting ART at a CD4 count below 500 cells/mm^3. Costs per disability-adjusted life-years saved were favourable in all settings with most models, result indicating that immediately expanding ART eligibility to people with a CD4 count below 500 cells/mm^3 would be more cost-effective than intensifying ART outreach under previous WHO guidelines.

F. Zhang at the IAS 2013 Symposia Session: "Treatment as Prevention in Asia: progress and challenges".
© IAS / Marcus Rose / Workers' Photos

A.R.T. AND PREGNANT WOMEN

A UK study compared pregnancy outcomes in women taking ritonavir-boosted lopinavir or atazanavir, the two protease inhibitors used most often by pregnant women in the UK.[43] British HIV Association guidelines for management of HIV advise clinicians to treat pregnant women primarily as they would treat non-pregnant individuals, on the basis of viral load, CD4 count and genotype. The guidelines recommend that all women should begin ART by 24 weeks gestation. The analysis involved 493 pregnant women with a median age of 33 years. Most women were of black African ethnicity and had acquired HIV heterosexually; rates of hepatitis B and C co-infection were low. The comparison showed no significant difference between lopinavir and atazanavir in:

- median decrease in viral load
- percentage of women with a viral load above 50 copies/ml at delivery
- percentage of women who delivered before gestation week 37 or who delivered a low-birth-weight infant, or
- HIV transmission.

Although this is not a randomized trial, the results suggest that lopinavir and atazanavir are comparable in virologic efficacy, preterm delivery rates and infant outcomes.

Partners PrEP is one of four randomized, placebo-controlled trials that found pre-exposure prophylaxis with tenofovir or tenofovir/emtricitabine can lower the risk of HIV acquisition in sexually active people. It is important to understand the impact PrEP can have on pregnancy and infant outcomes. Kenyan researchers presented a Partners PrEP study that looked at pregnancy rates and outcomes in HIV-negative women with an HIV-positive partner.[44] Women were randomised to take daily tenofovir, tenofovir/emtricitabine, or placebo and were tested for HIV and pregnancy. If women became pregnant during follow-up they stopped taking their medication, however some women were pregnant for up to six weeks before it was known so there was some pregnancy exposure which did not differ substantially between study arms.

The study found that daily TDF/FTC or tenofovir alone both protected seronegative sexual partners of seropositive persons at high levels (63% to 75%) and may offer a method for HIV uninfected women with HIV infected partners to reduce their risk of infection during conception. Of the 167 live births that occurred in the study group (out of 288 pregnancies in 267 women) there was a lower adverse pregnancy outcome than would be expected in this group which may reflect a benign nature of the drugs.

Starting ART at HIV diagnosis during pregnancy and continuing treatment for life regardless of CD4 count is known as WHO Option B+ for PMTCT. Two studies showed the advantages of adopting Option B+ in Africa. Malawi became the first country to adopt Option B+, and Bwaila Maternity Unit in Lilongwe began implementing Option B+ in September 2011.[45] All women

Audience at the IAS 2013 Monday Plenary Session

were offered HIV counselling and testing and HIV-positive women began an efavirenz-based regimen. Monthly follow-up continued until 1 year after delivery, when women were referred to a regular outpatient clinic. Acceptance of HIV testing was greater than 99% and seroprevalence was 14%. By the end of March 2013, 1691 pregnant women and 207 lactating women had started ART, with 767 already on ART prior to pregnancy. Retention at six months was 70%, lower than the 82% national average however the researchers argued that this was in part artifact. Among women who remained in care, 96% had an undetectable viral load at 6 months or beyond. Among 1034 infants tested by polymerase chain reaction (PCR) for HIV to date, only 22 (2.1%) had HIV infection. The researchers concluded that Option B+ for antiretroviral prevention of mother-to-child transmission of HIV proved highly successful virologically however psychosocial support is needed to reduce early defaulting particularly after the first antenatal clinic visit.

A similar study of the Option B+ programme in Uganda found that women enrolled in Option B+ in the antenatal clinic were more likely to return for care than those who enrolled in labour wards.[46]

MALE CIRCUMCISION AND ITS ROLE IN HIV PREVENTION

Voluntary medical male circumcision (VMMC) is becoming a crucial arm in the fight against HIV transmission across sub-Saharan Africa. Two studies from Zambia revealed how circumcision is becoming increasingly accepted as the norm with 1 in 5 Zambian men aged between 15 and 49 undertaking the procedure in the previous two years.[47]

Simpler methods like the Shang Ring could help increase the number of men circumcised in countries where programmes are in place. This study involved 1,161 men, 81 already infected with HIV, who had the Shang Ring procedure at 10 sites in Kenya and Zambia.[48] Healing time was similar in men with and without HIV, with 95% returning to normal daily activities by the third day. Ninety-nine percent of men said they would recommend the Shang Ring to others. The Track D summary on the following pages outlines results of a separate study of Shang Ring acceptability and safety.

TRACK D

Roslan Hamzan, Community Representative, at the IAS 2013 Closing Session.

OPERATIONS AND IMPLEMENTATION RESEARCH

EXPANDING TESTING, COUNSELLING AND HIV KNOWLEDGE

Home-based HIV testing is seen as increasingly useful when done in association with facility-based testing in countries with high HIV prevalence, especially in rural areas. Several countries have scaled up HIV counselling and testing through provider-initiated HIV testing and community-based testing strategies; their success relies on increased testing as well as ensuring rapid identification of people with HIV and getting them access to CD4 testing, ART initiation and long-term adherence maintenance.

Because of concerns that people who test positive at home will not become linked to a clinic for care, a prospective cohort study aimed to identify factors affecting linkage to care in a rural sub-district of South Africa.[50] While about 70% of clients were successfully linked to care, six factors lowered chances of linkage: younger age, living with two or more adults, not believing or being unsure about HIV test results, difficulty finding time to seek health care, believing antiretroviral therapy can make you sick and drinking alcohol.

Speakers of the Late Breaker Track D press conference.

This study, and another from Uganda,[51] identified the following patient characteristics that need to be addressed to improve retention in care:

- being single
- young age
- patient knowledge and understanding of ART drugs and past experiences with health systems
- patient acceptance of HIV test results and status disclosure and
- opportunities to prioritize hospital visits.

MALE CIRCUMCISION – PROVIDING THE BEST OPTIONS TO THE MOST MEN

Randomized trials have shown that voluntary medical male circumcision (VMMC) can reduce a man's risk of becoming infected with HIV during heterosexual intercourse by up to 60%. In 2007, UNAIDS and WHO recommended circumcision as an important arm in HIV prevention.[52] Countries with high HIV prevalence and low circumcision rates are scaling up circumcision services, but questions have been raised about how well procedure quality and safety can be maintained in the first years of scaled-up implementation.

The Systematic Monitoring of the Voluntary Medical Male Circumcision (SYMMACS) project in South Africa assessed the implementation of VMMC under field conditions to monitor the quality and safety of the procedure. The project compared the quality of services of 15 VMMC sites in 2011 to the same sites in 2012 and to another 25 sites in 2013.[53] The study found the quality of surgical services declined in expanded and repeat site likely due to the dilution of skilled staff across new sites and the employment of new and inexperienced staff.

One of the constraints on VMMC service delivery is the time required for the surgical procedure, which limits the number of operations that can be performed daily. The Shang Ring, an easily applied double plastic ring that does not require sutures, is an increasingly popular alternative to the VMCC. The disadvantage of the Shang ring is that it must stay in place for a week.

A study of over 1,400 men in rural Uganda found that more than 80% of men preferred the Shang Ring to standard surgery and that the ring was safe and effective.[54] Procedure time averaged six minutes with the Shang ring and 18 minutes with surgery. While the Shang Ring appears to be an acceptable and safe method for VMMC in rural Africa, back-up surgical facilities are needed in case of ring placement failure, phimosis/tight skin or lack of appropriate ring sizes.

Zambia has approximately 2.6 million HIV-negative men eligible for circumcision. To determine men's interest in circumcision and recent circumcision rates, researchers conducted surveys of 15- to 29-year-old men between 2010 and 2013.[55] Jessica Price from the Population Council in Zambia reported that almost 80% of men had heard of circumcision, and knowledge about where to get circumcised increased significantly from the first survey period to the last. Three quarters of men said they had talked with a partner about circumcision. However, only 14% of men uncircumcised at the first survey had been circumcised by the third survey, a result that may have implications for the success of HIV prevention efforts across sub-Saharan Africa.

In a separate presentation, Price reported findings from 40 narrative interviews with VMMC clients aimed at understanding the process men go through when deciding to become circumcised and when seeking the procedure.[56] Men were asked to narrate their stories from the time they first became aware of the availability of VMMC to the day of their interview at the VMMC clinic. Of note, personal networks were found to play an important role at each stage of the behavior change process; female partners, friends and family members were the most influential members of these networks.

Audience at IAS 2013.
© IAS / Steve Forrest / Workers' Photos

PMTCT IMPLEMENTATION AND EVALUATION

In light of the new WHO guidelines released at IAS 2013 recommending all pregnant or breastfeeding women and all children under five with HIV start antiretroviral treatment immediately, whatever their CD4 count, results of a cluster-randomized trial from Kenya were timely.[57] The study looked at integrating antenatal services with HIV care as a strategy to improve access to HIV testing, care and treatment; to enhance prevention of mother-to-child transmission (PMTCT) services; and to prevent vertical (mother-to-child) HIV transmission. Researchers randomized almost 1,200 pregnant Kenyan women to fully integrated services or to non-integrated services. More than 90% of women in each study arm received antiretroviral prophylaxis to prevent vertical transmission.

The study found that being in the integrated-services group had some distinct advantages:

- Women in the integrated-services group were 2.7 times more likely to enroll in an HIV treatment programme within 1 year than were women in the non-integrated group
- Among women eligible for antiretroviral therapy by Kenyan guidelines, 46% in the integrated group versus 23% in the non-integrated group began treatment.

However, rates of infant HIV testing by 3 months of age and rates of infant HIV infection were similar in the two study arms. Because of these findings, the researchers believe strategies beyond service integration are needed to further decrease vertical transmission rates.

STICKING TO THERAPY AND STAYING IN CARE

A large Nigerian study demonstrated that different HIV counselling and testing strategies can have dramatically different impacts on uptake of HIV testing and counselling (HTC) among male most-at-risk populations (MARPs) in Nigeria.[58] The Population Council launched the Men's Health Network Nigeria (MHN), which provides clinic- and community-based interventions to avert new infections among male MARPs.

The three strategies were:

1. Static facility-based clinics with male MARP peer educators and key opinion leaders (KOL) referring their peers;
2. KOLs referring their peers to nearby mobile HTC teams;
3. KOLs mobilizing their peers and providing HTC.

More than 31,000 male MARPS received HTC. Option 3 attracted the largest number of men testing for HIV for the first time – 13,313 – compared to 12,079 in the referral strategy and 1646 in Option 1.

Once HIV-positive people are diagnosed and start ART, the main challenges become getting them to stick with therapy and to stay in care. Denis Mpiima from The AIDS Support Organization (TASO) in Uganda presented results of a cross-sectional study of community ART delivery models targeted at improving patient retention and medication adherence.[59] TASO is a large CDC/PEPFAR-funded HIV care organization in Uganda with over 90,000 patients active in care.

Non-violent demonstration at IAS 2013 against the Trans-Pacific Partnership Agreement and Access to medicines (TPP).
© IAS / Marcus Rose / Workers' Photos

TASO designed a strategy known as Community Drug Distribution Points (CDDP), which are public places selected by clients to access ART refills. Patients chose a CDDP of their preference after counselling and health talks. The study involved 3,457 HIV-positive people who received ART for 2 months or longer, 38% in a facility-based model and 62% in the CDDP model. The proportion of patients lost to follow-up was significantly higher at health facilities (16.5%) than CDDPs (4.3%). Adherence was higher in CDDPs (96.8%) than facilities (95.6%), although that difference was not statistically significant. The results suggest that health facilities with high patient volumes should consider the CDDP model.

Expanding antiretroviral coverage in some African countries with high HIV prevalence remains challenging because HIV centres are often city based and the large rural population has no access to testing and care.

With an adult HIV prevalence of 12.5%, Zambia launched a national mobile HIV care service in 2010. Albert Mwango of Zambia's Ministry of Health presented results of the national expansion of ART to rural health centres through mobile HIV services.[60] Compared with districts that did not have mobile ART sites, the 15 districts that did saw an increase in the number of rural health centres providing mobile ART services from 46 to 110 three years after the expansion began. The number of active patients on ART in mobile sites in the 15 districts increased from about 3,000 to more than 8,000 three years later. Patient retention at 12 months was significantly higher at districts with mobile facilities (92.7%) than in those with static sites (85.5%) ($p<0.001$). Retention at 24 months remained significantly higher in the mobile ART sites. It is clear that in Zambia mobile facilities are improving access to ART nationally and may offer a model for other African countries with similar urban-rural access issues.

ENCOURAGING PARTICIPATION IN PREVENTION AND TREATMENT PROGRAMMES

Malaysia introduced needle-exchange and methadone programmes in 2006 despite it being a controversial move because of the country's strict drug laws. Researchers from the Universities of Malaya and New South Wales conducted modeling to look at the HIV burden and injecting issues amongst Malaysians[61] – looking at the healthcare, clinical and epidemiological costs as a simulation of rates of new HIV infections and also to look at disease progression.

Their results revealed that the 2006 programmes averted 3,100 infections as well as a decrease in the number of IV drug users. In terms of cost effectiveness the cost per QALY (quality-adjusted life year) gained is 18,535 ringgit which is below the Malaysian GDP per capita of 29,915 ringgit – an important gauge as any QALY below a country's GDP is according to the WHO, "highly cost-effective".

Two Track C studies summarized above[37,38] assessed the value of providing small incentives (cash and lottery tickets) to increase testing for HIV among certain target groups. A study in Mozambique found that text messages delivered to cell phones significantly improved retention in care in a randomized trial of patients receiving ART.[62] Researchers randomized 830 enrollees to receive a structured series of text reminders to attend appointments and meet other goals or to standard follow-up. Loss of follow-up (dropping out of care) was significantly less frequent in the text-message group than in the control group. The researchers noted that messages were short and simple (considering illiteracy) and did not mention HIV, ART, or PMTCT.

PRICING OF ARVS – MAKING AVAILABILITY FAIR AND EQUITABLE

While antiretroviral prices fell dramatically with the introduction of generic agents, prices still vary widely among low-income countries, low-middle-income countries, and upper-middle-income countries. A 20-country study found that non-African middle-income countries are paying an average of 400% more for ART than African countries with similar gross national incomes (GNI), a finding which raises questions about pricing equity.[64]

Researchers in South Africa, Thailand, and the UK looked at five frequently prescribed antiretrovirals – efavirenz, nevirapine, lopinavir/ritonavir, tenofovir and tenofovir/emtricitabine – in 20 low- and middle-income countries. By extracting ARV drug prices from the WHO database and comparing treatment costs with per capita annual GNI, the investigators revealed that middle-income countries outside Africa are paying, on average, four times higher prices for antiretrovirals than African countries with similar GNI.

The analysis revealed that median antiretroviral costs rose from one national income bracket to the next. For example, the annual per-person cost of lopinavir/ritonavir was $407 in low-income countries, $585 in low-middle-income countries, and $878 in upper-middle-income countries. In African countries antiretroviral prices remained largely stable regardless of GNI, while non-African countries had widely variable antiretroviral prices not clearly correlated with GNI. Antiretroviral prices in upper-middle-income countries outside Africa were significantly higher than in African countries with similar GNIs, for example, $122 for tenofovir/emtricitabine per person per year in African countries versus $468 in non-African countries. Malaysia had the highest antiretroviral prices, despite having a lower GNI than Russia or Brazil.

The study highlights the need for a global system of fair pricing for ARVs for all middle-income countries with large epidemics.[63]

REFERENCES

1. World Health Organization. **HIV/AIDS Programme. Consolidated Guidelines on the Use of Antiretroviral Drugs for Treating and Preventing HIV infection. Recommendations for a Public Health Approach.** June 2013.
2. Persaud D et al. **Functional HIV cure after very early ART of an infected infant. 20th Conference on Retroviruses and Opportunistic Infections.** Atlanta, 3 – 6 March 2013, abstract 48LB.
3. Sáez-Cirión A et al. **Post-treatment HIV-1 controllers with a long-term virological remission after the interruption of early initiated antiretroviral therapy ANRS VISCONTI Study.** PLoS Pathogens, 2013, 9:e1003211.
4. Henrich T et al. **Long-term reduction in peripheral blood HIV type 1 reservoirs following reduced-intensity conditioning allogeneic stem cell transplantation.** Journal of Infectious Diseases. 2013, 207:1964-1702.
5. Henrich T et al. **In depth investigation of peripheral and gut HIV-1 reservoirs, HIV-specific cellular immunity, and host microchimerism following allogeneic hematopoetic stem cell transplantation.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract WELBA05.
6. Huetter G et al. **Long-term control of HIV by CCR5 Delta32/Delta32 stem-cell transplantation.** New England Journal of Medicine. 2009, 360:692-698.
7. van Lunzen J et al. **Functional cure after long-term HAART initiated during early HIV infection: a comprehensive case study.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract TUPE246.
8. Casazza J et al. **Identification and characterization of CD4 T cells actively transcribing HIV RNA in peripheral blood.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract MOAA0101.
9. Noel N et al. **IP10 and sCD163 are biomarkers of CD4+ T cells decline and immune activation in HIV controllers patients.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract MOAA0102.
10. Hocqueloux L et al. **In chronically HIV-1-infected patients long-termantiretroviral therapy initiated above 500 CD4/mm3 achieves better HIV-1 reservoirs' depletion and T-cell count restoration.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract WEAB0102.
11. Ruiz MJ et al. **ADCC responses arising during acute/early HIV infection do not prevent rapid disease progression.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract MOPDA0105.
12. van Lunzen J et al. **T follicular helper cells in HIV infection.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract TUSY0105.
13. Allouch A et al. **The repression of the dNTP biosynthetic enzyme RNR2 by p21 restricts HIV-1 and related lentiviruses reverse transcription in macrophages.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract WEAA0105.
14. Denton PW et al. **Destruction of the residual active HIV-1 reservoir by Env-specific immunotoxin.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract TUAA0101.
15. Buzon M et al. **Targeting HIV-1 persistence in CD4 T memory stem cells by pharmaceutical inhibition of beta-catenin.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract TUAA0102.
16. Moreno Nieves UY et al. **DC infected by the ANRS MVA(HIV) vaccine candidate primes NK cells with anti-HIV specific activity through a mechanism involving NKG2D and NKp46 on NK cells and membrane bound IL-5 on DC.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract TUAA0104.
17. Islam FM et al. **Relative risk of cardiovascular disease among people living with HIV: a systematic review and meta-analysis.** HIV Medicine. 2012, 13:453-68.
18. Poomlek V et al. **Cardiovascular abnormalities and carotid intima-media thickness (cIMT) among HIV-infected adolescents receiving long-term highly antiretroviral therapy in Thailand: a cross-sectional study with HIV-uninfected controls.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract MOPDB0101.
19. Puthanakit T et al. **A randomized study comparing low dose versus standard dose lopinavir/ritonavir among HIV-infected children with virological suppression.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract MOAB0101.
20. Violari A et al. **ARIEL: 24-week safety and efficacy of darunavir/ritonavir in treatment-experienced pediatric patients aged 3 to <6 years.** 18th Conference on Retroviruses and Opportunistic Infections, Boston, 27 February – 2 March, 2011, abstract 713.

21. Violari A et al. **Safety and efficacy of darunavir/ritonavir in treatment-experienced pediatric patients 3 to <6 years: week 48 analysis of the ARIEL study.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract MOAB0102.
22. Cheret A et al. **Impact of 12 months HAART on cell-associated HIV-DNA in acute primary HIV-1 infection in the OPTIPRIM-ANRS 147 Trial.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract WEAB0101.
23. U.S. Department of Health and Human Services. **Guidelines for the Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents.** 27 March 2012.
24. Hocqueloux L et al. **In chronically HIV-1 infected patients long term antiretroviral therapy initiated above 500 CD4/mm3 achieves better HIV-1 reservoirs' depletion and T cell count restoration.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract WEAB010225.
25. Spreen W et al. **First study of repeat dose co-administration of GSK1265744 and TMC278 long-acting parenteral nanosuspensions: pharmacokinetics, safety and tolerability in healthy adults.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract WEAB0103.
26. Lee F, Amin J, Carr A. **Efficacy of initial antiretroviral therapy: a meta-analysis of 40,124 adults with up to 144 weeks' follow up.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract WEAB0104.
27. Dravid A et al. **Tenofovir nephrotoxicity in resource-limited setting of western India: higher rate of renal function decline, acute kidney injury and progression to chronic kidney disease compared to western data.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract WEAB0201.
28. Harris M et al. **Effects on renal function of a switch from tenofovir (TDF)- to abacavir (ABC)-based highly active antiretroviral therapy (HAART), with or without atazanavir.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract WEAB0202.
29. Maalouf N et al. **HIV and HCV independently contribute to lower bone mineral density but have different effects on bone turnover markers.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract WEAB0204.
30. Knobel H et al. **HIV infection was associated with an increased risk of hip fracture, independently of age, gender and co-morbidities: a population-based cohort study.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract WEAB0205.
31. Hsu R et al. **Independent predictors of carotid intimal thickness differ between HIV+ and HIV- patients with respect to traditional cardiac risk factors, risk calculators, lipid subfractions and inflammatory markers.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract WEAB0206.
32. Paton N et al. **A pragmatic randomized controlled strategy trial of three second-line treatment options for use in public health rollout programme settings: the Europe-Africa Research Network for Evaluation of Second-line Therapy (EARNEST) trial.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract WELBB02.
33. Trottier B et al. **Single tablet regimens do not necessarily translate into more durable HIV treatments.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract TUPDB0106.
34. Duong T et al. **Long-term virological outcome in HIV-infected children on ART in the UK/Ireland.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract MOAB0105.
35. Poizot Martin I et al. **Access to HCV triple therapy with telaprevir or boceprevir in real-life setting in HIV-HCV co-infected patients – ANRS CO13 HEPAVIH Cohort (France).** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract TUAB0102.
36. Mongare J et al. **Client-centered HIV testing and counselling as a strategy for scaling up access to HIV prevention and care services.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract MOPDC0101.
37. Simaputtanasan A et al. **High uptake of mobile testing in Bangkok metropolitan area, Thailand.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract MOPDC0105.
38. Björkman-Nyqvist M et al. **Evaluating the impact of short term financial incentives on HIV and STI incidence among youth in Lesotho: a randomized trial.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract TUPDC0106.

39. Hull M et al. **Use of modest financial incentives to improve engagement of drug users in HIV testing and follow-up: results of a randomized controlled trial.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract TUAC0203.
40. Osoti A et al. **Home visits during antenatal care enhances male partner HIV-1 counseling and testing during pregnancy in Kenya: a randomized controlled trial.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract TUAC0103.
41. Jean K et al. **Early antiretroviral therapy, sexual behavours and HIV-1 transmission risk: estimates from the Temprano-ANRS 12136 Randomized Controlled Trial, Abidjan, Cote d'Ivoire.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract MOAC0201.
42. Eaton JW et al. **The epidemiological impact and cost-effectiveness of expanded eligibility for and access to adult antiretroviral therapy in South Africa, Zambia, India and Vietnam: a twelve model analysis.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract MOAC0203.
43. Perry M. **Lopinavir and atazanavir in pregnancy: comparable infant outcomes, virological efficacy and preterm delivery dates.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract TUAC0101.
44. Mugo N et al. **Pregnancy incidence and birth outcomes among African women in a clinical trial of pre-exposure prophylaxis: the Partners PrEP Study.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract WEAC0101.
45. Speight C et al. **Implementing option B+ for prevention of mother to child transmission at Bwaila Maternity Unit, Lilongwe: the first 18 months.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract WELBC01.
46. Namara Lugolobi E. **Retention in care among women initiated on option B plus in the Antenatal Clinic (ANC) and labour ward at Mulago National Referral Hospital, Kampala, Uganda.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract TUAC010.
47. Hewett P et al. **The demand for voluntary male circumcision in Zambia: a sequential model of the decision process.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract MOPDD0103.
48. Price J et al. **Behaviour change pathways to male circumcision: narrative interviews with 40 male circumcision (MC) clients in Zambia.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract MOPDD0105.
49. Barone MA et al. **A field study of male circumcision using the Shang Ring, a minimally-invasive disposable device, in routine clinical settings in Kenya and Zambia.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract WELBC04.
50. Choopanya K et al. **The Bangkok Tenofovir Study, an HIV pre-exposure prophylaxis trial in Thailand: participant adherence and study results.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract WELBC05.
51. Naik R et al. **Factors associated with client linkage to care following home-based HIV counseling and testing: a prospective cohort study in rural South Africa.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract MOAD0101.
52. Kwarisiima D et al. **Outcomes of newly diagnosed HIV-infected patients referred to care after provider initiated HIV counseling and testing in Uganda.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract MOAD0102.
53. WHO and UNAIDS. **WHO and UNAIDS announce recommendations from expert meeting on male circumcision for HIV prevention.** 28 March 2007.
54. Rech D et al. **Implications of the rapid scale up and the expansion of VMMC in South Africa for quality of services.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract MOPDD0101.
55. Kigozi G et al. **The acceptability and safety of the Shang Ring for adult male circumcision in Rakai, Uganda.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract MOPDD0102.
56. Hewett P et al. **The demand for voluntary male circumcision in Zambia: a sequential model of the decision process.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract MOPDD0103.

57. Price J et al. **Behaviour change pathways to male circumcision: narrative interviews with 40 male circumcision (MC) clients in Zambia.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract MOPDD0105.

58. Turan JM et al. **Effects of antenatal care-HIV service integration on utilization of prevention of mother to child transmission services and mother to child transmission: results from a cluster-randomized controlled trial in Kenya.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract MOAD0201.

59. Ukwuije F et al. **Cost-effectiveness of three HIV counseling and testing strategies among male most-at-risk population in Nigeria.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract MOPE180.

60. Mpiima D et al. **Community antiretroviral therapy (ART) delivery models for high patient's retention and sustaining good adherence: the AIDS Support Organisation (TASO) operational research findings, CDC/PEPFAR funded project in Uganda.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract TUAD0101.

61. Mwango A et al. **Outcomes of national expansion program for antiretroviral treatment to rural health centre level through mobile HIV services in Zambia.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract TUAD0103.

62. Naning H et al. **Return on investment of HIV harm reduction programmes for injecting drug users in Malaysia.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract WEAD0101.

63. Joseph-Davey D et al. **Improved retention in HIV care following SMS reminders in Mozambique: a randomized controlled trial.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract WELBD02.

64. Ford N et al. **Is the pricing of antiretrovirals equitable? Analysis of antiretroviral drug prices in 20 low- and middle-income countries.** 7th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Kuala Lumpur, 30 June – 3 July 2013, abstract WELBD05.

IAS 2013 Volunteers.

IAS 2013
KUALA LUMPUR, MALAYSIA
30 JUNE - 03 JULY

ORGANIZERS

International AIDS Society
Stronger Together Against HIV

ceria
CENTRE OF EXCELLENCE FOR RESEARCH in AIDS