

Several vaccines associated with reduced risk of Alzheimer's disease in adults 65 and older

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Paul E. Schulz, MD, the Rick McCord Professor in Neurology with McGovern Medical School at UTHealth Houston, was senior author of a study that found several vaccinations were linked to a reduced risk of Alzheimer's disease. Credit: UTHealth Houston

Prior vaccination against tetanus and diphtheria, with or without

pertussis (Tdap/Td); herpes zoster (HZ), better known as shingles; and pneumococcus are all associated with a reduced risk for developing Alzheimer's disease, according to new research from UTHealth Houston.

The study was published online recently in the *Journal of Alzheimer's Disease*. It was led by co-first authors Kristofer Harris, program manager in the Department of Neurology with McGovern Medical School at UTHealth Houston; Yaobin Ling, graduate research assistant with McWilliams School of Biomedical Informatics at UTHealth Houston; and Avram Bukhbinder, MD, an alumnus of the medical school. Paul E. Schulz, MD, the Rick McCord Professor in Neurology with McGovern Medical School, was senior author of the paper, which will appear in print in the Sept. 12 issue of the journal.

Alzheimer's disease affects more than 6 million people living in the U.S., with the number of affected individuals growing due to the nation's aging population.

The new findings come just over a year after Schulz's team published [another study](#) in the journal, which found that people who received at least one [influenza vaccine](#) were 40% less likely than their unvaccinated peers to develop Alzheimer's disease.

"We were wondering whether the influenza finding was specific to the [flu vaccine](#). This data revealed that several additional adult vaccines were also associated with a reduction in the risk of Alzheimer's," said Schulz, who is the Umphrey Family Professor in Neurodegenerative Diseases and director of the Neurocognitive Disorders Center at McGovern Medical School. "We and others hypothesize that the immune system is responsible for causing brain cell dysfunction in Alzheimer's. The findings suggest to us that vaccination is having a more general effect on the immune system that is reducing the risk for developing Alzheimer's."

Researchers performed a retrospective cohort study that included patients who were free of dementia during a two-year lookback period and were at least 65 years old by the start of the eight-year follow-up period. They compared two similar groups of patients using propensity score matching, one vaccinated and another unvaccinated, with Tdap/Td, HZ, or pneumococcal vaccine. Ultimately, they calculated the relative risk and absolute risk reduction for developing Alzheimer's disease.

"This study underscores the pivotal role that large-scale, observational datasets play in [biomedical research](#)," Ling said. "It's particularly encouraging to observe consistent results across numerous large-scale health care databases."

"By leveraging modern data analysis models and the very large claims database subscribed by McWilliams School of Biomedical Informatics, we gained valuable insights into which vaccines may protect against Alzheimer's and potentially develop more effective prevention strategies," said Xiaoqian Jiang, Ph.D., a co-author on the study who holds the Christopher Sarofim Family Professorship in Biomedical Informatics and Bioengineering with McWilliams School of Biomedical Informatics.

Patients who received the Tdap/Td vaccine were 30% less likely than their unvaccinated peers to develop Alzheimer's disease (7.2% of vaccinated patients versus 10.2% of unvaccinated patients developed the disease). Similarly, HZ vaccination was associated with a 25% reduced risk of developing Alzheimer's disease (8.1% of vaccinated patients versus 10.7% of unvaccinated patients). For the [pneumococcal vaccine](#), there was an associated 27% reduced risk of developing the disease (7.92% of vaccinated patients versus 10.9% of unvaccinated patients).

For comparison, Schulz said, three new anti-amyloid antibodies used to treat Alzheimer's have shown they slow disease progression by 25%,

27%, and 35%.

"We hypothesize that the reduced risk of Alzheimer's disease associated with vaccines is likely due to a combination of mechanisms," Bukhbinder said. "Vaccines may change how the [immune system](#) responds to the build-up of toxic proteins that contribute to Alzheimer's disease, such as by enhancing the efficiency of immune cells at clearing the toxic proteins or by 'honing' the immune response to these proteins so that 'collateral damage' to nearby healthy brain cells is decreased. Of course, these vaccines protect against infections like shingles, which can contribute to neuroinflammation."

Bukhbinder, Harris, Jiang, Ling, and Schulz recently explored the possible mechanisms in an [article](#) in *Human Vaccines and Immunotherapeutics*.

Bukhbinder said the research provides unique insights on the possible impact of certain vaccine technologies in the protection against Alzheimer's disease.

The Tdap vaccine protects against tetanus, diphtheria, and whooping cough, also known as pertussis, while the Td vaccine protects against the former two. Adults need a Td or Tdap booster shot every 10 years to keep a high level of protection against tetanus, which is commonly referred to as "lockjaw," and diphtheria, a serious bacterial infection that typically affects the mucous membranes of the nose and throat.

HZ protects against shingles, a reactivation of the chickenpox virus in the body that causes a painful rash. The Centers for Disease Control and Prevention (CDC) recommends adults 50 years and older, as well as adults 19 years and older who have or will have weakened immune systems because of disease or therapy, get two doses of the shingles vaccine called Shingrix.

Meanwhile, the pneumococcus vaccine protects against pneumonia, meningitis, sinus infection, blood infection, and middle ear infection. Pneumococcal disease is common in [young children](#), but [older adults](#) are at greatest risk of serious illness and death; consequently, the CDC recommends pneumococcal vaccination for all children younger than 5 years old and all adults 65 and older.

"This research highlights how important it is for patients to have ready access to routine adult vaccinations," Harris said. "Over the last couple of years, the field of Alzheimer's disease has vastly expanded, especially with the recent approval of anti-amyloid antibody medications by the FDA. However, those medications require costly infrastructure in order to be administered safely. Conversely, adult vaccinations are widely available and are already routinely administered as part of a vaccination schedule. Our findings are a win for both Alzheimer's disease prevention research and for public health in general, as this is one more study demonstrating the value of vaccination."

More information: Kristofer Harris et al, The Impact of Routine Vaccinations on Alzheimer's Disease Risk in Persons 65 Years and Older: A Claims-Based Cohort Study using Propensity Score Matching, *Journal of Alzheimer's Disease* (2023). [DOI: 10.3233/JAD-221231](https://doi.org/10.3233/JAD-221231)

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