HIV Drug Resistance

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

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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 (making copies of itself)

• HIV 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:
  – 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

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What Causes Resistance?

• After entering 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) happen randomly
  – 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

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Cross-Resistence and Sequencing

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

- There are seven classes of HIV drugs:
  - Nucleoside/nucleotide reverse transcriptase inhibitors (NRTIs)
  - Non-nucleoside reverse transcriptase inhibitors (NNRTIs)
  - Protease Inhibitors (PIs)
  - Entry inhibitors
  - Integrase inhibitors
  - Boosting agents
  - Post-attachment inhibitor

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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
How Do I Know if I Have Drug Resistance?

- Resistance is common, can be transmitted with the virus
  - People who just acquired HIV already have drug-resistant HIV
  - Have fewer 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 (in certain circumstances)

- 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

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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

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Ways to Test for Resistance

**Virtual phenotype test:**
- Genotype test that goes one step further
  - Takes your genotype and 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 considered as well
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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