HIV Transmission Routes, Pathology, Treatment and Prevention

Damian Kelly

Feb 2017
HIV Transmission Routes

• Factors necessary for transmission

• HIV presence in body fluids

• Common routes of transmission

• Less common routes of transmission
• HIV present in *infectious quantities* in blood, semen and vaginal fluids, breast milk of an *HIV positive person*

• Enters body through sexual organs, bloodstream, mouth

• **Presence** of virus in body fluid

• **Quantity** of virus in body fluid

• **Quality** of virus in body fluid

• **Route** into the body/bloodstream
Common Routes of Transmission

• Unprotected anal or vaginal sex

• Blood to blood contact – e.g. sharing needles

• Mother to baby – during pregnancy, birth or through breastfeeding
Less Common Routes of Transmission

• Oral sex without a condom

• Sharing sex toys

• Needle stick injuries

• Eye splashes

• Skin piercing/tattooing (unsterilised equipment)

• Donated blood and tissue in countries with inadequate screening
When should you get an **HIV** test?

- You have sex without a condom, with other people other than your partner – *oral, vaginal or anal sex*
- You have unprotected sex (without condom or improper condom use) with your partner who injects drugs or has sex with others
- You inject drugs and share needles with other people
- All pregnant women
- Sexual assault / rape

Watch: [https://www.youtube.com/watch?v=Kw_e_O6MdM4](https://www.youtube.com/watch?v=Kw_e_O6MdM4)
HIV Testing
Antibody test

• Antibody tests
  • Rapid tests and home tests
    • Antibodies are produced by the immune system which is what the test looks for. Can be used in blood and oral fluid
    • 3 – 12 weeks after infection before detection

  • Rapid antibody screening test takes 30 minutes
  • OraQuick HIV test swab from the mouth takes about 20 minutes
  • Home testing kits involves a finger prick blood sample can take 7 – 10 days for results

• All positive test results will require a second conformation test
Fourth Generation Tests

• Fourth generation tests look for
  • HIV antibodies and antigens
  • Antigens are foreign substances that cause your immune system to activate
  • Antigen is part of the virus and present during acute infection
  • Antigen p24 is produced before antibodies are produced

• 2 – 6 weeks for the body to make enough antigens and antibodies for the test to detect HIV
Nucleic Acid Test (NAT)

• Nucleic acid test
  • Does not look for antigens or antibodies
• It looks for the virus
• Gives a positive or negative result
  • And the actual amount of the virus

Takes 7 – 28 days for NAT to detect the virus

Very expensive and rarely used
HIV Types

• Type 1
  • 4 strains classed into four groups
  • M, N, O, P. M (major) group global infections
  • Within group M at least 9 subtypes A-K
  • B accounts for most clinical trials

• Type 2
  • Concentrated in West Africa
    • Less infectious
    • Progresses slower
    • Few clinical trials
    • Optimum treatment poorly understood
HIV LIFE CYCLE

1. Free Virus

2. Binding and Fusion: Virus binds to a CD4 molecule and one of two "coreceptors" (either CCR5 or CXCR4). Receptor molecules are common on the cell surface. Then the virus fuses with the cell.

3. Infection: Virus penetrates cell. Contents emptied into cell.

4. Reverse Transcription: Single strands of viral RNA are converted into double-stranded DNA by the reverse transcriptase enzyme.

5. Integration: Viral DNA is combined with the cell's own DNA by the integrase enzyme.

6. Transcription: When the infected cell divides, the viral DNA is "read" and long chains of proteins are made.


8. Budding: Immature virus pushes out of the cell, taking some cell membrane with it. The protease enzyme starts processing and packaging in the newly forming virus.

9. Immature virus breaks free of the infected cell.

10. Maturation: The protease enzyme finishes cutting HIV protein chains into individual proteins that combine to make a new working virus.

Revised April 30, 2005
HIV lifecycle

https://www.youtube.com/watch?v=fBPicJ-AZAk
HIV Drugs

• There are several categories of drugs used to treat HIV

• A combination of categories should be used
  • Mono therapy 1980’s  
  • Dual therapy 1980’s – 1990’s  
  • Triple therapy 1990’s onwards

• Until recently when dual therapy and even mono therapy are being investigated again with the new drugs.
Why Start Treatment?

• To prevent injury / damage to the immune system

• To repair damage done

• To prevent onward transmission

• To remain healthy

• To be in control
Key Terms

- Viral load
- CD4 count
- Resistance tests
- Drug levels
- Viral tropism
- Renal function test
- Liver function tests
- Full blood count
Viral Load

• The most important test once started on treatment!

• Shows how much virus is in the blood

• Result may look like 100 000 copies/mL for someone not on ART
  • For someone on ART it may look like 3 copies/mL (undetectable)

• Viral loads show if the ARV therapy is working or not
CD4 Count

- This measures how your immune system is functioning -
  - A high CD4 count means it's good
    - A low CD4 count is not
      - Anything under 250 is dangerous
      - The most important test before commencing ARV therapy

- CD4 cells are lymphocyte cells (white blood cells) sometime known as T-cells

- Two types of T-cells – CD4 are helper cells and lead against infection and CD8 cells “suppressor” cells. These are also killer cells

- A normal CD4 count range would be 400 – 1600 cells per cubic millimeter

- CD4% is the total lymphocytes (white blood cells) that are CD4 cells

- Starting ARV will increase the CD4 count as the immune system recovers
## When to Start Treatment

<table>
<thead>
<tr>
<th>AIDS / symptoms</th>
<th>CD4 &lt;200</th>
<th>CD4 200 - 350</th>
<th>CD4 350 - 500</th>
<th>CD4 &gt;500</th>
</tr>
</thead>
<tbody>
<tr>
<td>US DHHS 2016</td>
<td>RECOMMENDED</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>IAS/USA 2016</td>
<td>RECOMMENDED</td>
<td></td>
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<tr>
<td>EACS 2016</td>
<td>RECOMMENDED</td>
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<tr>
<td>BHIVA 2016</td>
<td>RECOMMENDED</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WHO 2016</td>
<td>Strongly recommended PRIORITY</td>
<td>Strongly recommended</td>
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</tr>
</tbody>
</table>
Resistance Testing

• This shows if the HIV virus is resistant to HIV drugs
  • It shows if the chosen drug will work

• A virus that has mutated may cause drug resistance to occur
  • K103N will stop EFV and NVP from working
  • M184V will stop 3TC and FTC working

• Missing medication can cause resistance to develop

• An detectable viral load while on treatment can cause a mutation to occur
Therapeutic Drug Monitoring

• Drug level testing

• This should be done once commenced on ARV

• Detects how much drug the body is absorbing
  • For ARV’s to work properly there has to be a set level of drug in the body

• Sometimes a dose adjustment maybe needed or a change of therapy if the body does not absorb the drug correctly
  • Many reasons why drugs are not absorbed
  • Adherence level is the biggest reason why drug levels maybe low....
Renal Function Tests (TX & PrEP)

- HIV Associated Nephropathy (HIVAN)
  damage caused by HIV to kidneys

- Nephrotoxicity
  toxicity or injury to the kidneys
  side effects of ARV’s

- Up to 30% of HIV+ people have kidney disease

- Measures the levels of urea, creatinine and salts
  dipstick urine tests often pick up increased protein levels which indicate potential kidney damage
Drug Classes

- Fixed dose combination (STR) single tablet regime
- Nukes; nucleoside or nucleotide reverse transcriptase inhibitors (NRTIs)
- Non-nucleoside reverse transcriptase inhibitors (NNRTIs)
- Integrase inhibitors (INIs)
- CCR5 Inhibitors (entry inhibitor)
- Protease Inhibitor (PIs)
- PK (pharmacokinetic) booster
- Attachment Inhibitor
<table>
<thead>
<tr>
<th>NAME</th>
<th>Restrictions and recommended dose</th>
<th>Amount of Tablets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atripla</td>
<td>Efavirenz 600mg + emtricitabine 200mg + Tenofovir DF 300mg</td>
<td>Take at night and not with high fat meal</td>
</tr>
<tr>
<td></td>
<td>1 tablet a day</td>
<td></td>
</tr>
<tr>
<td>Eviplera</td>
<td>Rilpivirine 25mg + emtricitabine 200mg + Tenofovir DF 300mg</td>
<td>Take with food</td>
</tr>
<tr>
<td></td>
<td>1 tablet a day</td>
<td></td>
</tr>
<tr>
<td>Odefsey</td>
<td>Rilpivirine 25mg + emtricitabine 200mg + TAF 25mg</td>
<td>With food</td>
</tr>
<tr>
<td></td>
<td>1 tablet a day</td>
<td></td>
</tr>
<tr>
<td>Trumeq</td>
<td>Dolutegravir 50mg + Abacavir 600mg + lamivudine 300mg</td>
<td>With or without food</td>
</tr>
<tr>
<td></td>
<td>1 tablet</td>
<td></td>
</tr>
<tr>
<td>Genvoya</td>
<td>Elvitegravir 150mg + cobicistat 150mg + emtricitabine 200mg + TAF 10mg.</td>
<td>Take with food</td>
</tr>
<tr>
<td></td>
<td>1 tablet a day</td>
<td></td>
</tr>
<tr>
<td>Stirbald</td>
<td>Elvitegravir 150mg + cobicistat 150mg + emtricitabine 200mg + Tenofovir DF 300mg</td>
<td>Take with food</td>
</tr>
<tr>
<td></td>
<td>1 tablet a day</td>
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</table>
### Nukes; nucleoside or nucleotide reverse transcript inhibitors (NRTIs)

| Single Nukes                                                                 | 1 x 300mg or 2 x 150mg taken as once daily or twice daily dose | 1 if 300mg  
|                                                                             | 1 if 300mg  
|                                                                             | 2 if 150mg  
|                                                                             | 2 if 150mg  
| Lamivudine (3TC)                             |   |   |   |
| Abacavir (Ziagen, Epzicom)               | 2 x 300mg tablets taken as once daily or twice daily dose | 2 Tablets |
| Emtricitabine (FTC) (Emtriva)            | 1 x 200mg once a day | 1 Tablet a day |
| Tenofovir DF (Viread)                    | 1 X 300MG tablet once a day | 1 Tablet a day |
| Zidovudine (AZT)                        | 1 x 250mg twice daily | 2 tablets |
| ddI (Videx, Didanosine)                  | 1 tablet a day either; 125, 200, 250 or 400mg) take on empty stomach 2hrs before eating | 1 tablet a day |

| Dual Nukes                                                                      |   |   |   |
| Truvada (Tenofovir and FTC)                                                     | Tenoforv DF 300mg + emtricitabine 200mg | 1 Tablet a day |
| Descovy (TAF)                                                                  | TAF 25mg + Emtricitabine 200mg | 1 tablet a day |
| Kivexa (Abacavir and 3tc)                                                      | Abacavir 600mg + lamivudine 300mg | 1 Tablet a day |
| Combivir (AZT and 3T)                                                          | One tablet twice a day | 2 Tablets a day |

| Triple Nukes                                                                    |   |   |   |
| Trizivir (AZT +3TC+abacavir)                                                   | One tablet twice a day | 2 tablets a day |
## Non-nucleoside reverse transcriptase inhibitors (NNRTI’s)

<table>
<thead>
<tr>
<th>Drug</th>
<th>Administration Details</th>
<th>Dosage</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efavirenz</td>
<td>Not with high fat meal. 1x 600mg tablet or 3 x 200mg tablets at night</td>
<td>1 Tablet or 3 tablets depending on dose</td>
<td></td>
</tr>
<tr>
<td>Nevirapine 200mg</td>
<td>200mg once daily for first 14 days. Then 1 x 200mg tablet twice a day or 2 x 200mg once a day OR 1 x 400mg prolonged release tablet once a day</td>
<td>1 or 2 Tablets depending whether 200mg 0r 400mg</td>
<td></td>
</tr>
<tr>
<td>(Viramune)</td>
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<tr>
<td>Nevirapine 400mg</td>
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<td></td>
<td></td>
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<tr>
<td>(Viramune pr)</td>
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<td></td>
<td></td>
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<tr>
<td>Etravirine</td>
<td>1 x 200mg tablet twice a day take with food</td>
<td>2 Tablets a day</td>
<td></td>
</tr>
<tr>
<td>(Intelence)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rilpivirine</td>
<td>1 x 25mg tablet once a day with 500kcal)</td>
<td>1 Tablet a day</td>
<td></td>
</tr>
<tr>
<td>(Edurant)</td>
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<td></td>
</tr>
</tbody>
</table>

Not to be used to treat HIV type 2 infections
<table>
<thead>
<tr>
<th>Integrase inhibitors (INIs)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Raltegravir (Isentress)</strong></td>
<td>1 x 400mg tablet twice a day with or without food</td>
<td>2 Tablets a day</td>
</tr>
<tr>
<td><strong>Elvitegravir (Vitekta)</strong></td>
<td>1 x 85mg tablet once a day (or 1 x 50mg tablet twice a day if drug resistance) With or without food</td>
<td>1 Tablet a day</td>
</tr>
<tr>
<td><strong>Dolutegravir (Ticicay)</strong></td>
<td>1 x 50mg tablet once a day or 1 x 50mg twice a day if drug resistance With or without food</td>
<td>1 or 2 Tablets a day</td>
</tr>
<tr>
<td></td>
<td>Dose</td>
<td>Dosage</td>
</tr>
<tr>
<td>----------------</td>
<td>-------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td><strong>Maraviroc</strong></td>
<td>150mg 300mg or 600mg as directed and depending on which other drugs are used</td>
<td>1 or 2 or 4 tablets a day</td>
</tr>
<tr>
<td><strong>T20 (Fuzeon, enfuvirtide)</strong></td>
<td>90mg injection under the skin twice a day</td>
<td>2 injections a day</td>
</tr>
<tr>
<td>Drug Name</td>
<td>Dosage Description</td>
<td>Tablet Quantity</td>
</tr>
<tr>
<td>------------------------</td>
<td>------------------------------------------------------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Atazanavir</td>
<td>1 x 300mg tablet + a booster once a day with food. 150mg and 200mg are also available</td>
<td>1 Tablet plus a booster</td>
</tr>
<tr>
<td>Darunavir</td>
<td>1 x 800mg plus booster once a day or 1 x 600mg plus 100mg booster twice a day if resistance. Take with food</td>
<td>1 or 2 tablets (based on dose) plus boosters</td>
</tr>
<tr>
<td>Atazanavir / cobicistat</td>
<td>Take with food</td>
<td>1 tablet a day</td>
</tr>
<tr>
<td>Darunavir / cobicistat</td>
<td>Take with food</td>
<td>1 tablet a day</td>
</tr>
<tr>
<td>Lopinavir (Kaletra)</td>
<td>2 x 200/50mg twice daily OR 4 x 100/25mg with or without food</td>
<td>4 Tablets using the larger dose OR 8 Tablets using the smaller dose</td>
</tr>
<tr>
<td>Foasamrenavir (Telzir)</td>
<td>1 x 700mg +100mg Ritonavir twice a day Take with or without food</td>
<td>2 Tablets a day plus booster</td>
</tr>
<tr>
<td>Saquinavir (Invirase)</td>
<td>2 x 500mg twice a day Take with food</td>
<td>4 tablets a day plus booster</td>
</tr>
<tr>
<td>Tripranavir (Aptivus)</td>
<td>2 x 250mg twice a day take with food</td>
<td>4 Tablets a day plus booster</td>
</tr>
<tr>
<td>Pharmacokinetic boosters (PK)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cobicistat</strong> (Tybost)</td>
<td>150mg tablet once a day used to boost Atazanavir, Darunavir and Elvitegravir</td>
<td>Depends on boosted drug</td>
</tr>
<tr>
<td><strong>Ritonavir (RTV)</strong> Norvir</td>
<td>100mg tablets used at different doses</td>
<td>Depends on PI drugs</td>
</tr>
</tbody>
</table>

Warning of Drug Drug Interactions especially Ecstasy and Viagra
## What to Start

<table>
<thead>
<tr>
<th></th>
<th>NRTI</th>
<th>NNRTI</th>
<th>PI</th>
<th>INS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>US DHHS 2016</strong></td>
<td>TAF/FTC</td>
<td></td>
<td>DRV/r</td>
<td>DTG EVG RAL</td>
</tr>
<tr>
<td></td>
<td>TDF/FTC</td>
<td>ABC/3TC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>IAS 2016</strong></td>
<td>TAF/FTC</td>
<td></td>
<td></td>
<td>DTG EVG RAL</td>
</tr>
<tr>
<td></td>
<td>ABC/3TC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EACS</strong></td>
<td>TAF/FTC</td>
<td></td>
<td>RPV</td>
<td>DTG EVG RAL</td>
</tr>
<tr>
<td></td>
<td>TDF/FTC</td>
<td>ABC/3TC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BHIVA 2016</strong></td>
<td>TAF/FTC</td>
<td></td>
<td>RPV</td>
<td>ATV/r DRV/r</td>
</tr>
<tr>
<td></td>
<td>TDF/FTC</td>
<td></td>
<td></td>
<td>DTG EVG RAL</td>
</tr>
<tr>
<td><strong>WHO 2015</strong></td>
<td>TDF + 3TC or FTC</td>
<td>EFV</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ART in 2017

- 29 approved drugs
- 5 broad mechanistic classes NRTI, NNRTI, PI, INI’s, entry inhibitor
- 10 recommended first line choices
  - 1 standard strategy: 2 NRTI’s + 1 NNRTI or PI or INSTI

Properties
- virologic activity
- safety and tolerability
- convenience
- Access and cost
- Life expectancy
**Undetectable** – What does it mean?

**Undetectable** means having a viral load below 50 copies.

**Undetectable** does **NOT** mean cured of HIV. HIV infection is still present within the body but cannot be picked up on a standard HIV test.

**Undetectable** means the virus has been “switched off” and is no longer replicating at high levels within the body.

**Undetectable** means the risk of onward transmission is virtually 0% chance of transmitting the virus.
Adherence

• What is adherence?

• How much is enough?

• How can adherence be improved?

• What about missed or forgotten tablets?

And so to ....
PrEP

Pre Exposure Prophylaxis
Pre-Exposure Prophylaxis

Pre
→ Before

Exposure
→ When a fluid containing HIV comes into contact with mucous membranes or non-intact skin

Prophylaxis
→ An action taken to prevent infection or disease
PrEP IS NOT NEW....

“The reduction in mother-to-child transmission of human immunodeficiency virus (HIV) is regarded as one of the most effective public health initiatives.

In the absence of treatment, the risk of vertical transmission of HIV is as high as 25-30%. With the implementation of HIV testing, counseling, antiretroviral medication, delivery by cesarean section prior to onset of labor, and discouraging breastfeeding, the mother-to-infant transmission has decreased to less than 2%”
PrEP
Pre Exposure Prophylaxis

HIV Prevention 2010

Male condoms
Female condoms
HIV testing
STI treatment
VMMC
Post Exposure Prophylaxis
PEP
Needle exchange
PMTCT

Behavioural Interventions: abstain, be faithful
Using ARV for prevention

The use of antiretrovirals for prevention by...

• HIV-positive individuals to reduce their risk of transmitting HIV
  Treatment as prevention

• HIV-negative individuals to reduce their risk of infection
  Post-exposure prophylaxis (PEP)
  Pre-exposure prophylaxis (PrEP)
Oct 2009: RV144 HIV vaccine

HIV vaccine trial was significant

By Matt McGrath
BBC News science and environment reporter

A review of a trial of an HIV vaccine in Thailand has concluded that it does show real signs of a protective effect.

Scientists announced last month that a combination of vaccines gave a 31% level of protection in trials among 16,000 heterosexuals aged 18-30.

Doubts had been raised about whether the finding was significant.
July 2010: Tenofovir microbicide
Oct 2013: First rectal microbicide trial

- **MTN017:**
  - Phase II trial
  - Reduced glycerine formulation of tenofovir gel
    - Daily
    - Before and after sex
  - Truvada oral daily
  - Enrolling 186 MSM/TSW in Peru, South Africa, Thailand and the United States
<table>
<thead>
<tr>
<th>Question</th>
<th>Answers</th>
</tr>
</thead>
</table>
| How are the antiretrovirals used?             | • Oral pill  
• Topical gel (microbicide)  
  • Rectal  
  • Vaginal  
• Injection  
• Intravaginal ring |
| How often are the antiretrovirals used?       | • Daily  
• Intermittently  
• Coitally (before/sex) |
| How many antiretrovirals are used?            | • Single  
• Combination |
| What antiretrovirals are used?                | • Mostly TRUVADA  
• Over 25 available |
<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Participants</th>
<th>Control</th>
<th>Limitations</th>
<th>Quality of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Among Men Who have Sex with Men</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>iPrEx Trial</td>
<td>Phase 3</td>
<td>TDF/FTC (n = 1251)</td>
<td>Placebo (n = 1248)</td>
<td>Adherence</td>
<td>High</td>
</tr>
<tr>
<td>US MSM Safety</td>
<td>Phase 2</td>
<td>TDF (n = 201)</td>
<td>Placebo (n = 199)</td>
<td>Minimal</td>
<td>High</td>
</tr>
<tr>
<td><strong>Among Heterosexual Men and Women</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Partners PrEP</td>
<td>Phase 3</td>
<td>TDF (n = 1589)</td>
<td>Placebo (n = 1586)</td>
<td>Minimal</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TDF/FTC (n = 1583)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TDF2</td>
<td>Phase 2</td>
<td>TDF/FTC (n = 611)</td>
<td>Placebo (n = 608)</td>
<td>High loss to follow-up; modest sample size</td>
<td>Moderate</td>
</tr>
<tr>
<td><strong>Among Heterosexual Women</strong></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>FEM-PrEP</td>
<td>Phase 3</td>
<td>TDF/FTC (n = 1062)</td>
<td>Placebo (n = 1058)</td>
<td>Stopped at interim analysis, limited follow-up time; very low adherence to drug regimen</td>
<td>Low</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td>West African</td>
<td>Phase 2</td>
<td>TDF (n = 469)</td>
<td>Placebo (n = 467)</td>
<td>Stopped early for operational concerns; small sample size; limited follow-up time on assigned drug</td>
<td>Low</td>
</tr>
<tr>
<td>Trial</td>
<td></td>
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</tr>
<tr>
<td>VOICE</td>
<td>Phase 2B</td>
<td>TDF (n = 1007)</td>
<td>Placebo (n = 1009)</td>
<td>TDF arm stopped at interim analysis (futility); very low adherence to drug regimen in both TDF and TDF/FTC arms</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TDF/FTC (n = 1003)</td>
<td></td>
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<tr>
<td><strong>Among Injection Drug Users</strong></td>
<td></td>
<td></td>
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<tr>
<td>BTS</td>
<td>Phase 3</td>
<td>TDF (n = 1204)</td>
<td>Placebo (n = 1207)</td>
<td>Minimal</td>
<td>High</td>
</tr>
</tbody>
</table>

Note: GRADE quality ratings:
- high = further research is very unlikely to change our confidence in the estimate of effect;
- moderate = further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate;
- low = further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate;
- very low = any estimate of effect is very uncertain.

* All trials in this table were randomized, double-blind, prospective clinical trials.
What is PrEP?

• PrEP is a prevention method in which an HIV negative person takes an intervention to reduce the risk of becoming infected.

• The oral PrEP contains two medicines that are also used to treat HIV (Tenofovir and emtricitabine).

• The topical PrEP (in trial) consists of medicines applied as a cream.

• PrEP does not protect against other sexually transmitted infections (STIs) or pregnancy and is not a cure for HIV.

• Truvada® is currently the only licensed product for use as PrEP (FDA).

• PrEP goals:
  • Prevent HIV infection
  • Complementing other methods of prevention
  • It helps reduce stigma towards people living with HIV.
PrEP
Pre Exposure Prophylaxis
PrEP
Pre Exposure Prophylaxis
PrEP
Pre Exposure Prophylaxis
Adherence
Adherence
Adherence
Adherence
Adherence