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Wistar Scientists Demonstrate First-Ever Single-Shot HIV Vaccine Neutralization Success

PHILADELPHIA — (TUESDAY, FEB. 3, 2026) — Scientists at The Wistar Institute have developed an HIV vaccine candidate that achieves something never before observed in the field: inducing neutralizing antibodies against HIV after a single immunization in nonhuman primates. The innovative approach, published in *Nature Immunology*, could significantly shorten and simplify HIV vaccination protocols, making them more accessible worldwide.

The research, led by **Amelia Escolano, Ph.D.,** assistant professor in Wistar's Vaccine and Immunotherapy Center and the senior author of the study, centers on an engineered HIV envelope protein, WIN332, that challenges scientific assumptions about how to design an effective HIV vaccine.

"By going against one commonly held belief in the field, we achieved low neutralization after a single immunization, which was further increased after one additional booster, something that has never been observed before," said Escolano. "Usually, HIV vaccination protocols require seven, eight, or even ten injections to start seeing any neutralization. For our immunogen, WIN332, we injected once and already saw some neutralization."

For years, scientists attempting to engineer HIV vaccines have focused on targeting the virus's envelope protein, a component of the outermost layer of the virus. Dr. Escolano's team has engineered a specific region of the envelope protein, called the V3-glycan epitope. Conventional wisdom held that antibodies targeting this region required a particular sugar, N332-glycan, to bind effectively. All previous envelope immunogens were designed to preserve this sugar. Escolano's team took the unprecedented step of removing the N332-glycan completely to create WIN332.

A single injection of WIN332 induced low but detectable neutralization against HIV within just three weeks—an unprecedented timeline. When the researchers gave a second injection using a related immunogen, neutralization levels increased significantly. This represents a potentially marked improvement over current experimental protocols.

"This immunogen could shorten and simplify vaccination protocols," said Ignacio Relano-Rodriguez, Ph.D., first author of the study. "If this approach proves successful, we could potentially achieve desired immunity with just three injections. This would make vaccination protocols shorter and more affordable."

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By removing the N332-glycan to create their immunogen, the team also revealed the existence of two distinct types of HIV-neutralizing antibodies that target the V3-glycan region. Type I antibodies represent the previously known class that requires the N332 sugar to bind effectively. Type II antibodies are a new class, identified by this research, that doesn't require the sugar for binding.

"This discovery potentially expands the toolkit available for developing HIV vaccines that provide broader protection against the diverse HIV strains circulating globally," Escolano said.

The promising results have attracted attention from major global health organizations to advance WIN332 into human clinical trials. Meanwhile, additional preclinical evaluations are underway, along with the design of subsequent immunogens that could be used in a shortened vaccination series to further enhance neutralization efficiency.

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