HIV Drug Resistance

Together, we can change the course of the HIV epidemic...one woman at a time.

#onewomanatatime

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What Is Resistance?

HIV drugs are designed to keep the amount of HIV virus in your body under control by preventing it from reproducing.

- The HIV virus may change (mutate) as it makes copies of itself:
  - Changes allow virus to overcome effects of a drug and keep reproducing
  - When this happens, HIV has developed resistance to that drug

- Resistance is a major challenge in HIV treatment:
  - Decreases ability of HIV drugs to control the virus
  - Reduces treatment options

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What Is Resistance?

- The best way to prevent resistance is to stick closely (adhere) to HIV drug regimen
- With good adherence, resistance is less likely to develop
- Keeps more treatment options open for the future
What Causes Resistance?

• After infecting a CD4 cell (disease-fighting white blood cell), HIV makes many new copies of itself, which then infect other CD4 cells
  – This happens very quickly; HIV can make billions of new viruses every day

• When making new viruses, HIV must copy its genetic information

• Copying happens so fast that mistakes (mutations) can happen
  – Some mutations are harmless
  – Other mutations can cause big problems and allow a virus to reproduce even when it is exposed to certain HIV drugs

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What Causes Resistance?

• If a drug does not work against a mutated virus, that virus will reproduce rapidly
  – This causes viral load to go up
  – May have to change drugs to get HIV back under control

• Main reason to use a combination of HIV drugs is to block reproduction at several points in HIV's lifecycle
  – Combination of drugs aimed at several different targets is much better at preventing HIV reproduction than one alone

• With less reproduction:
  – Viral load is lower
  – Mutations and resistance are less likely to occur
Cross-Resistance and Sequencing

**Cross-resistance:** When mutations cause resistance not just to one drug, but to an *entire class of drugs*

- There are six classes of HIV drugs:
  - Nucleoside or nucleotide reverse transcriptase inhibitors (NRTIs)
  - Non-nucleoside reverse transcriptase inhibitors (NNRTIs)
  - Protease Inhibitors (PIs)
  - Entry inhibitors
  - Integrase inhibitors
  - Boosting agents
Cross-Resistance and Sequencing

• Cross-resistance is *more likely to happen in some classes* than others
  – NRTIs
  – NNRTIs
  – May limit choices when picking new combination of HIV drugs

• Health care providers think about future HIV regimen options in case current regimen does not work
  – This is called *sequencing* treatment

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How Is Drug Resistance Detected?

- Resistance is common, can be transmitted with the virus
  - 10-17% of newly infected people acquire strains of virus that are resistant to at least one HIV medication
  - Have less selection of HIV treatments to choose from
- People living with HIV who have taken HIV drugs are more likely to have resistant virus, fewer drug choices
- Regular viral load tests are best way to tell if you have drug resistance
  - If HIV drugs are working well, your viral load should be "undetectable"
- Have a drug resistance test if you are taking HIV drugs and:
  - Your viral load does not become undetectable
  - Your viral load goes up after you have been taking the drugs for a while

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Resistance Testing

• US Department of Health and Human Services guidelines recommend drug resistance testing for people who:
  – Just acquired HIV
  – Are starting HIV care
  – Have never been on HIV drugs and are planning to start
  – Are on HIV drugs and see their viral load go up (usually over 1,000 copies/mL)
  – Have started HIV drugs but viral load is not coming down to undetectable
  – Are pregnant and living with HIV

• Resistance testing is **not usually recommended** for:
  – People who have stopped HIV drugs for four weeks or more
  – People with a viral load below 500 copies
Ways to Test for Resistance

**Genotype test:**
- Uses HIV from your blood to check for mutations associated with drug resistance
- Preferred test for those:
  - Who are new to HIV treatment
  - Whose HIV drugs fail to bring their viral load down enough
  - Who are pregnant with detectable virus while on treatment

**Phenotype test:**
- Exposes your virus to many HIV drugs in a test tube
  - Determines which drugs still work against your HIV
  - Preferred test for people with complex drug-resistance patterns
Ways to Test for Resistance

**Virtual phenotype test:**
- Genotype test that goes one step further
  - Takes your genotype
  - Finds similar genotypes in a database
  - Uses their phenotypic test results to predict which drugs will be effective against your virus (and its mutations)

Resistance tests are helpful when choosing a drug regimen, *but*
- Tests are only a guide
- Other factors (past medications, side effects, adherence) should be taken into account

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The best way to avoid resistance is to take medications daily as prescribed:

- Important not to skip doses
- Take medications at the same time every day
- Good adherence
- Remember, good adherence is the best way to prevent resistance
  - Follow your medication schedule
  - The virus will not reproduce as quickly
  - If not reproducing, cannot make changes that lead to resistance
To learn more, please read the full fact sheet on this topic:

- Resistance

For more fact sheets and to connect to our community of women living with HIV, visit:

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