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## What is HIV and What Does it Do?

- **HIV** stands for **h**uman **i**mmunodeficiency **v**irus

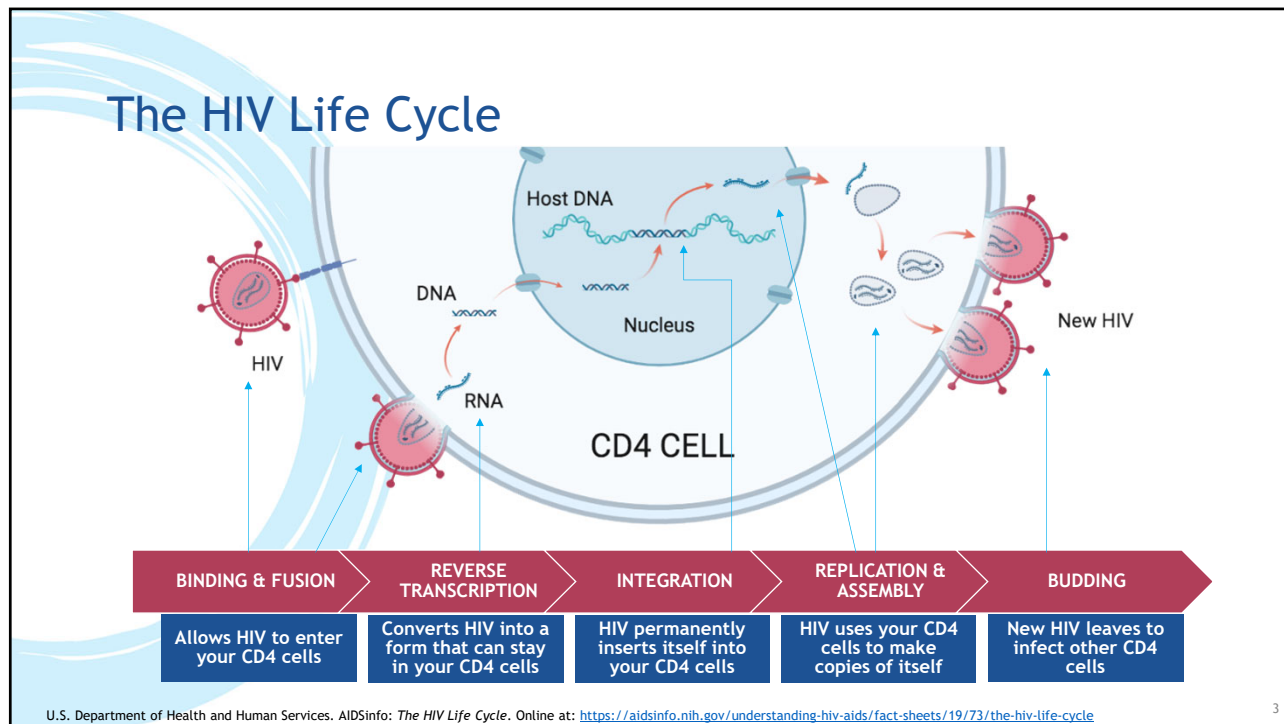
**HIV can weaken your immune system**

- HIV attacks and destroys **CD4 cells**, one of the most important players in your immune system
- HIV uses CD4 cells to multiply and spread throughout the body

A detailed illustration of an HIV virus particle, showing a spherical outer shell with numerous small spikes (glycoproteins) and a central core containing two dark, tangled lines representing the viral RNA.





CATIE. HIV Basics. <https://www.catie.ca/en/basics/hiv-and-aids>  
U.S. Department of Health and Human Services. AIDSinfo: The HIV Life Cycle. Online at: <https://aidsinfo.nih.gov/understanding-hiv-aids/fact-sheets/19/73/the-hiv-life-cycle>

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## What Happens if HIV Is Not Well Controlled?

-  The virus can become resistant
-  The immune system can be damaged – for example, CD4 cell counts can become very low
-  The body's ability to fight illness can be reduced
-  The infection can lead to **AIDS** (acquired immunodeficiency syndrome) and other infections

For most people living with HIV (PLWH), all this is avoidable with appropriate treatment, including possible adjustments to their medications over time

CATIE. A Practical Guide to HIV Drug Treatment for People Living with HIV. Online at: [https://www.catie.ca/ga-pdf.php?file=sites/default/files/Practical\\_Guide\\_to\\_HAART\\_EN.pdf](https://www.catie.ca/ga-pdf.php?file=sites/default/files/Practical_Guide_to_HAART_EN.pdf)

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## What Are the Drugs Used to Treat HIV?

- The drugs used to treat HIV are called **antiretrovirals (ARV)**
- Taking the drugs is called **antiretroviral therapy (ART)**
- **HIV treatment regimen** is the combination of 3 or more different drugs in tablet, injection or infusion form
  - You might see this referred to as **highly active ART (HAART)**



CATIE. A Practical Guide to HIV Drug Treatment for People Living with HIV. Online at: [https://www.catie.ca/ga-pdf.php?file=sites/default/files/Practical\\_Guide\\_to\\_HAART\\_EN.pdf](https://www.catie.ca/ga-pdf.php?file=sites/default/files/Practical_Guide_to_HAART_EN.pdf)  
U.S. Department of Health and Human Services. AIDSinfo: Glossary of HIV/AIDS Related terms. Online at: [https://aidsinfo.nih.gov/contentfiles/glossaryhivrelatedterms\\_english.pdf](https://aidsinfo.nih.gov/contentfiles/glossaryhivrelatedterms_english.pdf)

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## HIV Treatment Regimens Can Look Very Different Between PLWH

### DIFFERENT TARGETS

Some regimens have all different drug targets

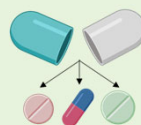


Others have more than one drug with the same target



### DIFFERENT FORMS

More than one drug can be contained in a single pill



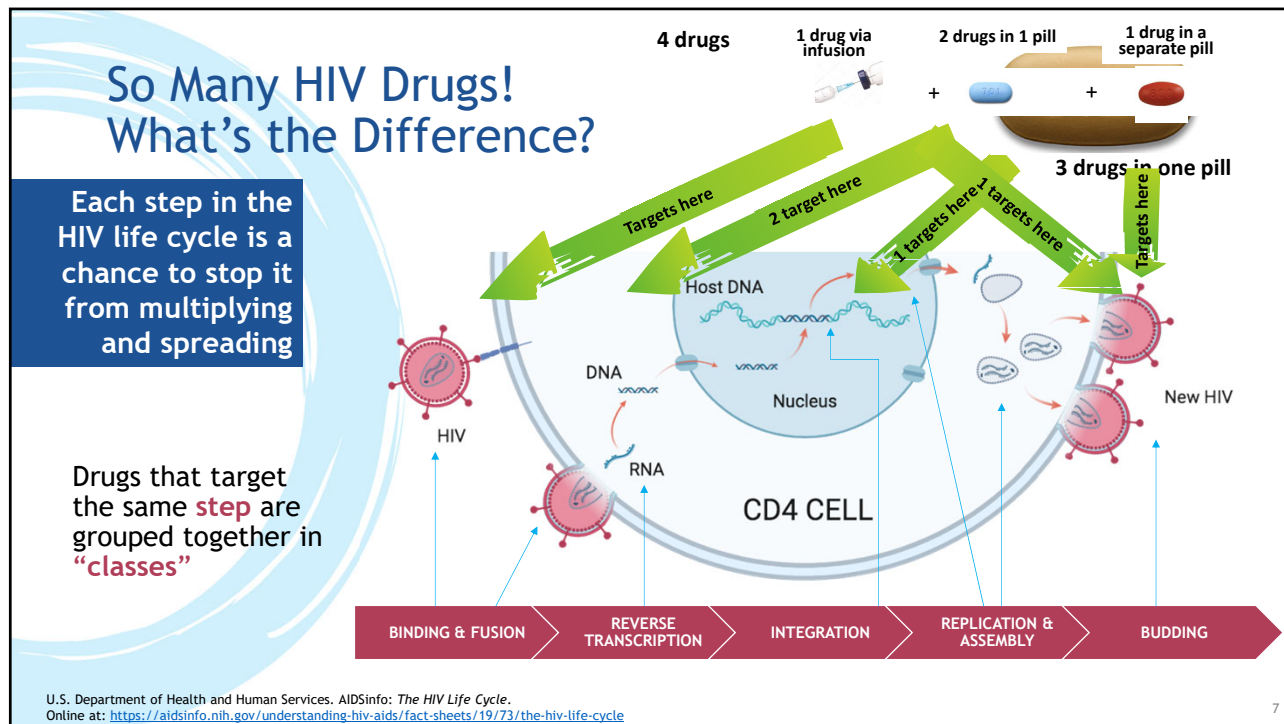
Others might need to take different medications, one for each drug



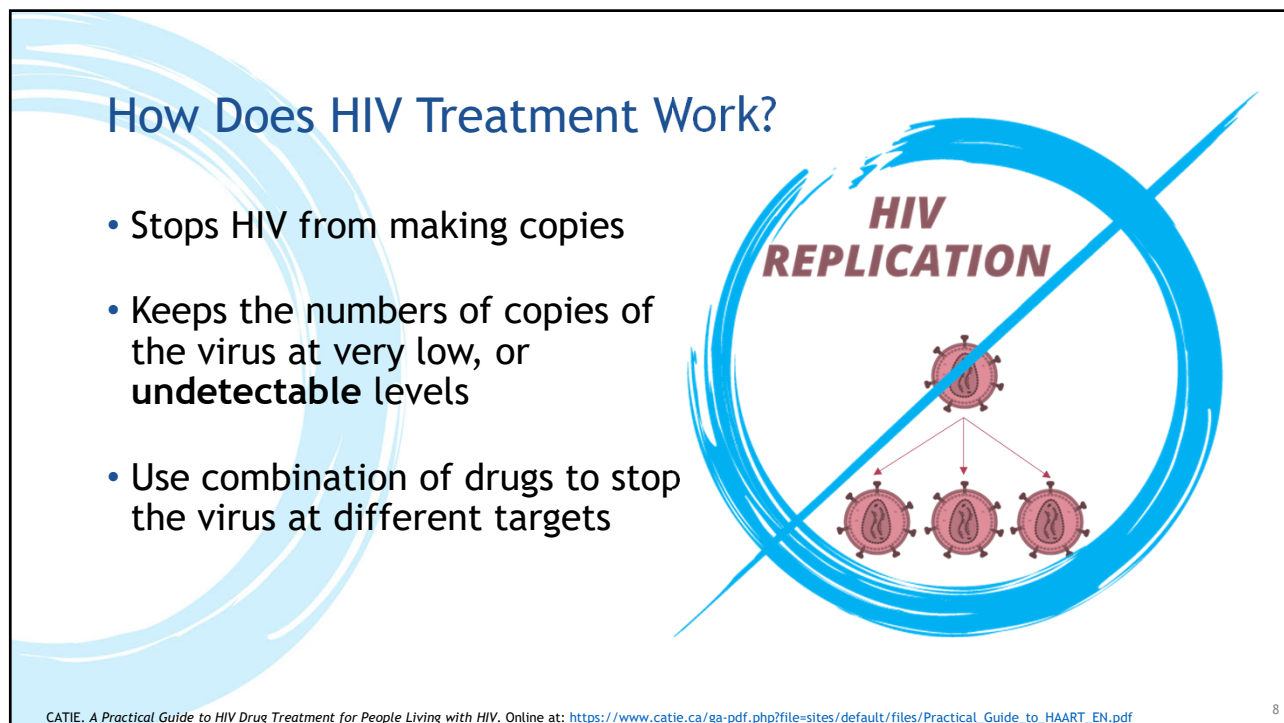
PLWH, people living with HIV  
U.S. Department of Health and Human Services. AIDSinfo: Glossary of HIV/AIDS Related terms. Online at: [https://aidsinfo.nih.gov/contentfiles/glossaryhivrelatedterms\\_english.pdf](https://aidsinfo.nih.gov/contentfiles/glossaryhivrelatedterms_english.pdf)

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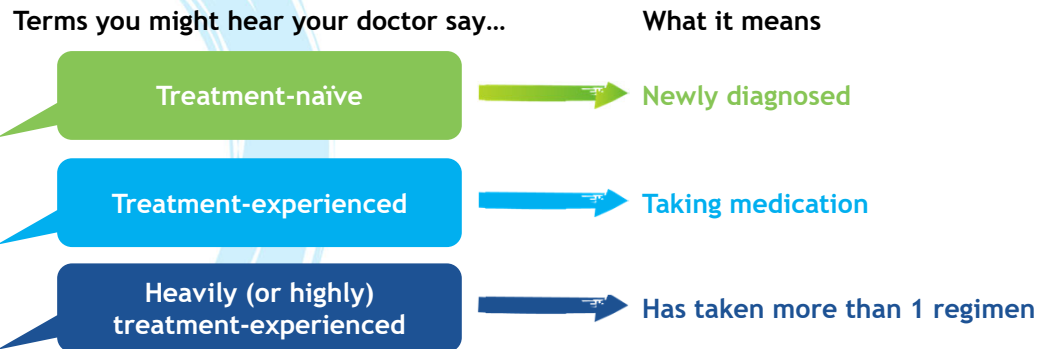


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## Describing a Person's Experience Taking HIV Medications








U.S. Department of Health and Human Services, AIDSinfo: *Glossary of HIV/AIDS Related terms*. Online at: [https://aidsinfo.nih.gov/contentfiles/glossaryhivrelatedterms\\_english.pdf](https://aidsinfo.nih.gov/contentfiles/glossaryhivrelatedterms_english.pdf)  
 McArthur RD. *Heavily Treatment Experienced HIV Patient: Management Help*. Online at: <https://www.theaidsreader.com/hiv-aids/heavily-treatment-experienced-hiv-patient-management-help>

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## What Are The Goals of Treatment in HIV?

-  Lower the level of HIV  **UNDETECTABLE**
-  Help the immune system fight off other infections
-  Live a longer and healthier life
-  Prevent the virus from being given to others

Health Canada. Treatment of HIV and AIDS. Online at: <https://www.canada.ca/en/public-health/services/diseases/hiv-aids/treatment-hiv-aids.html>  
 U.S. Department of Health and Human Services, AIDSinfo: *Glossary of HIV/AIDS Related terms*. Online at: [https://aidsinfo.nih.gov/contentfiles/glossaryhivrelatedterms\\_english.pdf](https://aidsinfo.nih.gov/contentfiles/glossaryhivrelatedterms_english.pdf)

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## How Do We Know if The Treatment is Working?

- Regular blood tests are a routine part of care for a person with HIV
- Two of the most important tests are:



### Viral load

Shows how much virus is in the body



### CD4 count

Shows how well the immune system is working



**IS BETTER**



**IS BETTER**



CATIE. A Practical Guide to HIV Drug Treatment for People Living with HIV. Online at: [https://www.catie.ca/ga-pdf.php?file=sites/default/files/Practical\\_Guide\\_to\\_HAART\\_EN.pdf](https://www.catie.ca/ga-pdf.php?file=sites/default/files/Practical_Guide_to_HAART_EN.pdf)

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## What Do My Viral Load Tests Mean?

Term you might hear

What it means (viral load result)

Undetectable

Less than 50 copies of HIV per mL of blood (copies/mL)



Not detectable by most lab tests

Low level

Between 50-200 copies of HIV per mL of blood (copies/mL)

Treatment failure

More than 200 copies of HIV per mL of blood (copies/mL)

U=U, Undetectable = Untransmittable  
Ryscavage P, et al. Antimicrob Agents Chemother 2014; 58(7):3585-98.

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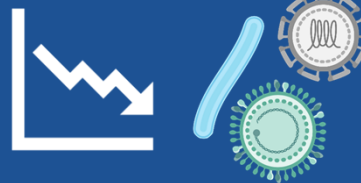
## Your CD4 Counts Explained

- Normal CD4 counts range from 500-1500

Usually the CD4 count increases when the virus is controlled



CD4 below 200 puts PLWH at risk for other infections



PLWH, people living with HIV  
CATIE. A Practical Guide to HIV Drug Treatment: Monitoring Your Health. Online at: <https://www.catie.ca/ga-pdf.php?file=pdf/pgtreat/pg-treat2.3.pdf>

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## Why is “Undetectable = Untransmittable” So Important?



Even if you test positive, as long as you have **less than 50** copies of HIV, you are considered **undetectable**



None of the people living with undetectable HIV in three recent large studies transmitted HIV to their partners

Undetectable = Untransmittable. UNAIDS Explainer. Online at: [https://www.unaids.org/sites/default/files/media\\_asset/undetectable-untransmittable\\_en.pdf](https://www.unaids.org/sites/default/files/media_asset/undetectable-untransmittable_en.pdf)

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## What Reasons Might There Be for Changing HIV Medications?

- **Detectable viral load** caused by:
  - Resistance
  - Difficulty taking the regimen
- **Side effects** that do not go away
- **Convenience**
  - Easier dosing
  - Taking fewer pills
  - Other ways to take including infusion or injection



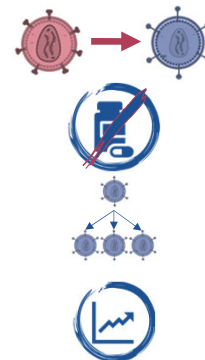
CATIE. A Practical Guide to HIV Drug Treatment for People Living with HIV. Online at: [https://www.catie.ca/ga-pdf.php?file=sites/default/files/Practical\\_Guide\\_to\\_HAART\\_EN.pdf](https://www.catie.ca/ga-pdf.php?file=sites/default/files/Practical_Guide_to_HAART_EN.pdf)

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## What Does “Resistance” to HIV Medications Mean?

- Resistance means a drug is **not effective anymore**
  - HIV sometimes changes form in the body  
→ this is called **a mutation** (or a change)
  - These changes can lead to resistance
  - Resistance can cause treatment to fail
  - Viral load starts to rise and become detectable again



U.S. Department of Health and Human Services. AIDSinfo: Drug Resistance.  
<https://aidsinfo.nih.gov/understanding-hiv-aids/fact-sheets/21/56/drug-resistance/>

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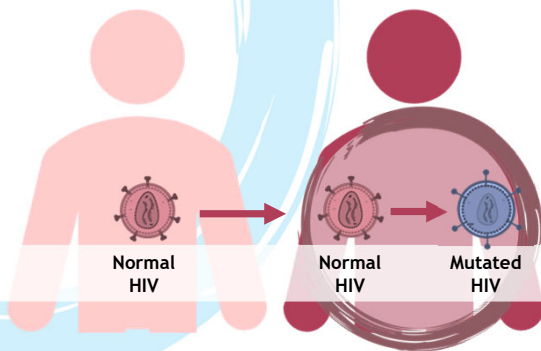
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## How Can People have Resistant HIV?

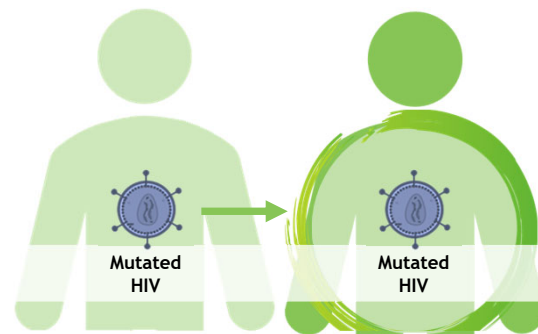
### “Acquired” resistance

- A normal virus can develop resistance in your own body



### “Transmitted” resistance

- The virus came to you with resistance



U.S. Department of Health and Human Services. AIDSinfo: Glossary of HIV/AIDS Related terms. Online at: [https://aidsinfo.nih.gov/contentfiles/glossaryhivrelatedterms\\_english.pdf](https://aidsinfo.nih.gov/contentfiles/glossaryhivrelatedterms_english.pdf)

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## How Would Someone Know if Their Virus is Resistant?

- There are many types of tests used to detect resistant HIV



Some look for specific changes or mutations in today's virus (**genotype**)



Some look for changes in the way the virus reacts to each drug (**phenotype**)



Some look into the history of specific changes by looking at older HIV in the body (**archive**)

HIV remembers certain mutations, particularly when they give the virus an advantage to survive

CATIE. Drug Resistance. Online at: <https://www.catie.ca/en/hiv-canada/6/6-4>  
U.S. Department of Health and Human Services. AIDSinfo: Guidelines for the Use of Antiretroviral Agents in Adults and Adolescents with HIV.  
Online at: <https://aidsinfo.nih.gov/contentfiles/lvguidelines/adultandadolescentgl.pdf>

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## When Do We Test For These Changes?



When you are newly diagnosed



To look for resistant virus coming from another person



When viral load rises



To look for new changes in your virus



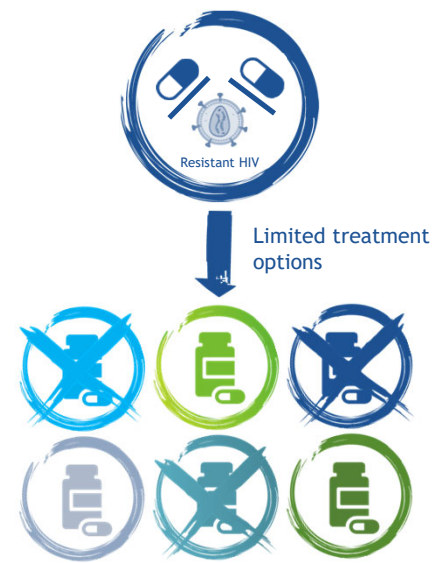
CATIE. Drug Resistance. Online at: <https://www.catie.ca/en/hiv-canada/6/6-4>  
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Online at: <https://aidsinfo.nih.gov/contentfiles/lvguidelines/adultandadolescentgl.pdf>

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## Why Is Resistance Important?

- It limits the number of drugs that work
- Some resistance affects more than one drug
- Sometimes one mutation can make the virus resistant to multiple drugs in the same class
- Resistance does not go away



CATIE. Drug Resistance. Online at: <https://www.catie.ca/en/hiv-canada/6/6-4>  
U.S. Department of Health and Human Services. AIDSinfo: Glossary of HIV/AIDS Related terms.  
Online at: [https://aidsinfo.nih.gov/contentfiles/glossaryhivrelatedterms\\_english.pdf](https://aidsinfo.nih.gov/contentfiles/glossaryhivrelatedterms_english.pdf)

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## What Is Multi-Drug Resistance (MDR) And Why Is It Important?

PLWH with MDR have fewer treatment options because they are resistant to drugs in many different classes



- Current HIV drugs have drastically lowered the number of PLWH whose treatment is limited by MDR
- However, there are still PLWH who are resistant to most or all currently available drugs

PLWH, people living with HIV  
U.S. Department of Health and Human Services, ARV Guidelines, July 2019. Online at: <http://www.aidsinfo.nih.gov/ContentFiles/AdultandAdolescentGL.pdf>.

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## What Are the Benefits of Being Undetectable?



**Undetectable is untransmittable**



**The immune system stays strong and can get healthier**

CATIE. A Practical Guide to HIV Drug Treatment for People Living with HIV. Online at: [https://www.catie.ca/ga-pdf.php?file=sites/default/files/Practical\\_Guide\\_to\\_HAART\\_EN.pdf](https://www.catie.ca/ga-pdf.php?file=sites/default/files/Practical_Guide_to_HAART_EN.pdf)  
CATIE. The Positive Side. Online at: <https://www.catie.ca/sites/default/files/ps%20v19i.pdf>

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## Things YOU Can Do



Take your medications on time every day



Use reminders, a pill box, or a calendar to help



Know whether it requires food or not



Stick to your doctor and lab appointments



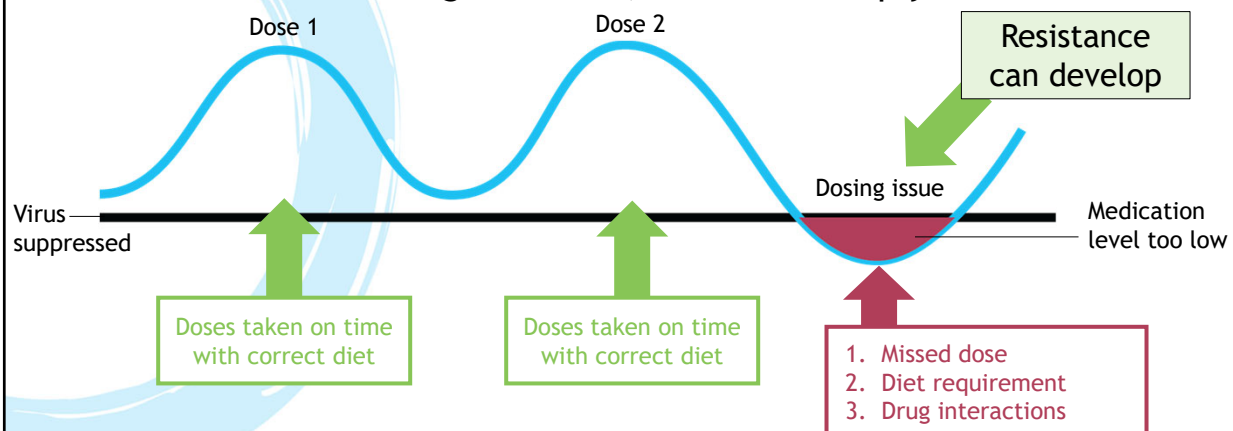
Talk to your doctor about side effects, but don't stop your medications unless they tell you to

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## Why Is Adherence Important?

If medication levels get too low, HIV can multiply

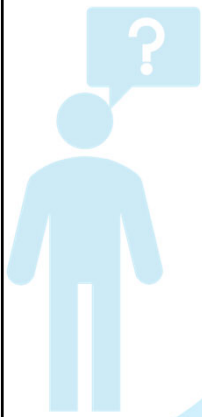


U.S. Department of Health and Human Services, ARV Guidelines, July 2019. Online at: <http://www.aidsinfo.nih.gov/ContentFiles/AdultandAdolescentGL.pdf>.

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## Some Questions to Ask Your Doctor



- What are my viral load and CD4 counts?
- Do I have resistance?
- What are my treatment options?
- How do I take this regimen?
- What should I expect?

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## Recap: HIV and Resistance



There are many different targets for your HIV regimen



When HIV copies itself, mutations can occur; some of these changes make the virus resistant to medication(s)



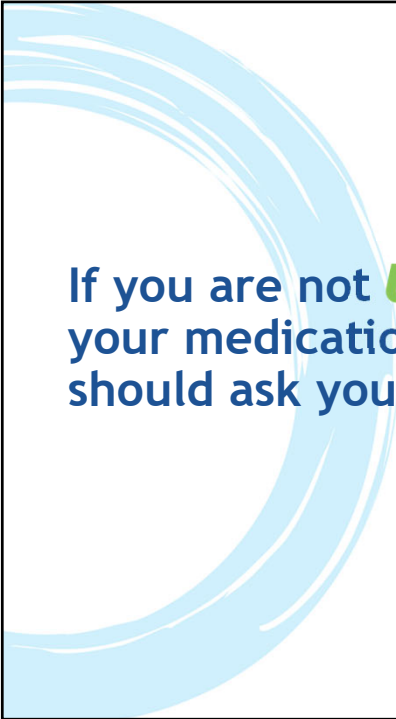
Changing medication can overcome resistance in most cases



The goal is to always get to UNDETECTABLE

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If you are not **UNDETECTABLE**, and you are taking your medications like you are supposed to, you should ask your doctor why

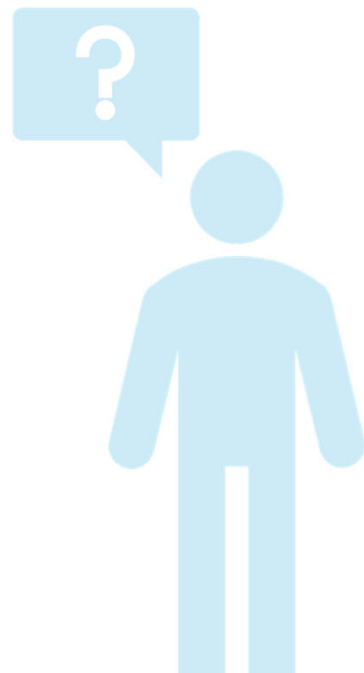
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**QUESTIONS?**

Thank you for your attention!



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