

Defeating Polio: The Disease that Paralyzed America

Story by Linton Weeks, NPR:

Tens of thousands of Americans — in the first half of the 20th century — were stricken by poliomyelitis. Polio, as it's known, is a disease that attacks the central nervous system and often leaves its victims partially or fully paralyzed. The hallmarks of the Polio Era were children on crutches and in iron lungs, shuttered swimming pools, theaters warning moviegoers to not sit too close to one another. On April 12, 2015, we celebrate the 60th anniversary of a vaccine developed by Jonas Salk that prevented the disease and eventually led to its remarkable decline. The introduction of that vaccine in 1955 was one of the biggest medical advances in American history.  

Click the picture for the full story.

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Annie De Groot (ISV Fellow) and Lenny Moise – University of Rhode Island and Epivax

Have you ever had a sentence stuck in your head? One sentence that I can’t forget was uttered by Robin Robinson at a recent convening of vaccinologists (Vaccine Technologies V, Playa del Carmen, Mexico, 2014). He said “we’re making great progress on building vaccine manufacturing capacity in the US, and we are also making progress developing methods to accelerate vaccine production, but we are not making good progress on vaccine efficacy.”

The underwhelming performance of H3N2 seasonal influenza vaccine for the 2014-2015 flu season is a case in point. Is it any surprise that public confidence in influenza vaccination is at an all time low? And from the pandemic perspective, poor vaccine efficacy can be even more worrisome. As of this writing, the H7N9 strain that emerged in China in 2013 still holds significant pandemic potential, and, as with H3N2, H7N9 vaccines appear to be underperforming.

Both the H3N2 and H7N9 strains present unique challenges to vaccinologists. Anti-H7 antibody responses are significantly delayed and exhibit low avidity, in comparison with antibodies generated following seasonal influenza vaccination and infection. Responses to H3N2 have also been reported to decrease with additional immunizations. Are these problems due to the existing standard designs for flu vaccines? Is it time for change? A number of exciting new approaches have been proposed to improve the immunogenicity of vaccines and ISV researchers are at the forefront of influenza research.

For example, the team at EpiVax, working with Rui Liu at the University of Rhode Island, have discovered that H7N9 contains fewer T cell epitopes and some epitopes stimulate regulatory T cells (Tregs) that may help the virus evade effector responses needed for protection. Researchers at the Institute for Immunology and Informatics (University of Rhode Island) and EpiVax are seeking out, and finding, Treg epitopes in other pathogens, including HIV, Hepatitis C Virus, and parasites.

Can anything be done to fix the problem? Yes, as it turns out. Using methods that were honed on biologics, for the purpose of “deimmunization” (removal of T effector epitopes), these vaccine design teams have been modifying H7N9 sequences so as to remove Treg epitopes. With Manobu Ato and Yoshimasa Takahashi at National Institute for Infectious Diseases in Japan, the researchers are observing improved antibody titers. They are definitely not standing around with their hands in their pockets!

Stay tuned, as vaccine developers begin to outsmart viruses that have adapted to humans, so as to develop “biobetter vaccines” in response to global (and governmental) demands.

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