Published on *The Well Project* (http://www.thewellproject.org)



# Drug Interactions [1]

Submitted on Aug 17, 2015

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In order for a drug to work properly, a person must take the correct dose at the correct time so that the right amount of drug enters the bloodstream. Before an HIV drug is approved, researchers study different doses and choose one that is both safe and effective. The dose has to be high enough to stop HIV from making copies of itself, but not so high that it causes a lot of side effects [2].

All people living with HIV (HIV+) who are on treatment take more than one HIV drug, even if they only take one pill. Some pills contain more than one drug; for example, Truvada is a pill that contains the HIV drugs Emtriva (emtricitabine) and Viread (tenofovir). Many people living with HIV take other types of medications as well. Some prescription, over-the-counter, and recreational drugs, as well as herbs, vitamins, and supplements [3], can cause changes in the amount of HIV drugs in your bloodstream, even if you take the correct doses. Eating certain foods and beverages can also change drug levels in the blood.

When one drug affects the level of another drug it is called an interaction. Some drug interactions do not cause problems, but some interactions can be harmful. It is important to discuss the possibility of drug interactions with your health care provider when choosing a new HIV drug combination or when adding or removing any drug from your regimen.

# How Drugs Are Metabolized

The body metabolizes (breaks down) the drugs you take. This process involves the liver and kidneys:

- The liver makes chemicals called enzymes to break down the drug
- The kidneys filter the drug out of the bloodstream and into the urine
- The drug is removed from the body in urine or feces

Sometimes, one drug affects the way another drug is metabolized by speeding up or slowing down the action of liver enzymes. This can cause big changes in the blood levels of other drugs that are broken down by the same enzyme.

# Drugs That Slow Down Metabolism

Some drugs inhibit (slow down) the liver enzymes. This causes other drugs to be metabolized and removed from the system more slowly, which:

- Increases the amount of other drugs in the body

- Increases the length of time other drugs stay in the bloodstream

This can be useful in HIV treatment. Here is an example: Norvir (ritonavir) is a protease inhibitor (PI) that makes the liver enzymes work more slowly. This keeps some other drugs in the body longer and at higher levels. So if Norvir is given with another PI, like Reyataz (atazanavir), it "boosts" Reyataz. This means the amount of Reyataz in the blood is higher than it would be without Norvir.

As a result, one tablet of Reyataz can be taken once a day with a little Norvir instead of two tablets by itself. The boosted regimen increases the amount of Reyataz in the body and lowers the chance of developing resistance [4]. Several other PIs can be boosted with Norvir. This can make the other PIs work better so that you can take lower doses and fewer pills. However, Norvir can also cause other types of drugs (see list below) to have higher levels in the blood.

Tybost (cobicistat), a boosting agent and one of the four drugs in the combination HIV drug Stribild, can cause higher levels of other drugs, much like Norvir does. For more information, see our HIV Drug Chart [5].

Unfortunately, increased blood levels of drugs can also cause overdoses or increase side effects [2]. If you are taking a drug that slows down liver enzymes, your health care provider may need to adjust the doses of your other medications.

## Drugs That Speed Up Metabolism

Some drugs induce (speed up) the action of the liver enzymes. This causes other drugs to be metabolized and removed from the system more quickly, which:

- Decreases the amount of other drugs in the body
- May cause other drugs to be less effective

Some drugs used to treat HIV-related conditions speed up liver enzymes. This can be a serious problem if it causes the HIV drugs to be metabolized too quickly. If HIV drug levels drop too low:

- HIV can make more copies of itself
- Viral load [6] can go up
- Resistance [4] can develop
- HIV drugs can stop working

The non-nucleoside reverse transcriptase inhibitors (NNRTIs), such as Viramune (nevirapine) and Sustiva (efavirenz), speed up enzymes and remove some other drugs from the system more quickly. If you are taking a drug that speeds up liver enzymes, your health care provider may need to increase the doses of your other medications.

## Other Types of Drug Interactions

If drugs cause similar side effects, combining them may increase the amount or seriousness of those side effects. For example, combining Zerit (stavudine) with Videx (didanosine) may

increase the risk of a serious condition called lactic acidosis [7] (high levels of lactic acid in the blood), especially in pregnant [8] women. Pregnant women living with HIV should not take Zerit and Videx together.

Some drugs work against each other and should not be taken together. An example is Retrovir (zidovudine) and Zerit.

# Drugs and Other Substances That May Interact with HIV Medications

There is a long list of prescription, over-the-counter, complementary, and recreational drugs that may have major interactions with HIV medications. Food and beverages can also change the way HIV drugs are broken down in the body. Below are a few examples:

## Birth Control Pills

Birth control pills [9] containing ethinyl estradiol (a form of estrogen) can interact with HIV drugs. This can make the birth control pills less effective and increase the chances of pregnancy. If your HIV drugs affect the levels of your birth control pills, talk with your provider about switching to or adding another form of birth control.

## Complementary Therapies

Many people living with HIV use complementary therapies [10] such as vitamins or herbs. While most of these have not been studied with HIV drugs, St. John's Wort (an herbal anti-depressant) and garlic supplements have been shown to affect the levels of some HIV drugs. St. John's Wort and garlic supplements should not be taken with any PIs or NNRTIs. It is important to tell your health care provider if you take any vitamins, herbs, or supplements.

## Recreational Drugs and Alcohol

There have been reports of overdoses, some fatal, caused by taking recreational drugs (street drugs) and HIV drugs. Interactions between ecstasy or amphetamines (crystal meth, speed) and PIs are particularly dangerous.

Alcohol [11] affects body processes and is often responsible for drug interactions. Combining alcohol and certain HIV drugs like Videx can put you at risk for developing pancreatitis (inflammation of the pancreas).

## Methadone and Buprenorphine

Methadone and buprenorphine [12] can interact with many HIV drugs. It is important to tell the health care provider at the opioid treatment program and your HIV health care provider what you are taking. This way necessary adjustments can be made to make sure you get enough methadone or buprenorphine to prevent withdrawal symptoms, and enough HIV drugs to fight the virus effectively.

# Other Types of Drugs That May Interact with HIV Drugs

There are certain classes of drugs to treat different medical conditions that are more likely to interact with HIV drugs. Not all drugs in these classes will cause problems. If you take any of the following types of drugs, talk to your health care provider about the specific drugs you take and if there are any possible interactions. Note: this is not a complete list; other classes of drugs may also cause interactions.

- Antifungal drugs
- Antibiotics
- Antacids
- Drugs that prevent convulsions or seizures
- Drugs to treat high cholesterol [13]
- Drugs to treat depression [14]
- Antihistamines (allergy medications)
- Drugs to control heart rhythm
- Opium-based pain killers (narcotics)
- Drugs that increase bowel activity
- Sedatives (medications to calm your nerves)
- Drugs to thin the blood
- Drugs to treat erectile dysfunction
- Drugs to treat tuberculosis [15]
- Drugs to treat hepatitis C [16]

## Food

Any pills that you take go through your stomach. What you eat can affect how much of your drugs get into your system. Most drugs are absorbed faster if your stomach is empty. For some drugs, this is a good thing, but it can also cause more side effects. Some drugs need to be taken with food so that they are broken down more slowly, or to reduce their side effects. Others should be taken with fatty foods because they dissolve in fat and are absorbed better. Check your drug labels and follow the food instructions carefully. If you have any questions, it is important to ask your provider or pharmacist.

## Taking Care of Yourself

People living with HIV often have to take many different drugs. Sometimes taking more than one medication can cause drug interactions. This can lead to the drugs not working as well or an increased risk of side effects.

Because there are so many possible drug interactions with HIV drugs, it is very important for you and your health care provider to go over all your medications (including over-the-counter, prescription, street drugs, and complimentary therapies), even if you only use them occasionally. Your health care provider may need to adjust the doses of your drugs or change the drugs you currently take.

To get the best results, it is a good idea to:

- Keep a list of all your drugs and ask your health care provider to review it for possible interactions
- Give a copy of your drug list to all of your health care providers

- Discuss all your medical conditions with your health care provider
- Each time you are prescribed a new medication, check with your health care provider to see if it can be combined safely with your other therapies
- Review the information that comes with each medication (the "package insert [17]"), ask for this information for each drug that you are taking
- Have all your prescriptions filled at one pharmacy
- Learn about all the possible side effects [2] of your drugs
- Learn how, when, and with what to take your drugs
- Do not stop or change your drugs without talking to your health care provider
- Report any side effects to your provider

## Tags:

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- HIV drugs [21]
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- HIV drugs birth control [36]
- HIV erectile dysfunction [37]
- HIV crystal meth [38]
- HIV ecstasy [39]
- HIV amphetamines [40]

## Additional Resources

Select the links below for additional material related to drug interactions.
Drug Interactions (The AIDS InfoNet) [41]
Are you a good interaction or a bad interaction? (The Body) [42]
Growing Older with HIV and Drug Interactions (Avert) [43]
Recreational Drugs and HIV (CATIE) [44]
Risk or Benefit: Garlic and HIV (Healthline) [45]
Database of Antiretroviral Drug Interactions (HIVInSite) [46]
Drug Interaction Charts (for HIV drugs; University of Liverpool) [47]
Drug Interactions (HIV Guidelines; NIH) [48]

Drug Interaction Tables (Toronto General Hospital) [49]
Drug Interaction Charts (for hepatitis C drugs; University of Liverpool) [50]

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[43] http://www.avert.org/growing-older-hiv-and-drug-interactions.htm
[44] http://www.catie.ca/fact-sheets/streetrecreational-drugs/recreational-drugs-and-hiv
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