



VACCINE DEVELOPMENT: A HISTORY OF SUCCESS

The Wistar Institute's half-century of achievement in vaccine development has saved countless lives in the United States and around the world. Discoveries at Wistar have led to the creation of vaccines that protect children and adults from widespread, debilitating, and life-threatening diseases.

RUBELLA: THE END OF A PANDEMIC

Thanks to a Wistar vaccine, rubella – also known as German measles – no longer threatens the health of U.S. babies. Professor emeritus Stanley A. Plotkin, M.D., began work on the vaccine during the 1960s after a rubella pandemic swept across the United States and Europe and left some 12,000 infants deaf, blind, or with both impairments. His vaccine became available in 1969 and gained widespread use in industrialized nations, sending the rubella infection rates into rapid decline. In 2005, the Centers for Disease Control and Prevention declared rubella eradicated in the United States, crediting Plotkin's vaccine.

In developing nations, however, rubella remains a threat. In countries without strong mass vaccination programs, rubella outbreaks still cause severe birth defects, miscarriages, and stillbirths. Wistar has licensed the rubella vaccine seed stock to companies in China, India, and Russia. The agreements, which do not bring significant royalties to the Institute, are designed to help these countries develop affordable vaccines to protect their populations.

RABIES: PREVENTING LETHAL INFECTION

Two Wistar vaccines have played an important role in preventing rabies infections, which are almost always fatal. One vaccine protects people bitten by a rabid animal. When given promptly as part of post-exposure treatment, it is nearly 100 percent effective in preventing infection. The vaccine is also given to those at high risk of exposure, including veterinarians and wildlife officers. The second vaccine prevents rabies in wildlife and has been used in raccoons and coyotes to protect not only the animals but also, indirectly, neighboring human populations.

Three Wistar researchers developed the human vaccine in the 1960s and 70s: Tadeusz Wiktor, V.M.D.; former institute director Hilary Koprowski, M.D., now professor laureate; and Stanley A. Plotkin, M.D., now professor emeritus. Louis Pasteur administered the first human rabies vaccine in the late 1800s; however, vaccines used through the first half of the 20th century were extremely painful, caused side effects, and were not always effective. The Wistar vaccine prompted a stronger immune response while causing fewer side effects and less pain. Today, it is widely used in the United States, Western Europe, and other areas.

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Vaccinating wildlife is important to controlling rabies; more than 90 percent of rabies cases in U.S. animals occur in wildlife. Wistar scientists William H. Wunner, Ph.D., Peter J. Curtis, Ph.D., and Charles E. Rupprecht, D.V.M., Ph.D., collaborated to develop a wildlife vaccine delivered by oral bait. First approved in 1995 to prevent raccoon rabies, it is now also used to stop infections in Texas coyotes along the U.S. border with Mexico.

Wistar researchers now aim to develop a human vaccine suited for the developing world, where some 55,000 people, mostly children, still die from rabies each year.

ROTAVIRUS: PROTECTING CHILDREN WORLDWIDE

A new vaccine co-developed by Wistar researchers is protecting children from a disease responsible for hundreds of thousands of cases of childhood illness and death worldwide each year. Rotavirus, the most common cause of diarrhea in infants and young children, infects virtually all American children by the time they reach age five, causing some 250,000 emergency room visits and 70,000 hospitalizations each year. Besides diarrhea, its symptoms include vomiting, fever, and abdominal pain. Victims can become so dehydrated they must be treated with intravenous fluids. In the developing world, where medical facilities are limited, the infection takes an annual death toll of some 600,000 infants and children.

The vaccine, which protects against the highly contagious virus was approved and became part of the recommended vaccine schedule for U.S. babies in 2006. It is used in 16 countries and is approved in 30 more. The vaccine was co-developed by three scientists at Wistar and Children's Hospital of Philadelphia (CHOP) in the 1980s: H. Fred Clark, D.V.M., now a Wistar adjunct professor and research professor of pediatrics at CHOP; Paul A. Offit, M.D., an adjunct professor at Wistar and chief of infectious diseases at CHOP; and Stanley A. Plotkin, M.D., now a Wistar professor emeritus. The pharmaceutical company that produces the vaccine donated enough of it to protect every Nicaraguan-born baby for three years, and the GAVI Alliance, a public-private partnership dedicated to increasing children's access to vaccines in poor countries, included it in an initiative to enable purchase of vaccines needed in the developing world.

CYTOMEGALOVIRUS: COMBATING A DEBILITATING DISEASE

Each year, about 40,000 babies are born infected with human cytomegalovirus, or CMV, about 8,000 of whom suffer permanent disabilities due to the virus. These disabilities include hearing loss, vision loss, mental disability, a lack of coordination, and seizures. According to the Centers for Disease Control and Prevention, CMV, a member of the herpes family, is as common a cause of serious disability as Down syndrome, fetal alcohol syndrome, or neural tube defects. The Institute of Medicine has declared the development of a CMV vaccine one of the highest priorities for vaccine makers.

Stanley A. Plotkin, M.D., now a Wistar Institute professor emeritus, led the development in the 1970s of a CMV vaccine based on attenuated, or weakened, human CMV virus. Wistar is now seeking a commercial partner to further develop the vaccine for the clinic.