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Behavior change model promotes HIV drug compliance, safe sex practices

Model uses 'stages of change' approach to encourage prevention efforts

A model of how people change their behavior may hold the long-sought keys to the two biggest issues facing public health officials and clinicians in their battle to stop the spread of AIDS: The model provides a way to teach at-risk people how to incorporate safe-sex practices into their daily lives, and it helps clinicians encourage HIV-infected people to comply with their medication regimens.

While not a magic wand, the transtheoretical model of health behavior change is a logical and well-studied tool that is being used in trial studies across the country.

"The first applications of the model had to do with psychotherapy and what helps people change, and the first data applications were with smoking cessation," says **Colleen A. Redding**, PhD, assistant research professor with the Cancer Prevention Research Center in Kingston, RI. Redding has used the model, which was developed at the University of Rhode Island in Kingston, for HIV prevention.

"The developers of the model started by studying people who were changing on their own, and they then developed ideas to apply to the change in a therapy situation or with counselor assistance, as well as self-change efforts," Redding adds.

Educational efforts are geared to specific changes

The model is based on six processes of change, although some projects may use only the first five stages. Before people actively change a certain habit or behavior, they go through each or a portion of these stages. Sometimes people already will have moved through one or more of the stages on their own before clinicians first see them. When clinicians are working with patients and desire to help them make a behavior change, they should gear their education and efforts toward the specific stage the patient is in. **(See chart on stages of change for medication adherence, p. 51.)**

The six stages are as follows:

1. Precontemplation: At this stage, a person is not thinking about making a change in the near future, which the model describes as the

next six months. This is the stage in which patients need more education about the consequences of continuing their behavior.

2. Contemplation: Now the person is beginning to think about changing and is weighing the costs, benefits, and risks involved in the change, explains **Christine Galavotti**, PhD, research behavioral scientist and chief of behavioral research unit in the Division of Reproductive Health at the Centers for Disease Control and Prevention in Atlanta.

3. Preparation: This is when a person becomes ready for action and has a firm intention to change behavior within the immediate future, Galavotti says. The person might have a plan of action at this point.

"Then they're focused on skills needed to implement the change," she says. For example, if the change has to do with smoking cessation, the person might begin to notice people who don't smoke and become better educated about the hazards of smoking.

HIV-infected patients might begin at this stage to think about their personal resources, such as physician support and family support. They may ask clinicians about side effects of drug therapy and how best to cope with them.

4. Action: This is the most volatile stage of change. The person at this stage begins to carry out the plans devised in stage three. Clinicians would define a person in the action stage as someone who has made overt changes in his or her behavior over the past six months. For instance, a smoker has stopped smoking, at least for a few months.

However, a person in the action stage could easily relapse to an earlier stage unless the person has adequate support. This is the stage where clinicians should most closely monitor a patient who is taking HIV medication, for instance. It's possible that patients could experience some adverse side effects and decide to stop taking their drugs, and they might not communicate the problem to their physicians.

5. Maintenance: This stage is achieved when a person has maintained the desired behavioral change for a longer period of time, such as six months to five years. The person in this stage is taking actions to prevent relapse. For example, in the case of the smoker, the person might become involved with a social network that includes nonsmokers.

6. Termination: At this stage, the person has finally so incorporated the new behavior into his or her lifestyle that it is automatic and no longer a question of weighing the pros and cons. It's like when people put on their safety belts every day without thinking about the benefits or inconvenience. This is the stage where clinicians no longer have to monitor the patient's progress, and they can be confident that the patient is complying with treatment.

Researchers first used this model for smoking cessation, which is a major priority for grant funding from the National Cancer Institute in Washington, DC. They later applied it to sun exposure protection, dietary behavior change, and exercise, among other health behaviors.

CDC studied model for prevention use

In 1989, Rhode Island researchers began collaborating with the CDC to use the model in an HIV prevention program that promoted protected sex among high-risk populations. **(See related story, p. 52.)**

The next project was aimed at women who were at high risk for HIV infection. The model would apply to pregnancy prevention as well.

The Cancer Prevention Research Center has since developed computer-based expert system interventions that give participants feedback on effective and ineffective strategies for change. The interventions could work for a variety of projects, including HIV medication compliance.

One of Redding's collaborators, **Cynthia Willey Lessne**, PhD, an associate professor at the University of Rhode Island, has developed tools that will measure stages of change for adherence to HIV-related medication regimens.

"We studied about 230 HIV-positive patients to develop these measurement tools, and afterward we asked them questions about their readiness to take the medication as directed," she says.

Researchers developed the questionnaire, which will be published later this year, by asking HIV-infected people to describe what they see as the pros and cons of medication adherence.

The patients' answers were very helpful. "Patients think very differently about medications than clinicians do," Willey Lessne explains. "There are very common misconceptions about what the cons are, and it was an education for me to hold these focus groups and hear the patients' perspectives."

For example, HIV-infected patients would look at their medicine bottle every day, and it would remind them that they are sick. After a while, they

Stages of Change

Stage of Change	Characteristics	Defined for Medication Adherence
Precontemplation	The individual has no intention of changing behavior in the foreseeable future. People in this stage tend to be unaware of the benefits of changing their behavior and are resistant to efforts to modify their behavior.	*I am not considering taking my medication as directed.*
Contemplation	The individual begins to think about changing their behavior, but they are not seriously thinking about change. They have not yet made a commitment to take action in the near future.	*I am considering taking my medication as directed within the next six months.*
Preparation	This is the stage of decision making. A commitment to changing behavior has been made and individuals may already be making changes in their behavior.	*I am planning to start taking my medication as directed within the next month.*
Action	Notable overt efforts to change occur. Individuals are classified in the action stage if they have modified their behavior to an acceptable criterion.	*I have recently begun taking my medication as directed.*
Maintenance	Individuals are working to stabilize their behavior change and avoid relapse. In general, maintenance occurs after sustaining action for six months or more.	*I have been consistently taking my medication as directed for the last six months.*

Source: University of Rhode Island, Kingston.

didn't have the emotional strength to look at that medication bottle.

"So it's easier for them to push the bottle away and stay in denial," Willey Lessne says.

Another common response was equally surprising to researchers: "A lot of patients would say that they would stop taking their medication because they needed to give their bodies a rest," Willey Lessne says. "This is also something that most clinicians don't understand, and I didn't understand it at first until we continued to talk with patients."

The HIV patients apparently had a common misconception that the medication is unnatural and takes a toll on their bodies, so after they had taken the medicine for a while they would need to give their bodies a rest.

"I think part of it is folk knowledge, and we've seen this with a lot of other medications too," Willey Lessne says. "I was not sure about putting these items into the questionnaire, but we did include it because over and over again we heard people say, 'I need to give my body a rest.'"

Clinicians need to address this type of misconception early on by helping patients concentrate on the pros of the medication, such as how it keeps the virus from replicating as long as it is taken faithfully.

After devising the questionnaire, researchers monitored the patients' medication-taking behavior for 30 days to see if their answers on the stages of change could predict their compliance. The tool consists of a long questionnaire, but the model also can be streamlined.

"We find the best way to predict future compliance with medication and to assess a patient's temptation to skip medication is with 14 questions," Willey Lessne says. The questions have been submitted for publication in a national peer-reviewed journal.

"And we did find that when we compared the stages of change with other potential predictors of compliance, like severity of illness as measured by CD4 counts and demographic variables, the stages of change was the strongest predictor of compliance," Willey Lessne says. "So that was quite encouraging."

The experiment found two potential benefits of the stages-of-change model:

• The model may be a useful way of helping clinicians communicate differently with patients at different levels of readiness of change.

• It provides a good predictor of who is likely to be successful and who will need more assistance in complying with medication regimens.

When clinicians use the model to improve patients' medication compliance, they need to pay attention to what Willey Lessne calls the temptation to skip medication.

For example, one question researchers asked patients was: "How likely are you to skip your medication?" Then the questionnaire listed a variety of situations in which a person might skip medication, such as "when you're upset" or "when your family is not being supportive." Questions measuring temptation to relapse are important because they will help a clinician address the issues that are most important to the patients.

Give patients permission to explore issues

One reason this model works better than some other compliance programs is because the questions are nonjudgmental, Willey Lessne says.

Sometimes, clinicians will count doses to assess compliance or they'll ask patients how many times they've missed their medication in the past week or month. But patients tend to view these methods as judgmental. In contrast, this model gives patients permission to explore the issues that make it harder for them to take their medications.

"We found that patients liked filling out the questionnaire," Willey Lessne says. "And when we held focus groups with these patients, we asked them about their reaction to these scales, and they really felt the issues were relevant to them.

"We think this method has good clinical utility, and so we're doing a follow-up study now, and clinicians are using it with their patients, and we're asking them how useful it was in terms of opening discussion with their patients," Willey Lessne explains.

The National Institute of Health in Washington, DC, is involved in a national trial, called Project Treat, using this model to encourage medication adherence among HIV-positive adolescents. "We assisted this group with developing a method for determining the stages of change for adolescents, and they're going to be examining the effect of interventions that are developed for each stage of change," Willey Lessne says. ■

Behavior model targets message to correct stage

CDC, NIH are studying groups using the model

Researchers studying behavior change among HIV-infected populations and people at risk for infection increasingly are interested in the transtheoretical model of health behavior change.

The model is based on a premise that people change their health behavior after progressing through five or six stages of behavior change. The theory holds that if clinicians understand the stages and know which stage their patients are in, they can gear their education and monitoring efforts according to that stage. For example, in early stages, physicians might spend time raising patients' awareness of risks and options but not waste time urging them to change their behavior.

"The basic point of the whole model is to make intervention messages or counseling messages or media messages most effective by targeting the stage a person is in," says **Christine Galavotti**, PhD, research behavioral scientist and chief of the behavioral research unit of the Division of Reproductive Health at the Centers for Disease Control and Prevention in Atlanta.

The model's chief developers are James O. Prochaska, PhD, a professor at the University of Rhode Island and a director of the Cancer Prevention Research Center, both in Kingston; Carlo DiClemente, PhD, a professor at the University of Maryland in Baltimore; and Wayne Velicer, PhD, co-director of the Cancer Prevention Research Center and a professor in the department of psychology at the University of Rhode Island.

The CDC was so impressed with how the model worked in helping people quit smoking that the agency's HIV group started using the model in a $5 million community project, called the AIDS Community Demonstration Project (ACDP), in 1989, Galavotti says.

ACDP researchers developed an intervention program that was used in Denver, Long Beach, CA, New York City, and Seattle, targeting one or more members of the following population groups: street-recruited injecting-drug users; female sex partners of male injecting-drug users; women who trade sex for money or drugs; men who have sex with men but do not call themselves homosexuals; and street youths.

The program also was held in Dallas, where it targeted people living in two separate census tracts that had high rates of injecting-drug use and sexually transmitted diseases. The project goals were to increase consistent condom use among the targeted populations and to increase the use of bleach to clean needles among drug users.[1]

The program included a control group and a group that was counseled about HIV based on the stages-of-change model. The ACDP study found that condom use among a couple of groups targeted in the project was higher in the intervention group than in the control group. For example, among people who had vaginal intercourse with nonmain partners, 41.3% of the people who had been exposed to the intervention reported consistent condom use. Of those who received no intervention, 27.1% reported consistent condom use. In the group who had anal intercourse with nonmain partners, the difference was more striking: 58% of people who were exposed to the project reported consistent condom use, compared with 27% of people who were not exposed to the intervention.

The study protocol consisted of the use of behavior-change models; research within the project communities before beginning the intervention; development of brochures and other materials that had role-model stories of people who had changed their HIV-risk behavior; distribution of the brochures, condoms, and bleach kits; and an evaluation protocol to measure implementation and outcome.

The intervention was designed based on the stages-of-change model and other behavioral theories, such as the Health Belief Model, the Theory of Reasoned Action, and the Social Cognitive Theory. The CDC used the first five stages of the stages-of-change model. The stages-of-change scale for condom use reads as follows:

1. Precontemplation — has little or no intention to always use condoms in the future;

2. Contemplation — does not use condoms but intends to begin using them every time in the future;

3. Preparation — almost always or sometimes uses condoms and intends to use condoms every time in the future;

4. Action — has used condoms every time for less than six months;

5. Maintenance — has used condoms every time for six or more months.[2] **(See stages of change chart, p. 54.)**

The study measured behavioral outcomes for each person according to the stages-of-change continuum. The four behaviors studied were: consistent condom use for vaginal intercourse with a main partner; consistent condom use for vaginal intercourse with nonmain partners; consistent condom use for anal intercourse with nonmain partners; and consistent use of bleach to clean injection equipment.

The study found that for each of the four behaviors, the mean stages-of-change value among the study participants exposed to intervention was greater than the mean stages-of-change value among those who did not receive intervention.

The CDC later used the stages-of-change model, focusing on women at risk, such as commercial sex workers and women who lived in areas where there was a high rate of drug use.

Prevention efforts included role models

"We had outreach workers who did a quick assessment of where someone was in respect to condom use," Galavotti says. "They would tailor street outreach to the stage, using material such as role-model stories in which a commercial sex worker would talk about where she was, saying, 'I don't use condoms all the time, but I've been thinking about how this might affect my kids.'"

In 1993, the CDC developed a manual for training peer prevention workers in counseling. It was used at homeless shelters, drug treatment centers, and housing development health clinics. Peer prevention workers were recruited from the ranks of women who had HIV. Project coordinators taught them about the stages-of-change model and called them peer worker advocates. Women were offered six months of services, including health care and counseling that included messages based on the stages-of-change model. The advocates counseled women on condom use, contraceptives, reproductive decision-making, and other life goals.

"Our goal was to make sure women went through a thoughtful process of what they wanted to do, and we'd support whatever decision they made and try to make sure they didn't have an unintended pregnancy," Galavotti says.

Researchers evaluated whether the women moved up along the stages-of-change continuum toward different outcomes.

"First we looked at condom use with their main partner, and in the HIV-positive sample,

Method for assigning stage of change for consistent condom use*

Criterion	Stage of change				
	Stage 1 Pre-contemplation	Stage 2 Contemplation	Stage 3 Ready for action	Stage 4 Action	Stage 5 Maintenance
Frequency of use†	—	—	Sometimes/ almost every time	Every time	Every time
Duration of "every time" use§	—	—	—	<6 months	≥6 months
Immediate intention¶	—	—	Extremely/ quite/ slightly sure will	—	—
Future intention**	—	Extremely/ quite/ slightly sure will	Extremely/ quite/ slightly sure will	—	—

*A person's stage of change (SOC) for condom use is assigned by starting with the criteria necessary for Maintenance, then Action, etc. This method also is used for assigning SOC for consistent use of bleach to clean injection equipment.

†Persons interviewed were asked, "When you have (vaginal/anal) intercourse with your (main/nonmain) partner, how often do you use a condom?" Respondents' choice of answers included the following: every time, almost every time, sometimes, almost never, never.

§Persons interviewed who reported using a condom every time or almost every time were asked, "How long have you been using a condom (every time/almost every time) you have (vaginal/anal) intercourse with your (main/nonmain) partner?"

¶Persons interviewed were asked, "How likely do you think it is that from now on you will use a condom every time?" Respondents' choice of answers included the following: extremely/quite/slightly sure I will, undecided, slightly/quite/extremely sure I won't.

**Persons interviewed were asked, "In the next 6 months, how likely do you think it is that you will start using condoms every time?" Respondents' choice of answers included the following: extremely/quite/slightly sure I will, undecided, slightly/quite/extremely sure I won't.

Source: Community-level prevention of human immunodeficiency virus infection among high-risk populations: The AIDS Community Demonstration Projects. *MMWR* 1996; (RR-6):5.

the women who received the stage-based intervention had significantly better results than the women who didn't," Galavotti says.

These results were all the more remarkable because the women who did not receive the stage-based interventions still received the full reproductive health services of a complete gynecological exam and Pap smear, meeting with a reproductive health specialist, and contraceptive counseling.

The women who were randomly assigned to the enhanced services group received all of those services plus counseling with specially trained advocates. "We found that women who received that counseling were more than twice as likely to progress one or more stages or to have stayed in maintenance for condom use at the six-month follow-up period," Galavotti says. "And they were less likely to have relapses."

At the baseline, both groups in the HIV-positive sample reported about 43% consistent condom use. By the study's end, the control group's condom use was unchanged, but the enhanced group had increased condom use to 65%, Galavotti says.

"We were pleased with the HIV-infected sample," Galavotti says. "And we were extremely pleased that the peer professionals loved this; they thought it made tremendous sense and was intuitively very appealing, and they reported that clients loved it as well."

There was no turnover of staff during the study, which ran from 1993 to April 1997.

The results weren't as promising with the non-HIV group of women at risk for infection. This was expected because the at-risk group was mainly in the precontemplation stage of change, with 59% in this stage at baseline, Galavotti says.

"Not everybody accepted the services," she explains. "Only 75% of the women in the at-risk sample wanted to meet with the advocate."

Despite the generally favorable results, the CDC will continue to evaluate the stages-of-change model before promoting it publicly for use with HIV-positive and at-risk populations, Galavotti says.

"I would like to see it incorporated in the HIV counseling guidelines, but to date it has not been," she adds. "What has been incorporated is the client-centered kind of approach and some of the elements of a stage-based approach."

References

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Evidence builds that HIV mutates to resist HAART

The good news: Mutations are consistent

While reports that patients may be cured of HIV after years of highly active antiretroviral therapy (HAART) are circulating, clinicians need to be aware of a recent study clearly demonstrating that the virus in patients treated by these therapies still can mutate.

A study recently published in *Molecular Biology and Evolution* finds evidence that HIV can evolve and become drug-resistant even while a patient's combination drug therapy reduces viral load to undetectable levels.[1]

The study also shows a certain predictability in the mutations, which is good news for drug companies that want to create chemical barriers to stop the virus from evolving into a drug-resistant form.

"The basic idea is, you have this virus evolving down a road, and the drug therapy puts up a roadblock, and then the virus will go someplace else," says **Keith A. Crandall**, PhD, an evolutionary biologist in the department of zoology of Brigham Young University in Provo, UT.

The research demonstrates that it's possible to predict which way the virus will evolve. "So drug companies take this information and build a new roadblock," he says.

Crandall and his colleagues' research suggests HIV drug resistance will continue to spread, making it increasingly difficult to select drug therapies that work.

"We're going to see the exact same thing as we did with antibiotics, except that HIV mutates faster," he adds.

HIV's evolution rate depends on factors such as whether a patient has had prior exposure to monotherapy. HAART's ability to suppress the virus may not last as long in patients who were previously treated with one of the antiretroviral drugs, Crandall says.

Suppress HIV before viral load is high

"Also, when do you initiate drug therapy in the patient's progression?" he says. "If you begin it at the peak of the viral load, then the viral population has a much better chance of evolving resistance because its population is so high."

However, if clinicians wait to start HAART, there's a higher probability of the HIV population already having resistant mutations.

The best scenario would be to catch the virus before the viral load has exploded. Alternatively, if a clinician sees a patient after the viral load has had its first burst of activity, it would be better to wait and start HAART after the patient's own immune system kicks in and brings the viral load down, Crandall suggests.

"I'm sure you have patients whose immune systems are compromised for other reasons, and in those patients you want to intervene as soon as you can," he says. Otherwise, it's better to wait until the viral load has come down.

The study also highlights the importance of focusing on drug compliance and emphasizing to patients that drug therapy is not a cure.

"If your patient has been on drug therapy for two years and still shows undetectable levels of virus, that is not the time to take the patient off of drug therapy," Crandall says. "That will just make it easier for the virus to come back up and rebound."

Researchers analyzed HIV in patients who had been on triple-drug therapy for more than two years. Although the patients' viral loads were less than 50 copies / mL, investigators still found signs of HIV evolution. The evolutionary patterns were

similar in different patients, suggesting parallel evolution, Crandall says.

Parallel evolution is what happened when fish and dolphins developed fins, for example. Parallel changes are those that occur in independent lines that share a common ancestral character state. Convergent evolution, by contrast, refers to natural selection, when an entity changes in order to adapt to its environment.

Some scientists have doubted that parallel evolution exists at the molecular level, but this study seems to indicate that it does.

Same mutations occur in different patients

"You have independent patients evolving the same mutations to escape drug therapy, which suggests there are a limited number of ways for HIV to escape," Crandall says.

"The fact that they're all evolving in a similar evolutionary pathway means that if you design a drug to affect that pathway, it will affect a lot of patients," he adds.

Crandall became involved in the research a couple of years ago when a colleague at the National Cancer Institute asked him to analyze some HIV sequences. They began a collaboration to see whether HIV was evolving, even when it was suppressed to undetectable levels in patients on triple-drug therapy.

The researchers explored the relationship between genetic variation and disease progression and measured genetic diversity at two time points in samples from eight patients.[1] In five patients, the HIV had evolved, with identical changes occurring in each person.

The researchers concluded that either very small populations of virus are being activated and then are replicating and evolving, or that latent reservoirs are activated.

The next step is to study the viral reservoirs in patients on triple-drug regimens to see if the virus is coming out of these reservoirs to replicate and evolve, Crandall says, adding that he hopes to become involved in such a project within the next six months.

If the virus is coming out of the reservoirs and depletes the reservoirs, this could mean there is an end-point when drug therapy has cured some patients. But if the virus outside the reservoirs becomes activated and replenishes the reservoirs, there will never be a drug therapy cure, he adds.

"It's an evolutionary question," Crandall explains. "You take samples of the virus from the reservoir early on, and then you take samples from the reservoirs four years down the road and see if there has been an evolution. If there has been, then they are being replenished."

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HAART won't completely eradicate HIV in semen

Study adds weight to 'safe sex' emphasis

AIDS researchers have been sounding the alarm for several months now because new studies show that if men on highly active antiretroviral therapy (HAART) have sex without condoms, they could be spreading antiretroviral-resistant HIV to their partners.

While clinicians have emphasized the safe-sex message since HAART first became available, they now have clinical data to back up their claim that HAART does not completely eradicate HIV in semen. And worse, it may be possible for men to spread HIV that has mutated and become resistant to the triple-drug therapies they are taking. Much of the same research is helping scientists and physicians gain a better understanding of how HIV is transmitted through genital secretions, and how sexually transmitted diseases enable HIV to spread more easily.

"Men are the main transmission route of the disease, and it has to be that genital secretions are the route to understanding transmission of the disease," says **Myron S. Cohen**, MD, professor of medicine, microbiology, and immunology and chief of the infectious disease division at the University of North Carolina at Chapel Hill.

"Since 1990, we've tried systematic studies to understand the biology of HIV transmission in male genital secretions," Cohen says.

The work he and other researchers have undertaken is examining how much HIV is in semen and how this amount corresponds to the amount of HIV in the bloodstream.

They also have studied how these levels of virus change when men have other sexually transmitted diseases, such as gonorrhea or syphilis. Another study, published in *AIDS*, evaluated HIV-infected men's blood and genital secretions for HIV-1 resistance to antiretroviral agents.[1]

The research has taken some interesting turns. For example, Cohen says, investigators wanted to discover whether men with STDs were at greater risk for spreading HIV because the STDs somehow increased the effectiveness of HIV transmission. They conducted a biological study of the semen of HIV-infected men in Africa who also had gonorrhea. They found that men whose gonorrhea had led to urethritis, a condition in which the penis excretes pus, had 10 times more HIV in their semen than men without urethritis.

"Once we treated urethritis, [the amount of HIV] was reduced," Cohen says. "So urethritis drastically increases the amount of HIV that the partner would be exposed to."

STD may cause faster replication

Investigators found that the local inflammation caused by the urethritis either allowed the HIV to replicate faster or allowed more HIV to escape from the blood, he adds. So far, their ongoing research indicates that the inflammation allows the virus to replicate faster, but the final answer is uncertain.

A second body of studies focused on the effects of antiretroviral drugs. "If you live in the United States and take antiretroviral drugs, you reduce the virus in the bloodstream, so how much do you reduce the virus in semen, and how often does the virus become resistant while you're taking therapy?" he asks.

For example, picture an HIV-infected man on HAART. Over time, the man's virus becomes resistant to his therapy. Will the man transmit this HAART-resistant virus to the next person he has sex with? If so, the drugs the HIV-infected man took in his HAART regimen will be useless to his newly infected partner.

"We're used to seeing drugs as beneficial to the individual, but we must also consider the community effects," Cohen says.

The *AIDS* study published by Cohen and other researchers late last year showed that HIV drug therapies could lead to widespread HIV resistance patterns in much the same way that antibiotic use has led to a high prevalence of antibiotic-resistant bacteria.

"If we're not careful that these drugs are enough to kill all the virus, then we'll lose the effects of the drugs on the next generation," Cohen cautions. "The point is, it's not stupid to worry about the public-health ramifications of these drugs."

The study, which was written by Cohen, Joseph J. Eron, MD, associate professor of medicine at the University of North Carolina in Chapel Hill, and other researchers, concluded that HIV-1 variants with genotypic resistance markers are present in the male genital tract. These variants evolve over time when the men are on incompletely suppressive antiretroviral therapy.

The study also found that reverse transcriptase genotypic resistance markers were present in seminal plasma at baseline in three out of six individuals with previous experience with reverse transcriptase inhibitors. Eight out of 10 men had new resistance mutations in their blood or seminal plasma or both.

When antiretroviral agents penetrate the genital tract poorly, they may allow ongoing replication in this compartment even when there is an apparent effectiveness of the therapy in the systemic compartment.

If these resistant variants are sexually transmitted, there may be a negative impact on treatment outcomes in newly infected individuals and on the spread of the disease within a population. Public health officials should make it a top priority to focus on therapeutic strategies that fully suppress HIV-1 in the genital tract, the study concludes.

The study concurs with other research indicating that HIV-1 in the male genital tract is in a biologically separate compartment, and the virus is at least partly produced locally and may be under different selective pressures from the virus in the systemic compartment.

Some men appear to be hypersecretors of HIV RNA in seminal plasma, and they may be particularly prone to incomplete suppression of HIV replication in the genital tract and therefore at greater risk of shedding resistant HIV-1.

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HIV misdiagnosis results in malpractice suit

An Ohio man's lawsuit against a physician who had diagnosed him with AIDS and then prescribed AZT illustrates how careful clinicians should be when patients request AIDS treatment, an infectious disease specialist says.

In the Ohio case, **Mark Savage** alleges his former doctor had misdiagnosed him in July 1990 as having HIV, although he was never even tested for the virus. According to a Jan. 28 Associated Press report, Savage says he was treated with AZT and other AIDS-fighting drugs through 1996. Then in 1997, his new physician in Ohio ordered tests that showed Savage was not infected with the virus.

Physicians clearly should not treat a patient for HIV without first conducting tests to conclusively determine whether the patient is infected with the virus, says **Tim Kuberski**, MD, an infectious disease specialist in private practice in Glendale, AZ. Kuberski sees about 100 HIV-positive patients in his practice.

Kuberski will not treat new HIV patients without first receiving documentation that they are indeed HIV-positive.

First Kuberski screens patients for HIV antibodies, and then he confirms a positive result with the Western Blot test. "It's almost impossible for a patient to have both of those tests be falsely positive," he says.

However, it's possible that a patient who has some sort of psychiatric disorder will request a physician to prescribe AIDS drugs, even when the patient has not been tested for HIV, and this is why physicians need to be cautious and confirm all HIV cases.

"I've had a couple of patients who have come to me wanting treatment for HIV, but they were not HIV-positive," Kuberski says. "They come into the office, saying 'I'm HIV-positive, and I've been on such-and-such drugs.'"

Sometimes patients have even invented elaborate explanations for why they cannot produce documentation of their positive HIV test.

"They say it was done in a confidential setting, and they couldn't get the results," Kuberski says. "Then I certainly get the confirmatory test done." ▼

CDC responds to 'urban legend' HIV scare

The Centers for Disease Control and Prevention in Atlanta recently responded to rumors spreading via the Internet and fax that HIV-infected people were leaving dirty needles in coin return slots of pay phones and in movie theater seats. Such reports are false, the CDC says.

"Some reports have falsely indicated that CDC 'confirmed' the presence of HIV in the needles," says a CDC fact sheet issued in March. "CDC has not tested such needles nor has CDC confirmed the presence or absence of HIV in any sample related to these rumors."

Further, CDC officials are unaware of any cases, outside of health care workers, where HIV has been transmitted by a needlestick injury.

However, the CDC has been informed of an incident in Virginia in which a person received a needlestick from a small-gauge needle left in a pay phone coin return slot. Local police investigated the incident, and another needle was found in a vending machine coin return slot a few days later But the CDC reports that these

COMING IN FUTURE MONTHS

- Health care workers with AIDS patients are safe from TB
- Researchers discover protein protects saliva from HIV transmission
- Drug companies race to develop microbicides that protect against HIV
- Black leaders, others join HIV prevention campaigns aimed at minorities
- Clinicians give guidelines to managing esophageal disease in AIDS patients

incidents probably involved needles accidentally left by people who either use insulin or are injection drug users.

The CDC report also says the agency does not recommend testing discarded needles to assess the presence or absence of HIV or other infectious agents. The agency outlines its policy, as follows:

Management of exposed persons should be done on a case-by-case evaluation of:

1) the risk of a bloodborne pathogen infection in the source, and

2) the nature of the injury.

Also, anyone who is injured from a needlestick in a community setting should contact a physician or go to an emergency room as soon as possible, and the injury should be reported to local or state health departments.

The CDC's fact sheet can be found at its Web site: www.cdc.gov/nchstp/hiv_aids/pubs/faq/faq5a.htm. ▼

The verdict's in: Chimps gave us HIV-1

One of the more dramatic moments at the 6th Conference on Retroviruses and Opportunistic Infections held in Chicago in February was the announcement that researchers in Alabama had traced HIV-1 back to a subspecies of chimpanzees.

Beatrice H. Hahn, MD, and other researchers at the University of Alabama in Birmingham found that the virus had passed from chimpanzees to humans, most likely when people killed and ate the animals. This happened at three separate definable points in time in western Africa, starting about 50 years ago and involving the subspecies *Pan troglodytes troglodytes*. The chimps were infected with simian immunodeficiency virus, which is genetically very close to HIV-1.

This isn't the first time a virus has existed harmlessly in its animal hosts before mutating into a killer virus in humans. Influenza is another example.

With the new discovery, researchers and others have called for a ban on the chimpanzee bushmeat trade because the existing animals may hold clues to cures for HIV, and because eating them is dangerous. ▼

HIV infection found more often in black blood donors

Blood Centers of the Pacific in San Francisco analyzed blood samples from 1.7 million first-time donors and found that black donors were 25 times more likely to have recently acquired HIV infections.[1]

Researchers found that two of every 100,000 white donors were newly infected, whereas 51 per 100,000 black donors had been newly infected, according to a demographic study of HIV incidence presented at the 6th Conference on Retroviruses and Opportunistic Infections, held in Chicago in February.

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The study also found that men and donors in the 25-44 age range were twice as likely as women to be infected, and the new infection rate did not change significantly between 1993 and 1996.

Reference

1. Busch MP, Aberle-Grasse J, Rawal BD, et al. Demographic correlates of HIV incidence among U.S. blood donors. Abstract No. 272. Presented at the 6th Conference on Retroviruses and Opportunistic Infections. Chicago; Feb. 1-5, 1999. ▼

New study shows efavirenz effective with d4T and 3TC

A new study of Sustiva / efavirenz, a once-daily non-nucleoside reverse transcriptase inhibitor, shows that Sustiva taken in combination with stavudine (d4T) and lamivudine (3TC) reduces viral load to below 400 copies / mL in 100% of patients observed.

Sustiva, manufactured by Wilmington, DE-based DuPont, also was studied in an ongoing 48-week, open-label multicenter trial. Three of 42 patients discontinued the therapy, and none of the discontinuations were related to adverse events, according to the study, which was presented in March at the 9th European Conference of Clinical Microbiology and Infectious Diseases in Berlin.

A second study showed that Sustiva combined with AZT / 3TC or indinavir lowered viral load in both vaginal and cerebrospinal fluid to fewer than 400 copies / mL in two groups of patients. In one group, the viral load was suppressed in eight women's genital tracts after 12 weeks of therapy. A second group of nine patients achieved the same results in their cerebrospinal fluid after 16 weeks of therapy.

Sustiva was granted approval by the Food and Drug Administration on Sept. 17, 1998. The drug also was approved March 23, 1999, by the Canadian Health Protection Branch for use in Canada. ■

CE objectives

After reading this issue of *AIDS Alert*, CE participants should be able to:

- identify the particular clinical, legal, or scientific issues relates to AIDS patient care;
- describe how those issues affect nurses, physicians, hospitals, clinics, or the health care industry in general;
- cite practical solutions to the problems associated with those issues, based on overall expert guidelines from the Centers for Disease Control and Prevention or other authorities and / or based on independent recommendations from specific clinicians at individual institutions. ■