HIV-2 offers protection against HIV-1

Discovered a few years after HIV-1, HIV-2 has dwelled in the shadow of its more common cousin. Though both viruses eventually cripple the human immune system and cause AIDS, HIV-1 spreads more readily from person to person and usually causes death much more quickly (SN: 9/17/94, p.187).

Now, in a report that offers a glimmer of hope for an AIDS vaccine, researchers argue that the immune response triggered by infection with HIV-2 can shield against a later attack by the more virulent HIV-1. After 9 years of carefully monitoring female prostitutes in Dakar, Senegal, they calculate that infection with HIV-2 reduced a woman's risk of HIV-1 infection by about 70 percent.

"It's the first time that you can identify a population that was protected," says epidemiologist Phyllis Kanki. Kanki headed a team from the Harvard School of Public Health in Boston that collaborated in the study with a group of African researchers led by Souleymane Mboup of University Cheikh Anta Diop in Senegal.

"This is encouraging for vaccine development. We have evidence that protection can be achieved," comments infectious disease researcher Bruce D. Walker of Massachusetts General Hospital in Boston.

Of the 618 women initially not infected with either HIV-1 or HIV-2, 61 later tested positive for HIV-1, Kanki and her colleagues report in the June 16 SCIENCE. Among the 187 women without HIV-1 who started with an HIV-2 infection or contracted the virus during the study, only 7 showed subsequent signs of HIV-1, according to antibody and DNA tests of blood samples taken regularly from the women.

By taking into account the periods of time that the women tested positive or negative for HIV-1 or HIV-2, the researchers found that the rate of HIV-1 infection was two and a half times greater in women not infected with HIV-2.

Kanki and her colleagues did not observe the opposite effect—protection against HIV-2 by prior HIV-1 infection. They note, however, that their study may not have been large enough to detect that phenomenon.

The group also examined the possibility that women adopted safer sex practices once they learned of their HIV-2 infection; such precautions could account for the increased protection from HIV-1. The researchers regularly tested the women for other sexually transmitted diseases, such as gonorrhea and syphilis. The incidence of these diseases rose among the HIV-2-infected women, suggesting that they continued to engage in risky sexual behavior.

This new study may provide additional support for a controversial AIDS vaccine strategy in which researchers would inject people at risk with a weakened form of HIV to stimulate a protective immune response. "I think it lends more credence to a live, attenuated virus," acknowledges Anthony S. Fauci, director of the National Institute of Allergy and Infectious Diseases in Bethesda, Md.

Fauci cautions, however, that he and most other researchers find such a strategy too risky. They fear that even weakened forms of HIV-2 or HIV-1 could mutate back to a more dangerous form. Some also worry that such a vaccine could cause cancer, since HIV-1 and HIV-2 insert their genetic material into a cell's genes.

"HIV-2 is not a virus you fool around with. We're not pushing for its use as a vaccine," agrees Kanki.

Instead, both Fauci and Kanki stress, researchers need to characterize the potent immune response stimulated by HIV-2 and deduce what viral proteins (or fragments of proteins) generate that reaction. Then, they say, those proteins could provide the foundation for a safe, as well as effective, HIV-1 vaccine.

— J. Travis

Understanding speech: I see what you mean

When someone gives you an instruction, a kind of grammar decoder in your brain first makes sense of the utterance. Then other mental procedures, such as a consideration of how your surroundings relate to the statement, flesh out its meaning—at least according to a school of thought influential among cognitive scientists.

New findings, however, indicate that visual cues relevant to a message but having nothing to do with grammar influence speech comprehension in its earliest stages. People simultaneously integrate visual and linguistic information in order to understand what others say, a research team argues in the June 16 SCIENCE.

"We now have a tool for tracking, moment by moment, mental processes that underlie speech comprehension in natural contexts," contends Michael K. Tanenhaus, a psycholinguist at the University of Rochester (N.Y.).

Tanenhaus and his coworkers achieved this feat by monitoring volunteers' eye movements as they listened to verbal instructions involving visible objects in the laboratory. A camera mounted on a lightweight helmet took infrared images that measured the direction and extent of eye movements at fraction-of-a-second intervals.

Initial experiments indicated that people look at target items as soon as they hear words in an instruction that distinguish the target from other visible objects. For example, when told to "touch the starred yellow square," volunteers took about one-quarter of a second after hearing "starred" to look at the correct item if it lay among three blocks without stars. But if the display included two starred yellow blocks, subjects glanced at the target a quarter second after hearing the word "square."

Further tests suggested that visual cues influence word recognition. While hearing instructions regarding a target item, such as "candy," placed among several everyday objects, volunteers typically began to look for the target before hearing the end of its name. However, this visual reaction began substantially later if an object with a similar name to the target—"candle," for instance—was in the display.

Finally, Tanenhaus' group explored whether visual information could affect grammatical understanding of an instruction. Volunteers received either an ambiguous instruction ("Put the apple on the towel in the box") or an unambiguous instruction ("Put the apple that's on the towel in the box"). While hearing a directive, participants viewed one of two scenes: an apple set on a towel, another towel without an apple, a box, and a pencil; or a similar arrangement with the pencil replaced by a second apple lying on a napkin.

In the single-apple display, the ambiguous instruction often caused volunteers to glance at the irrelevant towel after hearing the word "towel," indicating their initial suspicion that the apple should be placed there, before putting the apple in the box. Participants given the unambiguous direction never looked at the irrelevant towel.

In the two-apple display, ambiguous and unambiguous instructions elicited the same pattern of eye movements. Volunteers glanced from one apple to the other after hearing "apple," then looked at the correct apple after hearing "towel." They made no further eye movements until hearing the word "box."

"This is a clever, innovative procedure," holds Peter D. Eimas, a psycholinguist at Brown University in Providence, R.I. "The data are consistent with the view that we have an innate ability to learn language using whatever information is available, including nonlinguistic information." *— B. Bower*