Race for Cure: What Will Eradicate AIDS?

A Vaccine Is Still a Long Way Off, but Other Methods May Slow Spread

By ANDREA CARTER, ABC News Medical Unit

June 5, 2006 — - AIDS was first introduced to the world 25 years ago today, with the publication of a report of a bizarre disease affecting gay men in the United States.

Now, there are drugs that suppress -- but not cure -- the disease. Many other strides have been made, but the most anticipated treatment of all -- a vaccine -- is still nonexistent. In fact, scientists still have different ideas on how best to tackle the virus through medical research.

While the world hopes for an HIV vaccine with the polio vaccine's magnitude, the reality is that HIV is a different kind of virus and has been tricky to pin down, making a vaccine elusive.

"The virus is a kind of chameleon, hard to keep from getting into the door," said Julie Overbaugh, a member of the Human Biology Division at Fred Hutchinson Cancer Research Center.

The human immunodeficiency virus is made of genetic material, RNA, which invades cells. The virus essentially hijacks the cell, and uses its machinery to multiply and survive. The HIV virus mutates faster than most other viruses, making vaccine development challenging.

"No one has really found a way to develop a broadly protective vaccine against a virus that mutates at high frequencies," Overbaugh said.

For other diseases, vaccines are either made of dead or weakened copies of a virus. When given as an inoculation, those virus copies help the body's immune system create antibodies that fight and attack the live virus when it infects the body.

Early in the fight against AIDS, scientists hoped to develop an HIV vaccine so that the body could produce antibodies to fight the virus. They also looked at creating one vaccine that could target all types of HIV, but there are hundreds of HIV subtypes and that compounds the difficulty of making a vaccine.

"The vaccine field has not even tried yet to tackle the issue of dealing with a genetically variable virus, which in my view is the major issue," Overbaugh said.

So, this has meant scientists have needed to adapt and think differently to target the virus. About five years ago, researchers switched their focus to vaccines that increase the number of t-cells in the body rather than antibodies, said Larry Corey, head of the Infectious Disease Program at Fred Hutchinson Cancer Research Center.

T-cells, which kill the virus, can only detect HIV once it enters the cells. Increasing the number of t-cells may not prevent the virus from entering the cells, but it can suppress the infection.

Dr. Rama Amara, of the Yerkes National Primate Research Center at Emory University and the Emory Vaccine Center, worked on a t-cell vaccine that will enter into clinical trials with Geovax, a company started by Emory University.

In studies with monkeys, the vaccine suppressed the virus for four years. Amara said a future vaccine could potentially provide an alternative to being on anti-retroviral drugs, which have strong side effects.

"If it generates the same response in humans as monkeys, I think this vaccine has a good chance," Amara said.

Others feel that the scientific community should not put all its eggs in one basket and instead focus on treatments that prevent the spread of the disease, such as microbicides -- sexual lubricants that kill the virus or prevent it from entering the body.

"They say that a vaccine is still decades away, but microbicides we may have in four [years] to five years," said Dr. Edwin Bayrd, associate director of the UCLA AIDS Institute.

Microbiocides also may sidestep the cultural stigma against condom use and their prohibitory cost. In many parts of Africa, a condom costs 20 cents -- about the same rate as a sex worker's fee, Bayrd said.

Researchers are also looking at using two different drugs in the microbicides that women could use undetected by their partners. The drugs are tenofovir, which kills the virus, and CCR5, a compound developed by Pfizer that prevents the virus from entering the CD4 t-cells.

"It's a designer molecule that exactly fits in this entry hole and serves as a plug," Bayrd said.

Currently, researchers are giving tenofovir to uninfected sex workers in Thailand to see whether this may prevent them from contracting the disease. According to Bayrd, tenofovir has a long half-life in the body so it could provide an arsenal of defense against an invading virus.

"Even if it's only 20 [percent] to 30 percent effective, that is still millions of lives saved," he said.

Dr. Robert Schooley, a professor of medicine and head of the division of infectious diseases at

University of California San Diego, believes that developing current drugs is important.

"The best strategy is to get more serious about how we use treatment," Schooley said.

He's referring to the fact that right now, people may need to take upwards of 20 pills in one sitting. The Food and Drug Administration is currently reviewing one pill that incorporates three anti-HIV drugs -- Sustiva, Emtriva and Viread. This could make drug regimens less complicated, Schooley said.

Preliminary data suggests that this pill is just as effective in delivering the drugs to the body as if they were taken separately, according to Eric Miller, spokesman for the drug company Bristol Meyers Squibb, which co-developed the drug with Gilead Sciences.

"It's ultimately up to the FDA to review and approve the drug," Miller said.

However, the race for a cure should always include vaccine research, Overbaugh said.

"A vaccine is, in the long run, the home run."