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UC San Diego Health Sciences Research News

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Honeybees give their all in defense of the hive. Their barbed stingers cannot be extracted. When a stinging bee pulls away, it leaves behind not just the stinger, but also parts of its digestive system, muscles and nerves.The resulting massive abdominal rupture is fatal. Photo courtesy of Waugsberg.

Bee HIV

For some people with acute allergies, the sting of the common honeybee can pose a potentially mortal threat.

Scientists hope to add human immunodeficiency virus or HIV to that list.

Researchers at Washington University in St. Louis are developing a prophylactic vaginal gel containing nanoparticles coated with a toxin found in bee venom. The peptide toxin, called melittin, pokes holes in the protective envelope surrounding HIV, killing the virus.

“Our hope is that in places where HIV is running rampant, people could use this gel as a preventive measure to stop the initial infection,” said study author Joshua L. Hood.

The melittin does not harm normal cells because researchers added protective bumpers to the nanoparticles' surfaces. When the nanoparticles come into contact with much larger normal cells, they simply bounce off. HIV, on the other hand, is much smaller than the nanoparticles and slides easily between the bumpers to make contact with the deadly bee toxin.

Hood said one advantage of this approach is that the nanoparticles' attack involves an essential part of the virus' structure. "We are attacking an inherent physical property of HIV," he said. "Theoretically, there isn't any way for the virus to adapt to that. The virus has to have a protective coat, a double-layered membrane that covers the virus."

By contrast, most current anti-HIV drugs focus upon inhibiting viral replication. Some HIV strains have evolved alternative reproductive strategies.

Hood thinks the nanoparticle approach could be adapted to treating current HIV infections and tweaked to target other viruses with similar protective envelopes, such as hepatitis B and C.

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