HIV 101: Basics of HIV Patient Care

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Objectives

Identify complete HIV therapeutic regimens
Describe several common drug interactions with HIV therapy
Discuss pharmacy related problems in HIV care
**HIV description**

HIV is a virus from the genus Lentivirus of the family Retroviridae

The family clues us into the fact that HIV is a retrovirus

Lentivirus is a genus of immunodeficiency viruses which are able to infect and deliver viral RNA into CD4, T-helper cells

HIV is transmitted through blood, sexual contacts, and perinatally

HIV was first identified in 1981 in MMWR identifying rare pneumonia cases in 5 previously healthy young men.

Throughout the 1980’s there was a huge stigma placed upon HIV being a disease for gay men and users of IV drugs. So much so that President Regan was not found mentioning HIV publicly until 1987.

Today HIV affects all people, regardless of race, sexual orientation, and drug use status.
Retrovirus replication

Virus enters cell and uncoats
Reverse transcription (no proofreading!!)
  Single stranded RNA →
  DNA/RNA complex →
  Double stranded viral DNA
Viral DNA is integrated into the cellular DNA
Viral mRNA and vRNA is transcribed using human mechanisms
Viral proteins are translated using human mechanisms
Viral proteins are cut into the correct size and shape by protease
Medication classes

Entry Inhibitors

Nucleoside Reverse Transcriptase Inhibitors (NRTIs)

Non-Nucleoside Reverse Transcriptase Inhibitors (NNRTIs)

Integrase Inhibitors

Protease Inhibitors (PIs)

Pharmacokinetic Enhancers (boosters)
NRTIs (Nukes)

Nucleoside Reverse Transcriptase Inhibitor Drugs

Tenofovir (TDF) - Viread
Tenofovir (TAF) - not available alone
Emtricitabine - Emtriva
Lamivudine - Epivir
Abacavir - Ziagen
Didanosine - Videx
Stavudine - Zerit
Zidovudine - Retrovir

NRTI Combination Products

Truvada (tenofovir DF / emtricitabine)
Descovy (tenofovir AF / emtricitabine)
Epzicom (lamivudine / abacavir)
Trizivir (lamivudine / zidovudine / abacavir)
Combivir (lamivudine / zidovudine)

https://www.poz.com/drug_charts/hiv-drug-chart
NNRTI

Non Nucleoside Reverse Transcriptase Drugs
Efavirenz - Sustiva
Rilpivirine - Edurant
Etravirine - Intelence
Nevirapine - Viramune
Delavirdine - Rescriptor

https://www.poz.com/drug_charts/hiv-drug-chart
Integrase Inhibitor

Dolutegravir - Tivicay
Elvitegravir - Vitekta
Raltegravir - Isentress
Protease Inhibitor

**PI Drugs**
- Darunavir - Prezista
- Atazanavir - Reyataz
- Lopinavir - not available alone
- Nelfinavir - Viracept
- Fosamprenavir - Lexiva
- Tipranavir - Aprivus
- Indinavir - Crixivan
- Saquinavir - Invirase

**PI Combination Products**
- Prezcobix - Darunavir / Cobicistat
- Evotaz - Atazanavir / Cobicistat
- Kaletra - Lopinavir / Ritonavir

https://www.poz.com/drug_charts/hiv-drug-chart
Entry Inhibitor

Miravirroc - Selzentry
Enfuvirtide - Fuzeon
Pharmacokinetic Enhancers

Ritonavir - Norvir
Cobicistat - Tybost
Single Tablet Regimens

Genvoya (Elvitegravir/Cobicistat/Tenofovir AF/Emtricitabine)
Stribild (Elvitegravir/Cobicistat/Tenofovir DF/Emtricitabine)
Triumeq (Dolutegravir/Abacavir/Lamivudine)
Odesfey (Rilpivirine/Tenofovir AF/Emtricitabine)
Complera (Rilpivirine/Tenofovir DF/Emtricitabine)
Atripla (Efavirenz/Tenofovir DF/Emtricitabine)
Currently available HIV medications

**Nucleoside/tide Reverse Transcriptase Inhibitors (NRTIs)**
- Abacavir (ABC)
- Didanosine (ddI)
- Emtricitabine (FTC)
- Lamivudine (3TC)
- Stavudine (D4T)
- Tenofovir (TDF)
- Tenofovir (TAF)
- Zidovudine (ZDV)

**Non-nucleoside Reverse Transcriptase Inhibitors (NNRTIs)**
- Delavirdine (DLV)
- Efavirenz (EFV)
- Etravirine (ETR)
- Nevirapine (NVP)
- Rilpivirine (RPV)

**Protease Inhibitors (PIs)**
- Atazanavir (ATV/r)
- Darunavir (DRV/r)
- Fosamprenavir (FPV)
- Indinavir (IDV)
- Lopinavir/Ritonavir (LPV/r)
- Nelfinavir (NFV)
- Ritonavir (RTV)
- Saquinavir (SQV)
- Tipranavir (TPV)

**Integrase Inhibitor**
- Elvitegravir (EVG)
- Dolutegravir (DTG)
- Raltegravir (RAL)

**Fusion Inhibitors**
- Enfuvertide (T-20)

**CCR5 Antagonist**
- Maraviroc (MVC)

**Single tablet regimens**
- Tenofovir + emtricitabine + efavirenz (Atripla®)
- Elvitegravir + cobicistat + emtricitabine + tenofovir (TDF)(Stribild®)
- Elvitegravir + cobicistat + emtricitabine + tenofovir (TAF)(Genvoya®)
- Dolutegravir + abacavir + lamivudine (Triumeq®)
- Tenofovir (TDF) + emtricitabine + rilpivirine (Complera®)
- Tenofovir (TAF) + emtricitabine + rilpivirine (Odefsey®)

**Portions of therapy**
- Tenofovir + emtricitabine (Truvada®)
- Lamivudine + abacavir (Epzicom®)
- Atazanavir + cobicistat (EvoTaz®)*
- Darunavir + cobicistat (Prezcobix®)*
- Lopinavir + ritonavir (Kaletra®)
- Zidovudine + lamivudine + abacavir (Trizivir®)
- Zidovudine + lamivudine (Combivir®)
Knowledge quiz

Truvada has which components?
What class(es) of medication is Truvada?
Renal toxicity is associated with which medication?
Genvoya has which components?
HLA hypersensitivity reaction is associated with which medication?
Triumeq has which components?
Darunavir is which class of medication?
Complete Therapy

Highly Active Anti-Retroviral Therapy (HAART)

A drug cocktail which works to suppress HIV via 3 active HIV therapies from 2 classes of medication.

Decreases ability of virus to reproduce and mutate.

Lowers the amount of medication required to suppress the virus.

Backbone of 2 NRTIs and ‘something else’

Eg. Truvada (tenofovir DF/emtricitabine) + Tivicay (dolutegravir)

2 NRTIs + NNRTI, Boosted PI, or Integrase Inhibitor

DHHS HIV Guidelines 7/2016
Which of the following is a complete regimen?

Truvada + Prezcobix
Emtricitabine + Abacavir + Tenofovir
Lamivudine + Abacavir + Dolutegravir
Darunavir + Ritonavir + Atazanavir
Elvitegravir + Cobicistat + Emtricitabine + Tenofovir AF
Efavirenz + Rilpivirine + Lamivudine
Descovy
Triumeq
Resistance

The HIV virus contains 9749 base pairs and has an error rate of a mutation every 5000-10,000 base pairs

1-2 mutations every time the genome is reverse transcribed

The replication cycle time is about 1-2 days – about 200-300 generations each year

Resistance can build to medications when exposure is not at appropriate concentrations due to non-adherence or other issues

Resistance to one medication may confer class resistance

Resistance cannot form without viral replication

http://uhavax.hartford.edu/bug/hiv.htm
Interactions

Cytochrome P-450
- Protease Inhibitors - 3A4 inhibitor
- Cobicistat - 3A4 inhibitor
- Efavirenz - 3A4 substrate

Antacids / Polyvalent cations
- Effect the absorption of Integrase Inhibitors
- Rilpivirene and Atazanavir affected by high pH

Food
- Some products require dosing based on food presence or absence

Inhibition of CYP enzymes can prevent metabolism and raise levels of other drugs
- Statins can increase to extreme concentrations (simvastatin ↑ 3000%)
- Cardiovascular medications can increase to higher levels
- Opiate levels may be increased (PIs are used in maintaining longer highs)
- Benzodiazepine levels may be increased

Integrase inhibitor concentration can reduce the efficacy and allow for mutations and resistance to build

Some products require presence or absence of food for absorption to achieve appropriate levels for efficacy
Some products require presence or absence of food to prevent adverse effects

Liverpool drug interactions: http://www.hiv-druginteractions.org/treatment_selections, Accessed 10/1/16
Evelyn is a 52 year old WF who takes Simvastatin 40mg, Metformin 500mg, and a multivitamin, brings in a prescription for Prescobix and Descovy. Is this going to be an acceptable regimen for her, why or why not?

No, Simvastatin concentration could be increased by well over 1000% - toxicity

Rachel is a 34 year old AAF who brings in a prescription for Genvoya, Centrum Daily, enalapril, and you know she also takes occasional Maalox from previous recommendations you’ve given her. Is this going to be an acceptable regimen for her, why or why not?

Multivitamin or antacid with Genvoya may decrease Elvitegravir – Drugs need to be separated INSTI 2 hours before or 6 hours after multivitamin and separated by 4 hours from Maalox

Kirby, a 42 year old AAM, brings in a pile of prescriptions for Triumeq, Lisinopril 20mg, Prilosec 20mg, Claritin 10mg, and Valacyclovir 1g. Is this an acceptable medication regimen, why or why not?

– only if HLA neg

Frank brings in prescriptions with: Viread every Monday, Lamivudine 100mg ¼ tablet every day, and Tivicay 1 tablet daily. He also has on his profile Lexapro 10mg, amlodipine 5mg, bumetanide 2mg, and Lipitor 40mg. Is this an acceptable regimen?

Only if you know why the meds are being dosed so strange... this would be a good dosage range for someone in kidney failure, otherwise levels would not suppress and lead to resistance.
Dispensing HIV Medications

IT IS BETTER TO NOT TAKE ANY MEDICINE THAN TO TAKE A PARTIAL REGIMEN

Patients should only receive complete therapy regimens

   If not check where their other meds are coming from and that they are being dispensed

Do not out of stock portions of therapy or dispense partials

Check previous regimen

   Make sure you are dispensing what they had previously filled, if not question why

Call on drug interactions and questions, you may have a more complete medication list than the prescriber, interactions matter

“Dispense in original container”
Adherence/Med Timing/Support

Medication adherence is strongly correlated with viral suppression, reduced resistance, and increased survival.

Identify barriers to adherence before starting ART.

Assess adherence at every opportunity and provide reminder education on adherence importance.

Good methods to help adherence include:

- Pill boxes, Pill packs/bags
- Tying medication taking to specific regular activities (meal, brushing teeth, at bed, Jeopardy) and having medications available in that area
- Adherence support in the home
- Alarms – if this is recommended, ask them to do it in front of you “so they don’t forget”
- Discussing reason why patient wants to take medications
- Have patient identify times when dosage was missed, problem that was encountered and solutions to that issue
  - Medication too large – Pill Glide, smaller tablets, liquid, or chewable formulations
  - Forgot to pack on an overnight – Reminder note in overnight bag or luggage
References


CDC. Pneumocystis Pneumonia – Los Angeles. MMWR 1981;30(21);1-3.


Liverpool drug interactions http://www.hiv-druginteractions.org/treatment_selectors Accessed 10/1/16

