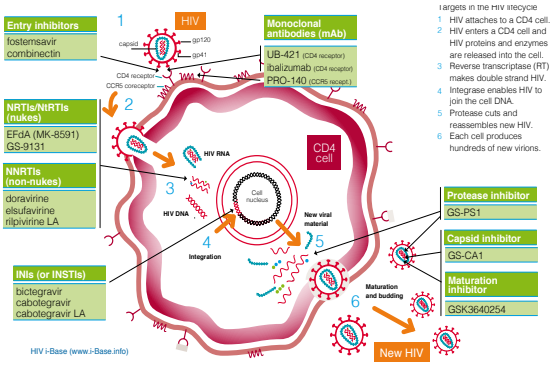
ISSN 1472-4863

HIV pipeline-lite 2017

New drugs in development

htb supplement: 2017 Vol 18:(2)



CONTENTS

Published by HIV i-Base

HIV pipeline 2017

This year i-Base has produced the HIV pipeline review as part of our Fit for Purpose report on HIV treatment optimisation.

Two main versions are available:

1. The full version reports key research in detail for each drug.
2. The new "Pipeline-lite" version has a summary for each drug with less data. (This version)

Both electronic versions (web and PDF) include hyperlinks to all research sources and references.

3. We will also publish an early update from the IAS conference being held in Paris from 23–26 July.

All three reports are available online:

http://i-base.info/pipeline-2017

h-tb

HIV TREATMENT BULLETIN

Editor: Simon Collins
Contributing Editor: Polly Clayden

Medical consultants:
Dr Tristan Barber, Chelsea & Westminster Hosp, London.
Dr Karen Beckerman, Albert Einstein College of Medicine, NYC.
Dr Sanjay Bhagani, Royal Free Hospital, London.
Prof. Diana Gibb, Medical Research Council, London.
Dr Gareth Hardy, PhD.
Prof. Saye Khoo, University of Liverpool Hospital.
Prof. Clive Loveday, International Laboratory Virology Centre.
Prof. James McIntyre, Chris Hani Baragwanath Hosp. South Africa
Dr Graeme Moyle, Chelsea & Westminster Hosp, London.
Dr Stefan Mauss, Düsseldorf.
Prof. Caroline Sabin, UCL Medical School, London.
Dr Graham P Taylor, Imperial College, London.
Dr Stephen Taylor, Birmingham Heartlands Hospital.
Dr Gareth Tudor-Williams, Imperial College, London.
Dr Edmund Wilkins, Manchester General Hospital, Manchester.

HTB is a not-for-profit community publication that aims to provide a review of the most important medical advances related to clinical management of HIV and its related conditions as well as access to treatments. Comments to articles are compiled from consultant, author and editorial responses.

HIV i-Base is a registered charity no 1081905 and company reg no 3962064. HTB was formerly known as DrFax.

Introduction

This has been a lively year for HIV research.

Even though only one new drug was approved (a once-daily version of raltegravir) several key generic approvals (dolutegravir and tenofovir/FTC) are perhaps just as important. Three new fixed-dose combinations (FDCs) have been submitted to the US Food and Drug Administration (FDA)/European Medicines Agency (EMA) with expected decisions soon, including one with a new integrase inhibitor (bictegravir).

Early data presented for several new compounds, including from new drug classes in early stages of research, are an optimistic sign that HIV is still a potential market for new drugs.

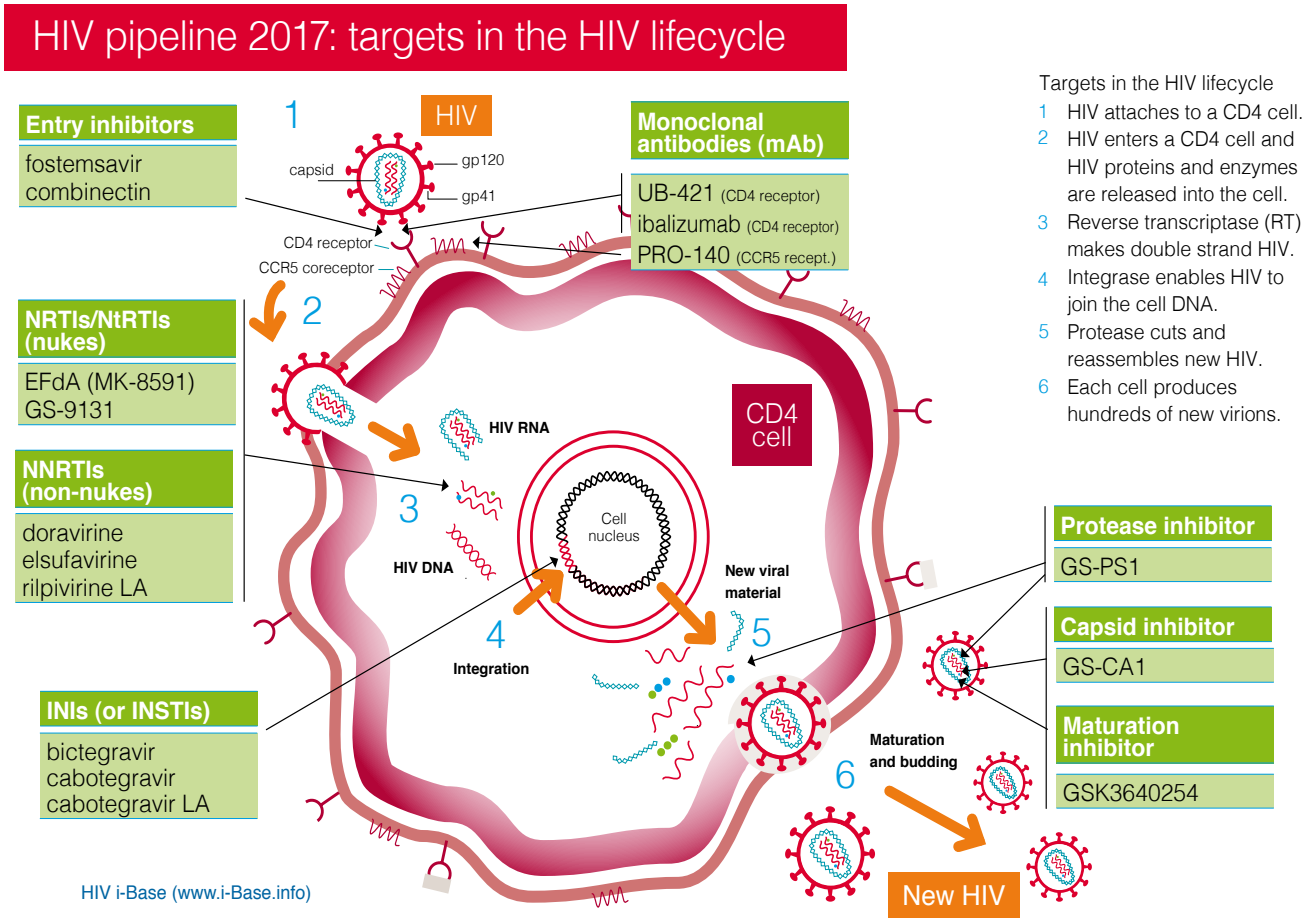
While current ART is safe and effective there are ways it could become better still: formulations with smaller pills, less frequent dosing, long-acting compounds (weekly, monthly, yearly), with lower doses, fewer side effects and drug interactions, stronger resistance profiles – and it could be cheaper and more accessible. Some of these factors feature in compounds already filed for regulatory approval.

This year the pipeline includes compounds in current classes (NRTIs, NNRTIs, PIs and integrase inhibitors) and compounds with new targets and mechanisms of action (including a capsid inhibitor and several monoclonal antibodies), see Figure 1. It also includes a two-drug combination submitted with an indication as maintenance therapy (dolutegravir/rilpivirine).

Importantly, compounds from new classes – monoclonal antibodies (mAbs), entry inhibitors, maturation inhibitors and capsid inhibitors – are all expected to work for people with multiple drug resistant (MDR) HIV who are dependent on new drugs.

Some of these drugs have potential to be used in very different ways – as treatment, as part of a cure strategy and for prevention as PrEP.

Figure 1: HIV pipeline 2017: targets in the HIV lifecycle



Key: INSTI: Integrase strand transfer inhibitors; NRTI: Nucleoside/tide reverse transcriptase inhibitors; NNRTI Non-nucleoside reverse transcriptase inhibitors.

Recently approved new HIV drugs

Raltegravir HD

The only new HIV drug approval since the pipeline report in July 2016 was for a once-daily formulation of raltegravir. [1]

The new version still requires a two-pill dose (2 x 600 mg) but has improved pharmacokinetic (PK) properties that allow once-daily dosing without regard to food. Approval was based on 48-week results from the phase 3 treatment-naive ONCEMRK study. [2]

The improved PK profile also results in lower peak drug concentrations and higher trough levels, and less interpatient variability.

The regulatory approval of several generic formulations over the last year is also important.

Generic dolutegravir

The regulatory approval of several generic formulations over the last year is also important.

- In September 2016, tentative approval by the FDA of a generic formulation of dolutegravir has the potential to significantly improve treatment in countries who have access to in-patent generics. This will be especially true once the FDC (with TAF/FTC) also becomes available. [3]

Generic TDF/FTC

- EMA approval of three generic formulations of TDF/FTC [4] that use a different base salt for tenofovir, but that has been referred to European courts to decide on patent issues. [5]
- The FDA also approved a generic version of TDF/FTC. [6] The patent implications and timeline for US generic access and pricing is unclear: generic drugs are sometimes priced very highly in the US. [7]

Submitted applications: completed phase 3 results

Several compounds have already been submitted for regulatory evaluation based on primary endpoint results from phase 3 studies.

Darunavir/cobicistat/FTC/TAF - FDC

In September 2016, the first single pill protease-inhibitor based fixed dose combination (FDC) of darunavir/cobicistat/FTC/TAF (D/C/F/TAF) was submitted in both the US and Europe, with a decision expected later in 2017. [8]

The applications are based on studies with darunavir/cobicistat plus tenofovirDF/FTC as control [9] and at least one study at IAS will report on this FDC. [10]

The reduced milligram dose for TAF compared to TDF makes this formulation possible as a single tablet.

Bictegravir/FTC/TAF - FDC

On 12 June 2017, a new drug application to the US FDA for a single tablet FDC of bictegravir/emtricitabine/tenofovir alafenamide (BIC/FTC/TAF). [11] A similar submission to the EMA is expected during 3Q 2017.

Bictegravir (formerly GS-9883) is a once-daily integrase inhibitor, that (unlike elvitegravir) does not need to be boosted or to be taken with food. This is also a potent compound, used at low milligram dose (50 mg) leading to a small pill when combined with TAF, few drug-drug interactions and a similar resistance profile to dolutegravir. [12]

Four phase 3 studies include a treatment naive study comparing it to dolutegravir and several switch studies in people with viral suppression on current treatment.

The most recent publicly presented data were results from a small phase 2 non-inferiority study in 98 treatment-naive study that showed very similar results compared to dolutegravir. [13]

Results from two phase 3 studies in treatment naive adults will be presented as late breaker abstracts at the IAS 2017 in Paris. [14, 15]

Dolutegravir/rilpivirine: two-drug FDC

Although both dolutegravir and rilpivirine are long-approved as oral drugs (in 2013 and 2011 respectively, in the US), in June 2017 a new oral coformulation with both drugs in a single pill was submitted for regulatory approval as an FDC for maintenance therapy. [16]

The application is for use as a switch option in people with suppressed viral load on earlier treatment and is notable for being the first FDC that doesn't include NRTIs. The application is based on results from the SWORD 1 and 2 studies presented at CROI 2017 that showed dual arm was non-inferior to continuing ART. [17]

Dolutegravir-based dual therapy with 3TC is also discussed below.

Compounds in phase 3 development

The unpredictability of drug development is always important to remember and this year included gains and losses of some compounds and the re-emergence of others.

Doravirine - NNRTI

Doravirine is a once-daily NNRTI that can be taken with or without food that has few drug-drug interactions and that retains activity against common first generation NNRTI mutations (K103N, Y181C, G190A and E138K). It is being developed in an FDC with generic TDF/3TC and has the compound name MK-1439A. [18]

Results from a two-part, dose-finding, phase 2 study in treatment-naive participants presented at CROI 2016, reported doravirine to be non-inferior compared to efavirenz with 78% in each group having undetectable viral load at week 48. [19]

This year another randomised phase 3 study reported doravirine to be non-inferior compared to boosted darunavir with similar safety and efficacy results. [20]

New nanoformulations of this compound are also in development [21] and IAS 2017 will include phase 3 results comparing the MK-1439A FDC to EFV/TDF/FTC in people on first ART. [22]

Cabotegravir and cabotegravir/rilpivirine long-acting (LA) FDC

Cabotegravir (CAB) is a second-generation integrase inhibitor being developed by ViiV Healthcare as both an oral tablet and long-acting (CAB-LA) injectable formulation. It has potential use as both treatment and, the injectable formulation, as PrEP.

CAB-LA has an extremely long half-life: a single injection results in drug levels that are still detectable in some people more than a year later. This requires that a lead-in phase using the oral formulation is essential before using the injection to screen for likely risk of hypersensitivity reaction. The long half-life means that anyone stopping CAB-LA when used as treatment needs to switch to alternative ART. When used as PrEP, current studies recommend switching to daily oral PrEP for a year.

The oral formulation has a similar drug resistance profile to dolutegravir, and is also being studied as part of dual oral therapy with rilpivirine (see dolutegravir/rilpivirine above). Results from a phase 2b included 144-week results from 243 treatment-naive participants who started triple therapy ART (dose-ranging cabotegravir or efavirenz, plus background TDF/FTC NRTIs), and who switched to oral cabotegravir plus rilpivirine maintenance therapy at week 24 if viral load was undetectable. [23]

The phase 2 LATTE-2 study, using dual injection maintenance therapy (CAB-LA coformulated with rilpivirine LA) reported good efficacy and tolerability at week-48 with >90% of participants having undetectable viral load and high patient satisfaction with injections (even though these caused usually minor side effects). [24]

Several international phase 3 studies of cabotegravir LA for PrEP are already underway, with oral TDF/FTC as the comparison. [25, 26] New nanoformulations of cabotegravir LA are also in development. [27]

Table 1: HIV pipeline compounds by development phase

Compound/Company	Class	Comment	Refs.
Submitted to FDA/EMA			
darunavir/cobicistat/ TAF/FTC FDC Janssen and Gilead	Boosted PI and NRTI FDC	As phase 3 research used darunavir/cobicistat plus TDF/FTC as a comparitor, the FDC is expected to be at least non-inferior.	8, 9
bictegravir Gilead	INSTI and NRTI FDC	Once-daily, unboosted, low mg FDC with FTC/TAF.	10, 11, 12, 13, 14, 15
dolutegravir/ rilpivirine FDC ViiV and Janssen	INSTI and NNRTI FDC	Already approved integrase inhibitor but now in a new two-drug coformulation with the NRTI rilpivirine.	16, 17
Phase 3			
doravirine Merck/MSD	NNRTI	Active against first generation NNRTI resistance. Non-inferior to efavirenz. Generic FDC with TDF/3TC in phase 3 studies.	18, 19, 20, 21, 22
cabotegravir ViiV Healthcare	INSTI	Oral formulation integrase inhibitor mainly used for lead-in dose before long-acting formulation.	23
cabotegravir/rilpivirine LA ViiV Healthcare	INSTI	Injection with very long half-life – detectable after more than one year following single injection. Research as both treatment in coformulation with rilpivirine LA and prevention as single compound.	24, 25, 26, 27, 28
dolutegravir/3TC ViiV	INSTI and NRTI FDC	Dual combination currently in Phase 3 studies as initial ART in naive participants and a switch option in people on stable ART.	29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39
Ibalizumab TaiMed and Theratechnologies	mAb CD4 binding	Intravenous infusion (800 mg every two weeks) being studied in addition to optimised ART in single arm study in people with multiclass HIV drug resistance.	40, 41, 42, 43, 44, 45, 46
PRO 140 CytoDyn	mAb CCR5 target	Once-weekly (350 mg) sub-cutaneous injection with potential to maintain viral suppression for more than two years after stopping ART. Also, with ART against multiclass resistance.	47, 48, 49
GSK3684934 ViiV	attachment inhibitor	Fostemsavir is a gp120 attachment inhibitor that is mainly being studied in treatment-experienced patients with MDR HIV in a large international study.	50, 51, 52, 53
Albuvirtide Frontier Biotech	Entry inhibitor	Similar to T-20 (enfuvirtide) but only requiring once-weekly infusion. Only in development for use in China.	77
Phase 2			
UB-421 United BioPharma	mAb CD4 binding	Infusion dosed either weekly or every two weeks as alternative to ART during treatment interruption.	54, 55, 56, 57, 63
VRC01	mAb CD4 binding	Intravenous infusion (40 mg/kg) being studied with ART for effect on reservoir and in cure research and as PrEP (2 large phase 3 studies are ongoing). Sub-cutaneous dosing of infants to prevent transmission at birth or from breastfeeding.	57, 58, 59, 60, 61, 62, 63
elsulfavirine, prodrug of VM-1500A Viriom	NNRTI	NNRTI that is being developed for use in low and middle income countries. Similar activity to efavirenz in Russian study. Long-acting formulation being studied with potential for weekly dosing.	78, 79
ABX464 Abivax	Rev inhibitor	Compound with evidence of modest antiviral activity (~0.5 log in 4/6 people) that is also being studied for impact on the viral reservoir.	81, 82, 83

Phase 1 and preclinical			
MK-8591 (EFdA) Merck/MSD	NRTIs	Highly potent, low dose, active against NRTI resistance. Long half-life, potential as oral (weekly dose) and implant (annual implant for PrEP).	64, 65, 66, 67
GS-9131 prodrug of GS-9141 Gilead	NRTI	Active against NRTI resistance. Synergy reported with AZT, FTC, abacavir, efavirenz, bictegravir, dolutegravir and lopinavir, and additive activity with TFV and TAF. Will be coformulated with other Gilead drugs. Currently difficult to synthesise in bulk.	68, 69, 70
GSK3640254 ViiV Healthcare	Maturation inhibitor	Back-up compound to first of two maturation inhibitors acquired from BMS. Early preclinical research.	71, 72, 73
GSK3732394 ViiV Healthcare	Entry inhibitor gp41 and CD4	Combined adnectin/fusion inhibitor that stops viral entry by targeting multiple sites of action and the potential for self-administered once-weekly injections.	74
GSPI1 Gilead	Protease inhibitor	New QD unboosted PI, high potency, long half-life, potential in FDC single table regimen (Gilead).	75
GS-CA1 Gilead	capsid inhibitor	Early stage for new class with activity at multiple stages of viral lifecycle. Sub-cutaneous injection with monthly or less frequent dosing.	76
Discontinued			
GS-9695 and GS-9822 Gilead	INSTI	Non-catalytic integrase inhibitors no longer being studied due to renal toxicity.	80
BMS-955176 ViiV Healthcare	Maturation inhibitor	Development stopped in October 2016 due to problems with GI toxicity and resistance.	72, 73

The phase 3 programme includes two large international studies in treatment-naive and -experienced participants: FLAIR (First Long-Acting Injectable Regimen) and ATLAS (Antiretroviral Therapy as Long-Acting Suppression). IAS 2017 will include updated 96-week results from LATTE-2. [28]

Dolutegravir/lamivudine - two-drug FDC

Dolutegravir showed a higher barrier against drug resistance in treatment-naive studies than any other antiretroviral to date and this led to several independent research groups looking at whether dolutegravir could be used in combinations with less than three active drugs.

In addition to using dolutegravir with rilpivirine (see above), several studies are using dolutegravir with lamivudine (3TC) including with the two drugs coformulated in an FDC.

This include use both as first-line ART and as a switch option in people who are stable on current ART (usually defined as having undetectable viral load for year).

Of these, the single-arm treatment naive PADDLE study reported rapid reductions in viral load, including in four people with baseline viral load >100,000 copies/mL with 18/20 maintaining undetectable viral load at week-48. [29] Results from week-96 of this study will be presented at IAS 2017. [30]

Several larger phase 2 and 3 studies are ongoing including the single arm LAMIDOL and ACTG A5353 studies and the randomised ASPIRE and TRULIGHT studies. [31, 32, 33, 34] Of these, only the French ANRS 167 LAMIDOL single arm switch study has reported results. At CROI 2017, after 40 weeks of dual therapy, 101/104 participants remaining undetectable, with a single person with viral rebound (>50 - 200 copies mL) who switched back to triple ART. [31] ACTG A5353 in 122 treatment-naive participants is due to report results at IAS 2017. [32]

Finally, in August 2016, ViiV announced two large international randomised phase 3 studies (GEMINI 1 and 2) that will compare dolutegravir/3TC FDC to dolutegravir plus separate TDF/FTC. [35] Together these will enrol 1400 treatment-naive participants and will quantify whether dual-NRTIs are still needed for some integrase-based regimens, with data collection for the primary endpoint (viral suppression at week-48) expected in 2018. [36, 37]

If these studies produce positive results, a modelling study published last year reported potential savings of $550 million in the US alone over five years if dolutegravir/3TC was used as maintenance therapy by 50% of people who suppressed viral load on triple ART and $800 million if used as initial ART. This increased to $3 billion if 25% of people currently on stable ART switch to dolutegravir/3TC dual therapy. [38]

It is also important that although several studies using dolutegravir as monotherapy maintained viral suppression in most participants, the unpredictable risk of viral rebound in some people with the development of integrase resistance means that monotherapy with dolutegravir is now clearly not recommended. All dolutegravir monotherapy studies should have now changed all participants back to dual or triple therapy. [39]

Ibalizumab - mAb

Ibalizumab is a monoclonal antibody that has been in development for over a decade. Previous development names included TMB-355 and TNX-355 and phase 1 efficacy results were first reported in 2008. [40]

Ibalizumab blocks initial HIV entry by attaching to CD4 receptors and stopping conformational changes that are needed for the virus to enter a CD4 cell. It is active against CCR5 and CXCR4-tropic virus. The half-life of >3 days enables the intravenous (IV) infusion to be given every two weeks.

For much of the development programme, access was limited to an open-label expanded-access study [41] but results from a small phase 3 study (TMB-301) were presented at CROI 2017. This study in 40 people with multidrug resistant HIV, reported a mean viral load decrease from baseline was –1.6 log copies/mL, with 55% and 48% having reductions >1 log and >2 log respectively. [42]

Results from an intramuscular formulation were also presented at CROI 2017 but although initial viral load reductions were similar to the IV version, rebound after one week suggests greater vulnerability to drug resistance. [43]

Ibalizumab is being developed by the Taiwanese company TaiMed but marketing and distribution rights for the US and Canada have been sold to Theratechnologies (who market tesamorelin for visceral hypertrophy). A press release from the developing companies reported that FDA had granted a priority review with an expected deadline for submission in January 2018. [44]

A further phase 3 study is also ongoing [45] and updated results in treatment-experienced patients are due to be presented at IAS 2017. [46]

PRO 140 - mAb

PRO 140 is a humanised IgG4 antibody that blocks HIV entry by binding to CCR5 but is active against maraviroc-resistant virus. PRO 140 has been in development for more than ten years, but that paradoxically has been designated “fast-track” status, for having potential activity against MDR HIV.

The most recent phase 3 data were presented at CROI 2017 where a small number of people (n=41 originally and 16 in a follow up phase) switched to PRO140 monotherapy after stopping ART. PRO 140 uses weekly dosing of 350 mg self-administered sub-cutaneous injections of PRO 140 and 10/16 people continued to have undetectable viral load without ART for up to two years. [47]

Ongoing phase 3 studies include a monotherapy switch study in 300 participants with viral suppression >48 weeks on ART [48] and in addition to ART as part of salvage combination in 30 participants with multidrug resistance to other classes. [49] No new results are expected at IAS 2017.

Compounds in phase 2 studies

Fostemsavir - attachment inhibitor

Fostemsavir (GSK3684934) is an attachment inhibitor that binds to gp120 that is active against nearly all HIV-1 subtypes, though not sub-type AE or group O and has no in vitro cross resistance to drugs from other classes.

This compound is being developed by ViiV but was previously a BMS compound (BMS-663068).

Results from a phase 2b randomised dose-ranging study in 251 treatment-experienced participants that used atazanavir/r in the control arm were presented at the Glasgow conference in 2016. Rather than using 2 NRTIs as background drugs, all participants used raltegravir (400 mg twice-daily) plus TDF (once-daily) as the background drugs. At 96-weeks, 61% vs 53% had undetectable viral load <50 copies/mL (GSK934 vs atazanavir) with no difference by baseline subgroups. [50]

Ongoing research is in a large international phase 3 study (enrolled, no longer recruiting) in treatment-experienced patients with drug resistance and who are sensitive to only two or fewer drug classes. This study was launched in 2015 with an estimated end date in 2020. [51]

Although no new clinical data are due to be presented at IAS 2017, two drug interactions studies are due to be presented as posters. [52, 53]

UB-421 - mAb

UB-421 is a broadly neutralising mAb that targets CD4 binding with in vitro data suggest comparable or greater potency compared to other compounds, including VRC01 and 3BNC117. [5]

A phase 2 study in 29 virally suppressed participants on ART who used UB-421 monotherapy during an 8-week ART interruption had no cases of viral rebound during the monotherapy phase. UB-421 was given by infusion either 10 mg/kg weekly or 25 mg/kg every two-weeks. [54]

Although there were no cases of viral rebound during the monotherapy phase, viral load rebounded at 35 to 62 days after the last UB-421 dose in five participants who delayed restarting ART. All five later restarted ART and viral load became undetectable.

Two current phase 3 studies in people with MDR HIV are listed but not yet enrolling. [55, 56]

No new data are expected at IAS 2017.

VRC01 - mAb

VRC01 is another broadly neutralising mAb that targets the CD4 binding site that can be given by infusion or sub-cutaneous injection and that is in phase 1/2 development with multiple indications: for treatment, as part of cure research and for prevention.

One study at CROI reported no additional impact on reducing the latently infected viral reservoir from adding VRC01 to ART. [57] Other studies in cure research are ongoing [58].

This includes using a single injection in infants after birth to limit risk of vertical transmission and a potential role of additional injections for breastfed infants. [59]

Two large international phase 2 PrEP studies PrEP are already ongoing. [60, 61]

Although new clinical data are expected at IAS 2017, one study using this compound as a strategy in cure research is due to be presented, although results showing little impact on the reservoir after stopping ART were published in November 2016. [62, 63]

ABX464 - Rev inhibitor

ABX464 is a molecule thought to work by blocking the end stages of viral assembly. A phase 2a dose-ranging study presented at CROI 2016 in 80 treatment-naive participants in Thailand reported modest antiviral activity (~0.5 log copies/mL) but only in 4/6 people using the highest 150 mg dose (with no responses in 2/6). [81]

The compound is also being studied for impact on viral reservoir and whether it can limit viral rebound in absence of ART, included a related study due to be presented at IAS 2017 in Paris. [82, 83]

Phase 1 and preclinical compounds of interest

As many companies do not widely publicise pre-clinical work, this section is restricted to a few studies.

MK-8591 (EFdA) - NRTI

MK-8591 is a very interesting NRTI now in phase 1 development by Merck that is notable for high potency (currently using a 10 mg oral daily dose), a long plasma half-life that allows once-weekly oral dosing, a slow-release removable implant that might only require annual dosing and ongoing studies looking at use for both treatment and PrEP.

MK-8591 is active against both HIV-1 subtypes and HIV-2, including against NRTI mutations K65R and Q151M (although the M184V variant conferred 10-fold resistance). [64]

EFdA reaches good drug levels in vaginal and rectal tissue - supporting further PrEP studies. [65]

IAS 2017 is expected to include important new results for both use as treatment and prevention. [66, 67]

GS-9131 - NRTI

The first data from GS-9131 was reported ten years ago at CROI 2006. [68]

Other published studies highlight the potential for low risk of toxicity in animal studies and retains in vitro phenotypic sensitivity to broad NRTI resistance including mutations at K65R, L74V and M184V and multiple TAMS. [69] The poster at CROI 2017 confirmed results from previously published studies into the activity against common NRTI mutations. [70]

No new data are expected at IAS 2017.

GSK3640254 - maturation inhibitor

The maturation inhibitor GSK3640254 (previously BMS-986197) is in preclinical stages of development with GSK with a molecule acquired from BMS. [71]

An earlier maturation inhibitor, BMS-955176, also acquired from BMS was discontinued in October 2016 due to GI toxicity and drug resistance. [72]

New data on tolerability and side effects will be presented at IAS 2017. [73]

Combinectin - adnectin/fusion inhibitor

Combinectin (GSK3732394) is a combined adnectin/fusion inhibitor that stops viral entry by targeting multiple sites of action on gp41 and CD4. This compound has the potential for self-administered once-weekly injections.

This compound was in preclinical development with BMS and was acquired by ViiV in late 2015.

Latest data presented at Glasgow 2016 summarised, in vitro activity and resistance data and virologic data from mouse studies. [74]

GS-PI1 - protease inhibitor

GS-PI1 is a once-daily unboosted protease inhibitor with high potency and a long half-life, and in vitro sensitivity against some second-generation PI resistance, in pre-clinical development by Gilead.

An oral presentation at CROI 2017 reported a high barrier to resistance both after in vitro passaging and against multiple resistance complexes from multiple PI-resistant clinical isolates, and pharmacokinetic data from rat and dog studies. [75]

GS-CA1 - capsid inhibitor

First data was presented on GS-CA1, the first compound in a new class of HIV capsid inhibitors, with a formulation that can be used for slow-release injections, with monthly or longer dosing. [76]

Capsid is the cone-shaped structural core within the virion that protects HIV RNA and related enzymes. As part of a dynamic process, the capsid protein (p24) first breaks down to release viral contents into the CD4 cell to enable reverse transcription and also needs to reassemble inside new virions as part of the maturation process at the end of the lifecycle.

GS-CA1 acts in both the early and late stages by binding at a site that blocks both disassembly and assembly leading to defective new virions that are non-infectious.

Compounds developed for low- and middle-income markets

Although the following compounds are not being developed for use in high-income counties, they are progressing though clinical research.

Albuvirtide - fusion inhibitor

Albuvirtide is a second-generation fusion inhibitor similar to T-20 (enfuvirtide) that is being developed by Frontier Biotechnologies as an alternative second-line combination in China.

The long half-life enables once-weekly intravenous infusion (rather than twice-daily sub-cutaneous injections with T-20) and a side effect profile that does not include injection site reactions (ISRs).

Partial interim phase 3 results from 175/389 participants were presented in Glasgow in October 2016 included approximately 80% viral suppression at 24 weeks and generally good tolerability. [77]

Based on these results, albuvirtide has already been submitted for conditional approval in China and there are plans to run additional international studies in other countries next year, especially if paired with other long-acting drugs. A sub-cutaneous formulation of albuvirtide is also in development that would allow self-injections at home, rather than weekly clinic visits needed in the current version.

Elsulfavirine - NNRTI

Elsulfavirine (a pro drug of VM-1500A) is an NNRTI being developed by Viriom for registration in some middle-income countries.

48-week results from a phase 2b study at CROI 2017 reported similar viral suppression compared to efavirenz (81% vs 73% <50 copies/mL) using tenofovir-DF/FTC background NRTIs. [78]

A long-acting injectable formulation is being used in ongoing studies for treatment and PrEP with new results due at IAS 2017. [79]

Other compounds: trailing or lost

Several other compounds that featured in earlier pipeline reports have not lead to new data being presented over the last year.

GS-9695 and GS-9822 - integrase inhibitors

GS-9695 and GS-9822 were promising integrase inihibitor compounds that were discontinued due to unpredictable kidney/ urothelial toxicty in monkeys. [80]

BMS-955176 - maturation inhibitor

The development programme for BMS-955176 ended due to gastrointestinal intolerability. [71]

The follow-on compound GSK3640254 is still in development.

Conclusion

This is still an exciting time for HIV drug development.

This year the HIV pipeline is remarkable for a potential range of drugs that could improve many aspects of the traditional approach to treating HIV using three-drug oral therapy.

It includes responses to the changing situation in which all countries now have access to some generic anitretrovirals – and drug pricing will continue to drive access in all countries. It also includes some compounds that are only developed for low- and middle-income countries, and coformulations that will not be available in high income-countries.

References

Key: CROI: Conference on Retroviruses and Opportunistic Infections; IAS: International AIDS Society; HIV Glasgow: Glasgow Congress on HIV Therapy.

Full references are included in full version of the pipeline report.

1. Merck press statement. (30 May 2017). http://investors.merck.com/
2. Cahn P et al. HIV Glasgow, 23-26 October 2016. Oral abstract O334. https://vimeo.com/189136477 (webcast)
3. CHAI press release (22 September 2016). http://www.clintonhealthaccess.org/usfda-tentative-approval-dolutegravir
4. EMA, EMA/CHMP/596525/2016. (15 September 2016). http://www.ema.europa.eu/docs/en_GB/document_library/Summary_of_opinion_-_Initial_authorisation/human/004137/WC500212887.pdf (PDF)
5. England and Wales High Court (Patents) Decisions. (13 January 2017). http://www.bailii.org/ew/cases/EWHC/Patents/2017/13.html
6. US Food and Drug Administration. (June 9, 2017) https://content.govdelivery.com/accounts/USFDA/bulletins/1a0e24c
7. Salzman S. TheBody.com. (6 July 2017). http://www.thebody.com/content/80139/surprise-fda-approval-of-generic-truvada-is-a-wake.html
8. Janssen press statement. (12 September 2016). http://www.janssen.com/janssen-submits-marketing-authorisation-application-darunavir-based-single-tablet-regimen-treatment
9. ClinicalTrials.gov. NCT02431247. https://clinicaltrials.gov/ct2/show/NCT02431247
10. Molina JM et al. IAS 2017, 23-26 July, Paris. Oral abstract TUAB0101. http://programme.ias2017.org/Abstract/Abstract/4194
11. Gilead press statement. (12 June 2017). http://www.gilead.com/news/press-releases
12. Tsiang M et al. Antimic Agents and Chem. (September 2016). http://aac.asm.org/content/early/2016/09/13/AAC.01474-16.abstract
13. Sax PE et al. CROI 2017, 13-16 February 2017, Seattle. Oral abstract 41. http://www.croiconference.org/sessions/randomized-trial-bictegravir-or-dolutegravir-ftctaf-initial-hiv-therapy (abstract)
14. Gallant J et al. IAS 2017, 23-26 July, Paris. Oral abstract MOAB0105LB. http://programme.ias2017.org/Abstract/Abstract/5783
15. Sax PE et al. IAS 2017, 23-26 July, Paris. Oral abstract MOAB0105LB. http://programme.ias2017.org/Abstract/Abstract/5793
16. ViiV Healthcare press statement. (01 June 2017). https://www.viivhealthcare.com/media
17. Llibre JM et al. CROI 2017, 13-16 February, Seattle. Oral abstract 44LB. http://www.croiconference.org/sessions/phase-iii-sword-12-switch-dtgrpv-maintains-virologic-suppression-through-48-wks
18. ClinicalTrials.gov listing. NCT02652260. https://clinicaltrials.gov/ct2/show/NCT02652260
19. Gatell JM et al. CROI 2016, 22 – 25 February, Boston. Poster abs 470. http://www.croiconference.org/sessions/doravirine-100mg-qd-vs-efavirenz-tdfftc-art-naive
20. Molina J-M et al. CROI 2017, 13-16 February, Seattle. Oral abs 45LB. http://www.croiconference.org/sessions/doravirine-non-inferior-darunavirr-phase-3-treatment-naïve-trial-week-48 (abstract)
21. ClinicalTrials.gov. Identifier NCT02549040. https://clinicaltrials.gov/ct2/show/NCT02549040
22. Squires K et al. IAS 2017, 23-26 July, Paris. Oral abstract TUAB0104LB. http://programme.ias2017.org/Abstract/Abstract/5585
23. Margolis DA et al. CROI 2017, 13-16 February, Seattle. Poster abs 442. http://www.croiconference.org/sessions/long-term-safety-and-efficacy-cab-and-rpv-2-drug-oral-maintenance-therapy
24. Margolis D et al. AIDS 2016, 18-22 July 2016, Durban. AbsTHAB0206LB. http://programme.aids2016.org/Abstract/Abstract/10517 (Abstract)
25. ClinicalTrials.gov. NCT03164564. https://clinicaltrials.gov/ct2/show/NCT03164564
26. ClinicalTrials.gov. NCT02720094. https://clinicaltrials.gov/ct2/show/NCT02720094

27. Zhou T et al. CROI 2017, 13-16 February, Seattle. Poster abstract 439. http://www.croiconference.org/sessions/long-acting-nanoformulated-cabotegravir-prodrug-improved-antiretroviral-therapy
28. Eron J et al. IAS 2017, Paris. Late breaker oral abstract MOAX0205LB. http://programme.ias2017.org/Abstract/Abstract/5628
29. Cahn P et al. AIDS 2016, 18-22 July 2016, Durban. Abs FRAB0104LB. http://programme.aids2016.org/Abstract/Abstract/10270 (Abstract)
30. Figueroa MI et al. IAS 2017, Paris. Poster abstract MOPEB0287. http://programme.ias2017.org/Abstract/Abstract/1984
31. Joly V et al. CROI 2017, 13-16 February 2017, Seattle. Poster 458. http://www.croiconference.org/sessions/promising-results-dolutegravir-lamivudine-maintenance-anrs-167-lamidol-trial (abstract and poster)
33. Taiwo BO et al. IAS 2017, Paris. Poster abstract TULBPEB21. http://programme.ias2017.org/Abstract/Abstract/5634
33. ClinicalTrials.gov. NCT02263326. https://clinicaltrials.gov/ct2/show/NCT02263326
34. ClinicalTrials.gov. NCT02302547. https://www.clinicaltrials.gov/ct2/show/NCT02302547
35. ViiV press release. (16 August 2016). https://www.viivhealthcare.com/media
36. ClinicalTrials.gov. NCT02831673. https://www.clinicaltrials.gov/ct2/show/NCT02831673
37. ClinicalTrials.gov. NCT02831764. https://www.clinicaltrials.gov/ct2/show/NCT02831764
38. Girouard M et al. Clin Infect Dis. 2016 Mar 15; 62(6): 784–791. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4772845
39. Collins S. HTB, February 2017. http://i-base.info/htb/31289
40. Jacobson JM et al. Antimicrob Agents Chemother. 2009; 53:450-7. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2630626
41. ClinicalTrials.gov. NCT02475629. https://clinicaltrials.gov/ct2/show/NCT02475629
42. Lewis S et al. CROI 2017, 13-16 February, Seattle. Poster 449LB. http://www.croiconference.org/sessions/long-acting-ibalizumab-patients-multi-drug-resistant-hiv-1-24-week-study (abstract and poster)
43. Lin H-H et al. CROI 2017, 13-16 February, Seattle. Poster abstract 438. http://www.croiconference.org/sessions/intramuscular-ibalizumab-pharmacokinetics-safety-and-efficacy-vs-iv-administration
44. Theratechnologies press release. (30 June 2017) http://theratech.com/sites/default/files/news_release_en/nr-20170630-en.pdf (PDF)
45. ClinicalTrials.gov. NCT02707861. https://clinicaltrials.gov/ct2/show/NCT02707861
46. Weinheimer S et al. IAS 2017, Paris. Poster abstract MOPEB0352. http://programme.ias2017.org/Abstract/Abstract/4685
47. Lalezari J et al. CROI 2017, 13-16 February, Seattle. Poster abstract 437. http://www.croiconference.org/sessions/pro140-single-agent-maintenance-therapy-hiv-1-infection-2-year-update
48. ClinicalTrials.gov. NCT02859961. https://clinicaltrials.gov/ct2/show/NCT02859961
49. ClinicalTrials.gov. NCT02483078. https://clinicaltrials.gov/ct2/show/NCT02483078
50. Llamoso C et al. HIV Glasgow, 23-26 October 2016. Oral abs O335B. https://vimeo.com/189136479
51. ClinicalTrials.gov. NCT02362503. https://clinicaltrials.gov/ct2/show/NCT02362503
52. Sevinsky H et al. IAS 2017, Paris. Poster abstract MOPEB0338. http://programme.ias2017.org/Abstract/Abstract/3300
53. Magee M et al. IAS 2017, Paris. Poster abstract MOPEB0339. http://programme.ias2017.org/Abstract/Abstract/3312
54. Wang C-Y et al. CROI 2017, 13-16 February, Seattle. Poster 450 LB. http://www.croiconference.org/sessions/phase-2-open-label-trial-antibody-ub-421-monotherapy-substitute-haart (abstract and poster)
55. ClinicalTrials.gov. NCT0314921. https://clinicaltrials.gov/ct2/show/NCT0314921
56. ClinicalTrials.gov. NCT03164447. https://clinicaltrials.gov/ct2/show/NCT03164447
57. Riddler S et al. CROI 2017, 13-16 February, Seattle. Poster 330LB. http://www.croiconference.org/sessions/vrc01-infusion-has-no-effect-hiv-1-persistance-art-suppressed-chronic-infection (abstract and poster)
58. Schief WR et al. CROI 2017, 13-16 February, Seattle. Oral abstract 143. http://www.croiconference.org/sessions/immunogen-design-induce-hiv-neutralizing-antibodies (abstract and webcast)
59. Cunningham CK et al. CROI 2017, 13-16 February, Seattle. Poster 760. http://www.croiconference.org/sessions/safety-pharmacokinetics-monoclonal-antibody-vrc01-hiv-exposed-newborns (abstract and poster)
60. ClinicalTrials.gov. NCT02568215. https://www.clinicaltrials.gov/ct2/show/NCT02568215
61. ClinicalTrials.gov. NCT02716675. https://www.clinicaltrials.gov/ct2/show/NCT02716675
62. Crowell TA et al. IAS 2017, Paris. Oral abstract TUAB0106LB. http://programme.ias2017.org/Abstract/Abstract/5527
63. Barr K et al. N Engl J Med 2016; 375:2037-2050. http://www.nejm.org/doi/full/10.1056/NEJMoa1608243
64. Wu V et al. CROI 2017, 13-16 February, Seattle. Poster abstract 440. http://www.croiconference.org/sessions/antiviral-activity-efda-against-nrti-sensitive-and-resistant-strains-hiv-2
65. Grobbler J et al. CROI 2017, 13-16 February, Seattle. Poster 435. http://www.croiconference.org/sessions/mk-8591-concentrations-sites-hiv-transmission-and-replication
66. Matthews RP. IAS 2017, Paris. Late breaker poster abstract TUPDB020. http://programme.ias2017.org/Abstract/Abstract/5525
67. Markowitz M et al. IAS 2017, Paris. Late breaker abstract MOAX0203LB. http://programme.ias2017.org/Abstract/Abstract/5533
68. Cihlar T et al. 13th CROI, 5-8 February 2006, Denver. Oral abstract 45.
69. Cihlar T et al. Antimicrob Agents Chemother. 2008 Feb; 52(2): 655–665. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2224772
70. White KL et al. CROI 2017, 13-16 February, Seattle. Poster abstract 436. http://www.croiconference.org/sessions/gs-9131-novel-nrti-activity-against-nrti-resistant-hiv-1
71. ViiV Healthcare press statement. (December 2015). https://www.viivhealthcare.com/our-medicines/medicines-in-development.aspx
72. Collins S. GSK discontinues development of maturation inhibitor BMS-955176. HTB (October 2016). http://i-base.info/htb/30865
73. Joshi SR et al. IAS 2017, Paris. Poster abstract WEPEB0540. http://programme.ias2017.org/Abstract/Abstract/2917
74. Krystal M et al. HIV Glasgow 2016. Poster abstract P022. http://www.natap.org/2016/GLASGOW/GLASGOW_27.htm
75. Link JO et al. CROI 2017, 13-16 February, Seattle. Abstract 433. http://www.croiwebcasts.org/p/2017croi/croi33636
76. Tse WC et al. CROI 2017, 13-16 February, Seattle. Oral abstract 38. http://www.croiconference.org/sessions/discovery-novel-potent-hiv-capsid-inhibitors-long-acting-potential
77. Wu H et al. HIV Glasgow, 23-26 October 2016. Oral abstract O336. https://vimeo.com/189136480 (webcast)
78. Murphy R et al. CROI 2017, 13-16 February, Seattle. Abstract 452LB. http://www.croiconference.org/sessions/elsulfavirine-compared-efavirenz-combination-tdfftc-48-week-study
79. Bichko V et al. IAS 2017, 23-26 July, Paris. Poster abstract WEPEA0190. http://programme.ias2017.org/Abstract/Abstract/1515
80. Mitchell ML et al. CROI 2017, 13-16 February, Seattle. Poster 434. http://www.croiconference.org/sessions/novel-non-catalytic-site-integrase-inhibitor-improved-resistance-profile (abstract and PDF)
81. Scherrer D et al. CROI 2016, February 22–25, Boston. Poster 461LB. http://www.croiconference.org/sites/default/files/posters-2016/461LB.pdf
82. Scherrer D et al. HIV Glasgow 2016, 23–26 October. Poster P078. http://www.natap.org/2016/HIV/060116_02.htm
83. Paredes R et al. IAS 2017, 23-26 July, Paris. Poster TULBPEB22. http://programme.ias2017.org/Abstract/Abstract/5650

Supplement 2017; Vol 18 (1)

Fax-back orders and subscriptions

107 The Maltings,169 Tower Bridge Road, London, SE1 3LJ
Tel: +44 (0) 20 8616 2210 Fax: +44 (0) 20 8616 1250

Please use this form to amend subscription details for HIV Treatment Bulletin and to order single or bulk copies of publications. Publications are available free, but please contact i-Base if you would like to make a donation.

Name _____ **Position** _____

Organisation _____

Address _____

_____

Telephone _____ **Fax** _____

e-mail _____

☐ I would like to make a donation - *Please see: http://i-base.info/i-base-2017-appeal-we-need-your-help*

- **HIV Treatment Bulletin (HTB) every two months** ☐ **by e-mail**

Quantity

- **NEW: ART in pictures: HIV treatment explained** - *32 page A4 book* _____

- **Pocket leaflets** - *A7 small concertina-folded leaflets (2017)*

  Pocket HCV coinfection **quantity** _____ **Pocket PrEP** _____

  Pocket ART **quantity** _____ **Pocket pregnancy** _____

  Pocket side effects **quantity** _____

- **Treatment guides -** *A5 booklets (from 24 to 96 pages depending on title)*

  NEW: Guide to hepatitis C coinfection *(April 2017): 52-page A5 booklet* _____

  UK Guide To PrEP *(November 2016): 24-page A5 booklet* _____

  Introduction to ART *(September 2016): 48-page A5 booklet* _____

  Guide to side effects and long-term health *(September 2016): 96-pages* _____

  Guide To HIV testing and risks of sexual transmission *(July 2016): 52-pages* _____

  Guide to HIV, pregnancy and women's health *(November 2015): 52-page A5 booklet* _____

  Changing treatment: what to do if viral load rebounds *(February 2015): 24-pages* _____

- **HIV Treatment 'Passports'** - Booklets for patients to record their own medical history

  1 ☐ **5** ☐ **10** ☐ **25** ☐ **50** ☐ **Other** _____

- **Phoneline** ***A4 colour posters to advertise the treatment phoneline*** _____

Please fax this form back, post to the above address, or email a request to HIV i-Base:

020 8616 1250 (fax) subscriptions@i-Base.org.uk

Table 2: HIV pipeline by class

Compound	Phase	Ref.
Integrase inhibitors		
dolutegravir/ rilpivirine FDC	Submitted	
cabotegravir	Phase 2b	
cabotegravir LA	Phase 3 (for both ART and PrEP)	
bictegravir	Submitted to FDA.	
GS-9695 and GS-9822	Stopped.	
Protease inhibitors		
GS-PI1	Pre-clinical	
capsid inhibitors		
GC-CA1	Pre-clinical	
Entry inhibitors		
fostemsavir	Phase 3	
GSK3732394 (was combinection/BMS)	Pre-clinical	
monoclonal antibodies (mAbs)		
PRO 140 (CCR5 target)	Phase 3	
ibalizumab (previously TNX-355) (CD4 binding site)	Phase 3	
VRC01 (CD4 binding site)	Ph 1 (infants), ph 2 (cure-related and adult PrEP)	
UB-421	Phase 2/3	

Embargo IAS update

C/C/F/TAF FDC

8. Molina JM et al. Efficacy and safety of switching from boosted-protease inhibitor plus emtricitabine/tenofovir disoproxil fumarate regimens to the single-tablet regimen of darunavir/cobicistat/emtricitabine/tenofovir alafenamide (D/C/F/TAF) in virologically-suppressed, HIV-1-infected adults through 24 weeks: EMERALD study. Oral abstract TUAB0101. http://programme.ias2017.org/Abstract/Abstract/4194

Bictegravir FDC

12. Gallant J et al. A phase 3 randomized controlled clinical trial of bictegravir in a fixed dose combination, B/F/TAF, vs ABC/DTG/3TC in treatment-naïve adults at week 48. IAS 2017, Paris. Late breaker oral abstract MOAB0105LB. http://programme.ias2017.org/Abstract/Abstract/5783
13. Sax PE et al. Phase 3 randomized, controlled clinical trial of bictegravir coformulated with FTC/TAF in a fixed-dose combination (B/F/TAF) vs dolutegravir (DTG) + F/TAF in treatment-naïve HIV-1 positive adults: week 48 results. IAS 2017, Paris. Late breaker oral abstract MOAB0105LB. http://programme.ias2017.org/Abstract/Abstract/5793

Doravirine

20. Squires K et al. Fixed dose combination of doravirine/lamivudine/TDF is non-inferior to efavirenz/emtricitabine/TDF in treatment-naïve adults with HIV-1 infection: week 48 results of the Phase 3 DRIVE-AHEAD study. IAS 2017, Paris. Oral late-breaker abstract TUAB0104LB. http://programme.ias2017.org/Abstract/Abstract/5585

Cabotegravir LA/rilpivirine LA - injections

26. Eron J et al. Safety and efficacy of long-acting CAB and RPV as two drug IM maintenance therapy: LATTE-2 week 96 results. IAS 2017, Paris. Late breaker oral abstract MOAX0205LB.
http://programme.ias2017.org/Abstract/Abstract/5628

Ibalizumab

33. Weinheimer S et al. Long-acting ibalizumab susceptibility in multi-drug resistant HIV patients. IAS 2017, Paris. Poster abstract MOPEB0352. http://programme.ias2017.org/Abstract/Abstract/4685

Fostemsavir

37. Sevinsky H et al. The effect of fostemsavir on methadone and buprenorphine pharmacokinetics. IAS 2017, Paris. Poster abstract MOPEB0338. http://programme.ias2017.org/Abstract/Abstract/3300
38. Magee M et al. The effect of fostemsavir on the pharmacokinetics of a combined oral contraceptive (OC) containing ethinyl estradiol (EE) and norethindrone (NE) in healthy female subjects. IAS 2017, Paris. Poster abstract MOPEB0339. http://programme.ias2017.org/Abstract/Abstract/3312

MK-8591 - inc PrEP

52. Matthews RP. Single doses as low as 0.5 mg of the novel NRTTI MK-8591 suppress HIV for at least seven days. IAS 2017, Paris. Late breaker poster abstract TUPDB020. http://programme.ias2017.org/Abstract/Abstract/5525
53. Markowitz M et al. Weekly oral MK-8591 protects male rhesus macaques against repeated low dose intrarectal challenge with SHIVC109P3. IAS 2017, Paris. Late breaker oral abstract MOAX0203LB. http://programme.ias2017.org/Abstract/Abstract/5533

Elsufavirine

56. Bichko V et al. Pre-clinical pharmacokinetics of elsulfavirine/VM1500A long acting injectable formulations. IAS 2017, Paris. Poster abstract WEPEA0190. http://programme.ias2017.org/Abstract/Abstract/1515

IAS Others

Dolutegravir (long acting injection and implant for PrEP)

New formulation of injectable and removable long-acting dolutegravir is effective in prevention of HIV transmission with high dose vaginal HIV challenges. WEPEA0201

Dolutegravir/3TC

ACTG A5353: a pilot study of dolutegravir (DTG) + lamivudine (3TC) for initial treatment of HIV-1-infected participants with HIV-1 RNA < 500,000 copies/ mL. TULBPEB21

Switching from a boosted protease inhibitor (PI/r) based regimen to a dolutegravir regimen in virologically suppressed patients with high cardiovascular risk or age ≥50 years is non-inferior and decreases lipids. TUAB0102.

http://programme.ias2017.org/Abstract/Abstract/915

Dolutegravir-lamivudine as initial therapy in HIV-infected, ARV naive patients: 96 week results of the PADDLE trial. MOPEB0287.

http://programme.ias2017.org/Abstract/Abstract/1984

Dual regimen with dolutegravir and lamivudine maintains virologic suppression even in heavily treatment experienced HIV-infected patients: 96 weeks results from maintenance DOLULAM study. MOPEB0322.

http://programme.ias2017.org/Abstract/Abstract/2755

Characterization of a novel dolutegravir monotherapy-associated S230R Mutation in HIV. MOPEA0011.

http://programme.ias2017.org/Abstract/Abstract/1047

Dolutegravir-based simplification of antiretroviral therapy (mono- and dual therapy) in humanized mice with chronic HIV infection. TUPEA0162.

http://programme.ias2017.org/Abstract/Abstract/2714

MONODO: peripheral blood and cerebrospinal fluid viremia of 24-weeks MONOtherapy of DOlutegravir in HIV-1 virologically suppressed patients. MOPEB0325.

http://programme.ias2017.org/Abstract/Abstract/4511

Dual therapy with dolutegravir plus darunavir/cobicistat as salvage therapy regimen. Results at 24 weeks. MOPEB0310.

http://programme.ias2017.org/Abstract/Abstract/4637

Cabotegravir LA - PrEP

Safety, tolerability and pharmacokinetics of long-acting injectable cabotegravir in low-risk HIV-uninfected women and men: HPTN 077. TUAC0106LB.

http://programme.ias2017.org/Abstract/Abstract/5481