Immunizations in Adults

This is a PDF version of the following document:
Module 2: Basic HIV Primary Care
Lesson 4: Immunizations in Adults

You can always find the most up-to-date version of this document at https://www.hiv.uw.edu/go/basic-primary-care/immunizations/core-concept/all.

Background

Providing appropriate immunizations is an important component of comprehensive HIV clinical care, but immunizing persons with HIV poses several challenges and concerns related to safety and efficacy. This topic review will focus on immunization recommendations for adults with HIV based on the Adult and Adolescent OI Guidelines (Table 1).[1]

Adult Immunizations

There are numerous vaccines that are addressed in the adult immunization schedule and these are summarized in the table below (Table 2).[2]

Challenges with Efficacy

Current or past advanced immunosuppression in persons with HIV is often associated with suboptimal responses to standard recommended vaccine doses; for several vaccines, the response appears to depend on current and nadir CD4 cell counts.[3,5,6] In general, responses to immunization are better when the vaccine is given in persons with higher CD4 cell counts, including after immune reconstitution that has resulted from antiretroviral therapy. Nevertheless, in most circumstances, vaccine administration is not delayed until the CD4 count increases to greater than 200 cells/mm^3.

COVID-19 Vaccination

People with HIV are at elevated risk for significant morbidity and mortality from COVID-19 infection, particularly individuals who have untreated or advanced HIV (as evidenced by a low CD4 T-cell count or detectable HIV RNA) or other medical comorbidities.[7,8,9,10] Limited data exist on the specific safety and efficacy of COVID-19 vaccination for people with HIV, but, based on available data and clinical experience, it is generally accepted that the benefits for reducing COVID-related morbidity and mortality far outweigh any vaccine-related risks.[11,12]

COVID-19 Vaccines

mRNA Vaccines

COVID-19 mRNA vaccines employ novel mRNA technology—the mRNA is delivered in a lipid nanoparticle to express a full-length viral spike protein (Figure 1).[13] These mRNA vaccines stimulate vigorous SARS-CoV-2 B-cell mediated neutralizing antibody responses and T-cell augmentation and memory immune responses against SARS-Co-V2.[13] The most recent 2025-2026 mRNA vaccines are monovalent and target the Omicron variant sublineage LP.8.1 strain.[14,15]

- 2025–2026 Moderna COVID-19 Vaccine (*Spikevax*): approved for use in anyone 6 months of age and older
- 2025–2026 Moderna COVID-19 Vaccine (*mNexspike*): approved for use in anyone 12 years of age and older
- 2025–2026 Pfizer-BioNTech COVID-19 Vaccine (*Comirnaty*): approved for use in anyone 12 years of age and older

Protein Subunit Vaccines

The Novavax COVID-19 vaccine is a protein subunit vaccine contains recombinant SARS-CoV-2 spike protein in combination with an immune-boosting Matrix-M adjuvant.[14] The most recent 2025-2026 Novavax COVID-19 vaccine targets the Omicron variant JN.1, which is a closely-related predecessor of the Omicron JN.1 strain.[14,15]

- 2025–2026 Novavax COVID-19 Vaccine (*Nuvaxovid*): approved for use in anyone 12 years of age and older

Recommendations for COVID-19 Vaccines In Persons with HIV

The Adult and Adolescent OI Guidelines recommend that all adolescents and adults with HIV should receive a dose of the current season COVID-19 vaccine, regardless of their CD4 count, HIV RNA level, pregnancy status, or breastfeeding status.[1] The Centers for Disease Control and Prevention (CDC) recommends that all adults with HIV receive COVID-19 vaccination based on shared decision-making.[14] The number of recommended vaccine doses depends on prior receipt of the COVID-19 vaccine and the immune status of the person receiving the vaccine, typically with an additional dose recommended 6 months after the last dose for doses given for persons 65 years of age and older, untreated HIV, or advanced HIV.[1,14] For COVID-19 vaccine indication purposes, advanced HIV is defined as CD4 cell counts less than 200 cells/mm^3, history of an AIDS-defining illness without immune reconstitution, or clinical manifestations of symptomatic HIV.[1]

Recommendations for COVID Vaccine Dosing in Adults with HIV

Because COVID vaccine recommendations frequently change and may be complex for moderately or severely immunocompromised persons, we recommend always referring to reviewing updated recommendations on the CDC website—Use of COVID-19 Vaccines in the United States: Interim Clinical Considerations.[14]

Hepatitis A Virus (HAV) Vaccination

Hepatitis A virus (HAV) is transmitted through food, water, or objects contaminated with fecal matter.[16] Infection with HAV is usually an acute, self-limiting condition that does not require treatment, though it can rarely cause fulminant liver failure.[16] Following the widespread use of the hepatitis A vaccine beginning in 1995, the number of HAV infections in the United States declined for nearly 2 decades, rose again from 2015-2019, but then declined during 2020-2023 (Figure 2).[17,18] For persons with HIV, the hepatitis A vaccines are safe and usually effective, though seroconversion rates may be diminished for individuals with lower CD4 cell counts.

Hepatitis A Vaccines

Hepatitis A vaccine is an inactivated vaccine that can be given as one of the single-antigen preparations (*Havrix* or *Vaqta*) or as a combination vaccine (*Twinrix*). The two single-antigen brands of hepatitis A vaccine are potentially interchangeable, but ideally, all doses in a vaccine series should be from the same manufacturer (Table 3).[19]

Vaccine Efficacy in People with HIV

One randomized control study found seroconversion rates of 94% in persons with HIV compared to 100% in persons without HIV, though rates were only 87% in patients with CD4 counts less than 300 cells/mm^3.[20] In another randomized control trial, after two doses of hepatitis A vaccine, seroconversion rates were observed in 68% of persons with HIV who had a CD4 count greater than or equal to 200 cells/mm^3 compared to only 9% of those with CD4 counts less than 200 cells/mm^3.[3]

Recommendations

The following summarizes the Adult and Adolescent OI Guidelines recommendations for administering the hepatitis A vaccine to persons with HIV who are not immune to HAV.[1,19]

- **Recommended Dosing Schedule**: Hepatitis A vaccine should be administered in two doses at 0 and 6–12 months (*Havrix*) or 0 and 6-18 months (*Vaqta*); the minimum interval before the first and second dose of these vaccines is 6 months.[1,19] The combined hepatitis A-hepatitis B vaccine (*Twinrix*) can also be administered as a 3-dose series (0, 1, and 6 months); for this combined vaccine, the minimum intervals are 4 weeks between the first and second doses and 5 months between the second and third doses.[1,19] For non-immunized persons traveling to countries with endemic HAV, an accelerated dosing schedule with the combined hepatitis A-hepatitis B vaccine can be administered on days 0, 7, 21 to 30 days, with a booster dose given at 12 months.[1,19]
- **General Approach and Timing of Administration**: The Hepatitis A vaccine series should be administered to all adolescents and adults with HIV if they are not immune to HAV, with the timing of administering the vaccine based on the CD4 count (Figure 3).[1]
    - If the CD4 count is greater than 200 cells/mm^3, the hepatitis A vaccine should be given without delay.
    - If the CD4 count is less than 200 cells/mm^3 and there is an ongoing risk of acquiring HAV infection, the HAV vaccine series should be administered without delay. If the individual has a CD4 count of less than 200 cells/mm^3 and no active risk of acquiring HAV, two options exist: either administer without delay or wait to give the vaccine series until the CD4 is greater than 200 cells/mm^3.
    - Some experts recommend separating the hepatitis A vaccine from the conjugate pneumococcal vaccine by at least 1 month based on a study that showed lower serologic responses to hepatitis A vaccine when these two vaccines were given on the same day.[21]
- **Postvaccination Serologic Testing and Revaccination**: Since persons with HIV may have an attenuated response to the hepatitis A vaccine, postvaccination serologic testing should be performed

in these individuals at least 1–2 months after completing the HAV vaccination series.[1,19] Evidence of postvaccination immunity against HAV is based antibody titer of at least 10 mIU/mL.

- If there is no evidence of postvaccination immunity and the CD4 count is greater than or equal to 200 cells/mm^3 then administer a third dose of hepatitis A vaccine.[1]
- If there is no evidence of postvaccination immunity and the CD4 count is less than 200 cells/mm^3 then repeat the entire hepatitis A vaccine series.[1]
- Serology testing should be done again at least 1–2 months after completing either of the above (the third dose or repeat vaccine series). If there is still no evidence of an adequate immune response, then further vaccination is not recommended, but the individual should receive counseling on the need to receive immune globulin after an exposure to HAV.[19]

Hepatitis B Virus (HBV) Vaccination

Hepatitis B virus (HBV) is transmitted through percutaneous and mucosal exposure to infected blood or body fluids. Chronic HBV infection can cause cirrhosis, liver failure, hepatocellular cancer, and death. Individuals with HIV have an increased risk of acquiring HBV through injection drug use and/or condomless sex. When compared to persons with HBV monoinfection, those with HIV and HBV coinfection have an increased likelihood of establishing chronic HBV after initial infection, accelerated progression of liver disease, and significantly higher rates of liver-related mortality compared with individuals without HIV.[22,23] Thus, vaccination against HBV is very important for persons with HIV.

Hepatitis B Vaccines

For adults, there are three U.S. Food and Drug Administration (FDA)-approved recombinant HBsAg single antigen recombinant hepatitis vaccines: *Recombivax HB*, *Engerix-B*, and *Heplisav-B*. All hepatitis B vaccines are administered as intramuscular vaccines.

- *Heplisav-B*: This vaccine consists of recombinant HBsAg conjugated to the cytosine phosphoguanine oligonucleotide (CpG 1018) adjuvant, and is available in doses that each contain 20 µg of HBsAg and 3,000 µg of the 1018 adjuvant.[24]
- *Recombivax HB*: This vaccine is a recombinant, single-antigen that is available as an adult standard formulation (10 µg HBsAg per dose) and a high-dose dialysis formulation (40 µg per dose). The double-dose *Recombivax-HB* is 20 µg.
- *Engerix-B*: This vaccine is a single-antigen, recombinant vaccine, available as a standard 20 µg HBsAg per dose. The double-dose *Engerix*-B is 40 µg.
- *Twinrix*: This combined hepatitis A-hepatitis B vaccine contains 720 EL.U of hepatitis A (antigen component from *Havrix*) and 20 µg per dose of HBsAg (antigen component from *Engerix-B*). It is important to note that administering the *Twinrix* vaccine provides standard-dose, not double-dose strength hepatitis B antigen.

Vaccine Efficacy in People with HIV

Using standard doses of older single antigen hepatitis B vaccines in adults with HIV generated significantly lower seroprotective response rates than in adults without HIV.[25,26] Lower HBV vaccine responses in persons with HIV have been associated with a recent or nadir CD4 count of less than 200 cells/mm^3, detectable HIV RNA levels, coinfection with hepatitis C virus, occult HBV, and overall health of the vaccine recipient.[6,25,27] Past attempts to improve hepatitis B vaccine response rates have included giving a double dose, an increased number of doses, and the use of intradermal vaccines.[28,29] The BEe-HIVe clinical trial compared three doses (0, 1, and 6 months) of the *Heplisav-B* vaccine to placebo in persons with HIV who were hepatitis B vaccine naive and found 100% of those who received the vaccine had protective antibody levels (anti-HBs greater than 10 mIU/mL) at 28 weeks; in addition, at week 8 (4 weeks after the second dose), 87% had protective antibody titers and this number increased to 98.5% at week 24, which was prior to receipt of the third vaccine dose (Figure 4).[30]

Recommendations

The recommendations for hepatitis B immunization in persons with HIV are outlined as follows and are based on recommendations from the Adult and Adolescent OI Guidelines.[1,23]

- **General Approach and Timing of Administration**: All persons with HIV who do not have active HBV or evidence of immunity to HBV should receive the hepatitis B vaccine series if they have ongoing risks of acquiring HBV.[1,23] Although HBV non-immune individuals with a CD4 count less than 350 cells/mm^3 may have decreased response to HBV vaccination, deferring vaccination until CD4 rises to greater than 350 cells/mm^3 is not recommended since many individuals with a CD4 of less

than 350 cells/mm^3 will mount an adequate antibody response to the HBV vaccine series.[1,23] For hepatitis B vaccine nonresponder who have a CD4 count of less than 200 cells/mm^3, some experts would delay revaccination until after a CD4 count of 200 cells/mm^3 or greater is achieved and sustained on antiretroviral therapy.[1,23]

- **Prevaccine Screening**: Prevaccine screening should include HBsAg, anti-HBs, and anti-HBc. A positive HBsAg indicates active infection, and no vaccine is indicated. If the individual has a positive test for both anti-HBs and anti-HBc, there is no need for hepatitis B immunization. In addition, if the anti-HBs alone is positive (with a titer greater than 10 mIU/mL), the person is considered immune and has no need for hepatitis B immunization.[23] The approach to patients with isolated anti-HBc is addressed below.

- **Dosing and Schedule for Hepatitis B Immunization**: The following are recommended options for hepatitis B immunization in persons with HIV (Figure 5):[1,23]
    - Preferred
        - *Heplisav-B* given as a 2-dose series at 0 and 4 weeks
    - Alternative (if *Heplisav-B* unavailable)
        - *Engerix-B* 40 mcg (two simultaneous injections of 20 mcg each) at 0, 1, and 6 months (these doses are considered a “double-dose,” three-dose series), *or*
        - *Recombivax HB* 20 mcg (two injections of 10 mcg each) at 0, 1, and 6 months (these doses are considered a “double-dose,” three-dose series), *or*
        - *Twinrix* combined HepA and HepB vaccine (1 mL IM) as a three-dose series (at 0, 1, and 6 months). Note that administering the *Twinrix* vaccine provides standard-dose, not double-dose strength of hepatitis B antigen).
- **Post-vaccine Antibody Testing**: Given the decreased response rate to hepatitis B vaccine among persons with HIV, post-vaccine testing for antibody to hepatitis B surface antigen (anti-HBs) should be performed 4 weeks after completing the final dose of the vaccine series, with a titer of at least 10 mIU/mL considered protective; individuals who have a postvaccine anti-HB less than 10 mIU/mL are considered vaccine nonresponders.[23,31] Due to concerns of waning immunity, some experts recommend checking anti-HBs annually and giving a booster dose of hepatitis B vaccine if anti-HBs levels fall below 10 mIU/L, especially for individuals with ongoing risk of acquiring HBV who are not taking tenofovir DF or tenofovir alafenamide as part of their combination antiretroviral regimen.[23]
- **Vaccine Nonresponders**: In one of the arms of the BEe-HIVe trial, people with HIV who were previous hepatitis B vaccine non-responders were randomized to a 2-dose series of *Heplisav-B*, a 3-dose series of *Heplisav-B* vaccine, and a conventional 3-dose hepatitis B vaccine (*Engerix-B*).[32] Results showed superior protection in the *Heplislav*-B vaccine arms (93.1% seroprotection rate with the 2-dose series and 99.4% with the 3-dose series) compared with the 3-dose *Engerix-B* vaccine regimen (seroprotective rate of 80.6%).[32] If a post-vaccine anti-HBs concentration of at least 10 mIU/mL is not attained, the following are considered as options for hepatitis B vaccine nonresponder:
    - If vaccine nonresponse occurs after receipt of either the *Engerix-B* or *Recombivax HB* series, administer *Heplisav-B* at 0 and 4 weeks with consideration for a third dose of *Heplisav-B* at 24 weeks
    - If vaccine nonresponse occurs after receipt of a two-dose *Heplisav-B* series, there are no data, but clinicians can consider a third dose of *Heplisav-B*, given 24 weeks after first dose
- **Isolated Core Antibody**: The optimal approach for persons with HIV who have isolated anti-HBc (positive anti-HBc, negative anti-HBs, and negative HBsAg) is unclear, since this pattern may signify a false-positive result, an exposure in the distant past with waning anti-HBs, or occult HBV infection. Note, with this approach for persons with isolated core antibody, the cutoff representing immunity after the one vaccine dose (100 mIU/mL) is 10-fold higher than the 10 mIU/mL used to represent immunity following receipt of the HBV immunization series in persons who do not have isolated hepatitis B core antibody.[33] The recommended approach for persons with HIV is outlined below (Figure 6).[1,23]

Human Papillomavirus (HPV) Vaccination

Individuals with HIV have a high burden of human papillomavirus (HPV)-associated disease compared to persons who do not have HIV: genital warts are more common in women and men, abnormal cervical cytology is nearly 11 times more common in women, and anal cancer is approximately 30-fold higher among men.[34,35,36]

HPV Vaccines

Human papillomavirus vaccines are prepared from recombinant noninfectious virus-like particles and are considered safe for immunocompromised individuals since they do not pose any risk of transmitting infection.[37] In the United States, the 9-valent (9vHPV) vaccine is the only HPV vaccine currently manufactured; this vaccine provides protection against 7 cancer-causing HPV serotypes (16, 18, 31, 33, 45, 52, and 58) and the 2 HPV serotypes 6 and 11, that cause genital warts (Figure 7).[38] The HPV serotypes 16 and 18 account for approximately 66% of cases of cervical cancer; the HPV serotypes 31, 33, 45, 52, and 58 combined account for approximately 15% of cervical cancers and 10% of invasive HPV-associated cancers.[38] The HPV serotypes 6 and 11 account for approximately 90% of genital warts.[38] The 9vHPV vaccine is FDA-approved for use for ages 9 through 45 years.[39]

Vaccine Efficacy in People with HIV

Because HPV vaccine is typically given to young adolescents, there are limited data in people with HIV. Nevertheless, available data suggest the HPV is safe and immunogenic in people with HIV, with seroconversion rates with the older quadrivalent vaccine of 95% in men 18 years of age and older and 92.3 to 100% among women with HIV aged 16 to 23 years of age.[40,41] One randomized, double-blind clinical trial compared the older quadrivalent HPV vaccine (4vHPV) with placebo in people with HIV who were older than 27 years of age and the trial did not show efficacy for preventing new anal HPV infections.[41]

Recommendations

The following summarizes the Adult and Adolescent OI Guidelines recommendation for administering the HPV vaccine for people with HIV.[1,42]

- **General Approach**: The 9vHPV vaccine series should be given to all people with HIV who are 9 through 26 years of age who have not previously received the 9vHPV vaccine series. The 9vHPV vaccine is not routinely recommended for persons with HIV who are older than 26 years of age, but it can be considered in this age group using a shared decision-making process.
- **Dosing Recommendation**: For persons with HIV, the HPV vaccination should be given in a 3-dose series (given at 0, 1–2, and 6 months). The 2-dose schedule should not be used in persons with HIV.
- **HPV Vaccine in Pregnancy**: The HPV vaccine is not recommended for pregnant women, but pregnancy testing is not needed prior to vaccination. If a woman is found to be pregnant after receiving a dose of the HPV vaccine while she is pregnant, no intervention is needed. In addition, if a woman has started the vaccine series and becomes pregnant, the remainder of the 3-dose series should be delayed until completion of pregnancy.
- **Use as Therapeutic Vaccine**: The HPV vaccine is not recommended for therapeutic purposes for persons with HPV-related abnormal cervical or anal cytology.

Influenza Vaccination

Influenza viruses typically circulate widely in the United States annually from the late autumn through early spring. Influenza A and influenza B are the types of viruses that cause human epidemic disease. New variants emerge due to frequent antigenic change (i.e., antigenic drift) resulting from point mutations and recombination events that occur during viral replication; antigenic drift is the virologic basis for seasonal epidemics and necessitates adjustment of the vaccine components each year.[43] Larger antigenic change, termed antigenic shift, has the potential to cause a worldwide pandemic since there is no preexisting immunity among humans to the novel virus in this situation. Annual influenza vaccination is the primary means of preventing influenza and its complications. Persons with HIV have a higher risk of influenza-associated morbidity and mortality compared to persons without HIV.[44] Studies in individuals with HIV suggest a single dose of inactivated vaccine generates a good humoral immune response, except in those with a low CD4 cell count.[]

Influenza Vaccines

The recommended inactivated and recombinant influenza vaccines are quadrivalent vaccines (containing two strains of both influenza A and B).[1] All influenza vaccines expected for availability in the United States for the 2025–2026 season are trivalent vaccines containing hemagglutinin and the different types of vaccines include:

- Inactivated Influenza vaccine (IIV3) (standard-dose, egg-based vaccine)
- ccIIV3 (standard dose, cell culture-based vaccine)
- HD-IIV3 (high-dose, egg-based vaccine)
- aIIV3 (standard-dose, egg-based vaccine with MF59 adjuvant)
- RIV3 (recombinant hemagglutinin [HA] vaccine)

Recommendations

The following summarizes Adult and Adolescent OI Guidelines recommendation for administering the influenza vaccine in the 2025-2026 season for persons with HIV.[1]

- **General Approach**: All people with HIV should receive a single annual dose of a trivalent influenza vaccine. In general, administering vaccine during July and August should be avoided, unless there is a concern that the person will not receive influenza vaccination later in the season. The live attenuated influenza vaccine (LAIV3), also known as the nasal spray flu vaccine, is not recommended for people with HIV.
- **Pregnant Women**: Pregnant women with HIV can receive inactivated influenza vaccine or recombinant influenza vaccine at any time during pregnancy.
- **Recommended Vaccines for Persons 65 Years of Age and Older**: People with HIV who are 65 years of age and older should ideally receive a high-dose inactivated influenza vaccine (HD-IIV3) or adjuvanted inactivated influenza vaccine (aIIV3).
- **Persons with Egg Allergy**: The updated recommendations from now state that for persons with a history of egg allergy, any influenza vaccine (egg-based or nonegg-based) can be used, as long as the vaccine is otherwise appropriate for the recipient’s age and health status.

Measles-Mumps-Rubella (MMR) Vaccination

Measles, mumps, and rubella are highly contagious viruses that can cause a wide range of clinical manifestations, including congenital syndromes. In the United States, due to a recent decline in population use of the measles-mumps-rubella (MMR) vaccine, there has been a dramatic surge in measles cases in 2025 and 2026, which reflect the largest number of annual cases since 1992 (Figure 8).[45] Measles can cause significant morbidity and mortality in healthy individuals, and the impact is even greater in immunosuppressed persons, with one case report citing 40% mortality in patients with HIV.[46]

Measles Vaccines

In the United States, the combined MMR vaccine first became available in 1971 and the combined MMR vaccines remains the preferred vaccine for immunization against measles, mumps, and/or rubella. There is also an FDA-approved quadrivalent measles-mumps-rubella-varicella (MMRV) vaccine, but it is rarely used in adults. All currently used measles vaccines contain live attenuated measles virus, and thus pose a significant risk of measles infection to severely immunocompromised individuals, including persons with HIV who have low CD4 cell counts.

Vaccine Efficacy in People with HIV

Based on limited available data, the immunologic responses to the MMR vaccine among individuals with HIV are modest at best, and the protection of the vaccine in persons with HIV is not well established. There are some data that suggest persons with HIV have an attenuated antibody response to the MMR vaccine.[47,48,49] In addition, there have been case reports of fatal pneumonitis in persons with HIV and advanced immunosuppression who received the MMR vaccine.[50,51]

Recommendations

The following summarizes Adult and Adolescent OI Guidelines recommendation for administering the MMR vaccine to persons with HIV.[1]

- **General Approach**: The MMR vaccine should only be administered to adults with HIV if (1) they lack immunity to measles, mumps, and rubella and (2) they have a CD4 count of at least 200 cells/mm^3. Persons are considered to have immunity to measles if any of the following are met: they were born before 1957; they have documentation of receipt of two doses of the MMR vaccine, or they have laboratory evidence of immunity (positive measles antibody titer).
- **Recommended Dosing Schedule**: For non-immune persons with a CD4 count of at least 200 cells/mm^3, give the two-dose MMR vaccine series, with the doses administered at least 4 weeks apart.
- **Quadrivalent Measles-Mumps-Rubella-Varicella (MMRV) Vaccine**: The quadrivalent MMRV vaccine has not adequately studied in people with HIV and is not recommended, regardless of CD4 cell count.
- **Persons with Advanced Immunodeficiency**: For adults with HIV, the MMR and MMRV vaccines are contraindicated if the CD4 count is less than 200 cells/mm^3.
- **MMR in Pregnancy**: The MMR vaccine is not recommended during pregnancy, and pregnancy should be avoided for 4 weeks after vaccination to minimize the theoretical risk of congenital rubella syndrome. Pregnant women without evidence of rubella immunity who have a CD4 count of at least 200 cells/mm^3 (and receiving antiretroviral therapy) should receive the MMR vaccine series upon completion of pregnancy.
- **Persons who Received Measles Vaccine During 1963-1967**: Receipt of an inactivated measles vaccine, which was an option during 1963-1967 but was ineffective, does not count as a dose of measles vaccine.[52] In addition, if the type of measles vaccine received during 1963-1967, is not known, then it does not count as a dose.[52]
- **Vaccine Nonresponders**: Currently, there is no guidance on whether to obtain post-MMR vaccine

serologic titers to document vaccine response. If post-MMR vaccine titers are checked and demonstrate a lack of immunity, the recommendation is to consider repeating the 2-dose MMR series, especially if the person did not have suppressed HIV RNA levels at the time they received the MMR vaccine.

Meningococcal Vaccination

Meningococcal meningitis, which is caused by *Neisseria meningitidis*, can cause severe complications, including hearing loss, brain damage, and death. Available data from population studies suggest that persons with HIV have a 5- to 24-fold higher risk of developing meningococcal disease than persons without HIV; the highest risk in persons with HIV occurs in those with low CD4 cell counts and high HIV RNA levels.[1,53,54] In addition, several local outbreaks of meningococcal meningitis have been reported in the United States involving gay and bisexual men.[55,56,57] In 2023, the CDC reported an increase in meningococcal disease in persons with HIV, noting 29 cases in 2022 alone, with most of these cases involving persons who had not received meningococcal vaccination (Figure 9).[58] As with other vaccines given to individuals with HIV, a low CD4 count at the time of meningococcal immunization has been associated with decreased vaccine response rates.[59,60]

Vaccines

Multiple meningococcal vaccines are now available, including the quadrivalent meningococcal conjugate vaccines (MenACWY), recombinant meningococcal group B vaccine.

- **Quadrivalent Meningococcal Vaccines**: There are two covering groups A, C, W-135, and Y are licensed and available for use in the United States: MenACWY-CRM (*Menveo*) and MenACWY-TT (*MenQuadfi*) (Figure 10).[54] The MenACWY vaccine is approved for use in persons 2 months through 55 years of age, and MenACWY-TT is approved for persons at least 2 years of age.[2,54]
- **Recombinant Meningococcal Group B Vaccine**: Two recombinant serogroup B meningococcal vaccines (MenB) are now available: MenB-4C (*Bexero*), given in a 2-dose series and MenB-FHbp (*Trumenba*) given in a 3-dose series. If both the Men-ACWY and Men-B vaccines are indicated for an individual with HIV, the vaccines can be administered simultaneously, but, if feasible, they should be administered at 2 different anatomic sites.
- **Pentavalent Meningococcal Vaccines**: There are two pentavalent meningococcal vaccines (*Penbraya* and *Penmenvy)* that provide protection against the five meningococcal serogroups A, B, C, W, and Y.

Recommendations

The following summarizes recommendations from the Adult and Adolescent OI Guidelines for administering meningococcal vaccines to adolescents and adults with HIV.[1]

Meningococcal Conjugate Vaccine (A, C, W, Y)

- **General Approach**: Routine administration of either of the quadrivalent meningococcal conjugate vaccines (MenACWY-CRM and MenACWY-TT) is recommended for persons with HIV who are 18 years of age and older. If possible, the same meningococcal vaccine product should be used for all doses.
- **Recommendations for Primary Vaccine Series and Booster Doses**: For adults with HIV, the primary meningococcal vaccine series should consist of 2 doses given at least 8 weeks apart. For individuals with HIV who have previously received the primary conjugate meningococcal vaccine series and are at least 7 years of age, a booster dose of the conjugate meningococcal vaccine should occur every 5 years (and not given within 5 years of the last dose of the primary meningococcal vaccine series) (Figure 11).
- **Use in Pregnancy**: There are no restrictions on the use of the quadrivalent meningococcal conjugate vaccines in pregnancy.

Meningococcal B Vaccine

- **General Approach**: Administration of meningococcal B (MenB) vaccine is not routinely

recommended for adults with HIV. The MenB vaccine may be administered to individuals with HIV if they have an indication for receiving a meningococcal B vaccine, such as functional or anatomic asplenia, persistent complement component deficiency, or receipt of a complement inhibitor (e.g., eculizumab, ravulizumab). In addition, for those individuals 16–23 years of age with HIV, Men B vaccination may be given (using shared clinical decision-making) for short-term protection against most strains of serogroup B meningococcal disease and/or for patients at increased risk, such as those living in dormitories or barracks, and during meningococcal B outbreaks.

- **Dosing Recommendations**: Three doses should be given at 0, 1–2, and 6 months. If the second dose was administered more than 6 months after the first dose in the series, then a third dose is not required. In addition, if the third dose of the vaccine is administered within 4 months after the second dose, the dose should be repeated at least 4 months after the last dose. The MenB-4C and the MenB-FHbp should not be used interchangeably. Persons with an ongoing risk of meningococcal B infection should receive a booster dose of the MenB vaccine 1 year after completing the initial vaccine series, followed by booster doses every 2 to 3 years.
- **Use in Pregnancy**: The MenB vaccine should be avoided during pregnancy, unless the woman is at increased risk of meningococcal infection.

Adults who Need to Receive Both MenACWY and MenB

For adults who need to receive both MenACWY and MenB vaccines, the Adult and Adolescent OI Guidelines provides the option of administering a single dose of a pentavalent Men-ABCWY (*Penbraya* or *Penmenvy*) vaccine instead of giving separate Men-ACWY and Men-B vaccines. There are, however, no data on the use of pentavalent meningococcal vaccines in people with HIV. The pentavalent meningococcal vaccines should not be used as a substitute for the quadrivalent vaccine for the every 5 year booster doses of the quadrivalent meningococcal vaccine.

Mpox Vaccination

Mpox clinical infection is caused by monkeypox virus—a double-stranded DNA virus closely related to smallpox virus.[61] In the 2022-2023 mpox outbreak in the United States, persons with HIV were disproportionately impacted, with roughly 40% of cases involving persons with HIV.[62,63] In addition, persons with HIV with mpox were more likely to require hospitalization, especially those with a CD4 count of less than 350 cells/mm^3 or who were not engaged in care.[63,64] Most cases of mpox reported in the United States have been clade II, but as of February 2026, there have been 15 cases of clade I mpox.[61]

Mpox Vaccines

Currently, there are two vaccines available for orthopoxvirus infection prevention in the United States. *JYNNEOS, t*he Modified Vaccinia Ankara (MVA) vaccine, is a live, attenuated, non-replicating vaccinia virus vaccine.[65,66] It is the preferred vaccine for mpox protection.[65] The *JYNNEOS* vaccine is is safe to use in people with HIV. The mpox vaccine can be administered as a subcutaneous injection or intradermal injection.[1] The intradermal injection is not recommended for persons younger than 18 years of age. The second approved vaccine—ACAM2000—is a replication-competent smallpox vaccine that is contraindicated in persons with HIV and, therefore, will not be discussed further.[65]

Recommendations

For persons with HIV who have an indication for the mpox vaccine, vaccination is recommended. The *JYNNEOS* vaccine, which is the only mpox vaccine recommended for persons with HIV, may be administered at the same time as any other vaccines, though ideally in different limbs. Some experts recommend waiting 4 weeks after vaccination against COVID-19 because of the rare side effects of myocarditis or pericarditis associated with both of those vaccines. The following recommendations are for the *JYNNEOS* MVA vaccine, which is the mpox vaccine recommended for persons with HIV.[1,61] The following summarizes recommendations from the Adult and Adolescent OI Guidelines for administering mpox vaccines to adolescents and adults with HIV, including use of the mpox vaccine series before and after an mpox exposure (Figure 13).[1]

Vaccination Before Mpox Exposure

- **Indications**: Mpox vaccination should be offered for persons with HIV, regardless of CD4 count, who have the potential for mpox exposure or anticipate potential exposure to mpox. The mpox vaccine is not recommended for people with prior mpox infection. A prior history of receiving smallpox vaccines does not alter indications for mpox vaccine. The mpox vaccine should be given to any person with HIV who requests mpox vaccination, unless they have already received mpox vaccination or had mpox infection.
- **Dosing**: Administer two doses of the *JYNNEOS* MVA vaccine, 0.1 mL intradermal or 0.5 mL subcutaneously, 28 days apart. The intradermal dosing is not recommended for individuals younger than 18 years of age.
- **Booster Doses**: Booster doses are not recommended for persons with prior receipt of the mpox *JYNNEOS* vaccine series.

Vaccination Following Mpox Exposure (Postexposure Prophylaxis)

- **Indications**: For unvaccinated people with HIV who experience a known or presumed exposure, postexposure prophylaxis with mpox vaccination is recommended as soon as possible, ideally within 4 days after exposure. Less preferably, the vaccine can be administered 4 to 14 days after exposure, since the vaccine may still provide some protection against mpox if administered during this time frame (Figure).
- **Dosing**: Administer two doses of the *JYNNEOS* MVA vaccine, 0.1 mL intradermal or 0.5 mL

subcutaneously at least 28 days apart.

Pneumococcal Vaccination

In the general population, *Streptococcus pneumoniae* causes significant disease, including bacteremia, meningitis, and pneumonia, and is responsible for approximately 4,000 deaths each year in the United States. In the early years of the HIV epidemic, the risk of invasive pneumococcal disease in persons with HIV was approximately 20 times higher than in adults without high-risk conditions.[67] Subsequently, the incidence of invasive pneumococcal disease has decreased in persons with HIV, likely due to (1) the widespread use of potent antiretroviral therapy that resulted in improved immune function and improved humoral responses to pneumococcal antigens during clinical infections and (2) population herd protection against invasive strains of *S. pneumoniae* following the widespread use of conjugate pneumococcal vaccines in children since 2000.[68,69,70] A study that examined the risk of invasive pneumococcal disease in persons with HIV from 1996 through 2011 at a large integrated healthcare system in the United States reported a sevenfold increased risk of invasive pneumococcal disease in adults with HIV compared with adults without HIV.[71]

Vaccines

Four pneumococcal vaccines are currently available for use in the United States: PCV15 (*Vaxneuvance*), PCV20 (*Prevnar*), and PCV21 (*Capvaxive*), and PPSV23 (*Pneumovax*).[1,72] The PCV15, PCV20, and PCV21 are conjugate vaccines that provide more robust and longer lasting immune responses than the PPSV23 polysaccharide vaccine.[72] The PCV20 and PCV21 require one dose only; there are no additional doses needed.[72,73] The PCV20 vaccine includes the same 15 serotypes as in the PCV15 plus 5 additional serotypes; the PCV21 vaccine contains 8 serotypes not included in PCV15, PCV20, or PPSV23, but PCV21 does not contain pneumococcal serotype 4 (Figure 14).[73] Note that pneumococcal serotype 4 is prominent in certain populations and regions in the western United States, especially in Alaska, Colorado, the Navajo Nation, New Mexico, and Oregon.[73]

Vaccine Efficacy in People with HIV

There are limited data that have addressed the efficacy of pneumococcal vaccination in persons with HIV. There are no published major trials on pneumococcal conjugate vaccine in adults with HIV in the United States. The safety and immunogenicity of PCV15 compared to PCV13 was evaluated in approximately 300 adults with HIV in a phase 3, randomized, controlled clinical trial conducted at multiple sites internationally.[74] This study demonstrated the PCV15 vaccine was well tolerated and induced adequate antibody responses to all 15 pneumococcal serotypes included in the vaccine.[72,74] The PCV20 has also been shown to be safe and immunogenic in clinical trials involving adults with some medical conditions, but HIV and other immunocompromising conditions were excluded from the study.[72]

Recommendations

The following summarizes recommendations from Adult and Adolescent OI Guidelines for pneumococcal immunization in persons with HIV, with the exact schedule based on age and whether the individual has previously received any doses of pneumococcal vaccine.[1]

General Approach

Initial pneumococcal immunization for persons with HIV should now utilize the newer conjugate vaccines—PCV15, PCV20, or PCV21. Note that PCV21 is not recommended in regions of the United States where the prevalence of pneumococcal serotype 4 is greater than 30% among pneumococcal isolates.

No Prior Pneumococcal Immunization

Adults with HIV who have never received a pneumococcal vaccine (or their pneumococcal immunization status is unknown) should receive either a single dose of PCV20, a single dose of PCV 21, or a dose of PCV15

followed by a dose of PPSV23 at least 8 weeks later (Figure 15). Regardless of which of these two approaches is used, no further doses of pneumococcal vaccine are needed.

Prior Pneumococcal Immunization

In persons who have received at least one dose of a prior pneumococcal vaccine, the approach, options, and timing for completing the pneumococcal vaccine schedule depend on what prior vaccine was administered (Figure 16).

- **Prior Receipt of PCV13 Only**: Give 1 dose of PCV20 or PCV21; give the dose at least 1 year after the PCV13 dose.
- **Prior Receipt of PCV13 and One or More Doses of PPSV23**: For people with HIV who have received PCV13 and at least 1 dose of PPSV23, but have not completed the vaccine series, two options exist:
    - Received last dose of PPSV23 at age

Respiratory Syncytial Virus (RSV)

Respiratory syncytial virus (RSV) is a common cause of respiratory tract infection across the lifespan, though it is classically associated with significant morbidity in infants, young children, and severely immunocompromised individuals.[75] In adults, RSV typically manifests as an upper respiratory tract infection but it can progress to severe lower respiratory tract disease, resulting in substantial morbidity and mortality.[75] The highest risk of severe disease is observed among individuals 75 years of age and older, residents of long-term care facilities, and those with chronic medical comorbidities.[76] In the United States, RSV demonstrates seasonal circulation similar to influenza, occurring primarily between October and March, and typically peaking in December.[77] Transmission occurs via respiratory droplets and contact with contaminated surfaces.[75] There are no major studies evaluating RSV infection in people with HIV.[1]

Vaccines

There are three licensed RSV vaccines FDA-approved for use in the United States:

- *Arexvy*: Adjuvanted recombinant RSV prefusion F protein-based vaccine.[78]
- *Abrysvo*: Recombinant RSV prefusion F protein-based vaccine.[79,80]
- *mRESVIA*: An mRNA-based RSV vaccine.[81]

Vaccine Efficacy in People with HIV

Data on RSV vaccination in people with HIV are limited. Individuals with HIV were largely excluded from key registrational vaccine trials. Studies of Abrysvo and mRESVIA permitted enrollment of persons with well-controlled HIV, though the number enrolled was not reported in either study.[80,81] Large randomized controlled trials, conducted primarily in immunocompetent older adults, demonstrated good efficacy and tolerability.[78,80,81] Serious adverse events were uncommon, though very rare neurologic complications have been reported.[78,80,81] Abrysvo has also been studied in pregnancy and is recommended for use during pregnancy (at 32 to 36 weeks' gestation, seasonally administered between September and January) to prevent RSV-associated lower respiratory tract disease in infants via transplacental antibody transfer.[79]

Recommendations

Due to limited data on RSV immunization in people with HIV, RSV vaccination recommendations in persons with HIV are extrapolated from recommendations for the general population. The following table summarizes recommendations from the Adult and Adolescent OI Guidelines for use of RSV vaccines in people with HIV (Table 4).[1] At present, one-time vaccination is considered sufficient, and revaccination, including during subsequent pregnancies, is not recommended.

Tetanus, Diphtheria and Pertussis (Tdap) Vaccination

Tetanus, diphtheria, and pertussis are vaccine-preventable bacterial diseases that can lead to serious complications. Tetanus (lockjaw) can potentially cause muscle paralysis and carries a 20% mortality rate. Diphtheria causes a thick coating to form in the posterior pharynx that can lead to breathing difficulty, and, in some instances, death. Pertussis (whooping cough) causes severe coughing spells that can lead to pneumonia, hypoxia, sleeping problems, and rarely death. Widespread childhood vaccination has markedly reduced the number of serious complications related to tetanus, diphtheria, and pertussis in the United States among all age groups. Although the pertussis vaccine has reduced the incidence of pertussis compared with the prevaccine era, the number of reported cases of pertussis has increased since the 1980s, primarily due to the lack of long-term immunity with the pertussis vaccine.[82] Most individuals with HIV mount adequate antibody responses to tetanus and diphtheria toxins, but responses are often lower among those with CD4 count of less than 300 cells/mm^3.[83]

Tdap and Td Vaccines

Several tetanus and diphtheria toxoid vaccines (Td) are currently licensed by the FDA.[82] In addition, two tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis (Tdap) vaccines are approved by the FDA: *Boostrix* (for persons aged 10 and older) and *Adacel* (for persons aged 11 to 64 years). Both the Tdap and Td vaccines contain inactivated bacteria and thus are unlikely to pose any risk to individuals with HIV. When the Tdap vaccine was initially licensed, concern existed regarding the safety of administering the Tdap vaccine within 5 years of the Td vaccine. Subsequently, studies reported that administering Tdap to an individual who had recently received Td (21 days to 2 years) was safe, other than a mild local reaction.[82,84]

Recommendations

The following summarizes recommendations from the Adult and Adolescent OI Guidelines for administering Tdap and Td for adults with HIV.[1]

- **General Approach**: Adults and adolescents with HIV should receive immunization with Tdap and Td per the same schedule as nonpregnant adults without HIV. The timing and dosing of the Tdap and Td vaccination in persons with HIV is not altered based on CD4 cell count.
- **No Prior Tdap**: For adults and adolescents with HIV who have not received the primary vaccination series for tetanus, diphtheria, or pertussis, give an initial three-dose series consisting of one dose of Tdap, followed by one dose of Td or Tdap at least 4 weeks after Tdap, another dose of Td or Tdap 6 months to 12 months after the last Td or Tdap, then Td or Tdap booster every 10 years.
- **No Tdap After Age 11 Years**: For adults and adolescents with HIV who received the primary vaccine series for tetanus, diphtheria, or pertussis, but have not received a dose of Tdap after age 11 years, give a dose of Tdap, followed by a Td or Tdap booster every 10 years. Adults and adolescents who previously received Td but have not had a Tdap dose should receive the Tdap vaccine regardless of the interval since Td was last administered.
- **Tdap During Pregnancy**: Give Tdap during every pregnancy (in persons with or without HIV) to prevent pertussis morbidity and mortality in infants. The dose of Tdap should be given preferably during gestational weeks 27 to 36, and it should be administered regardless of the pregnant woman’s prior history of receiving Tdap.

Varicella Vaccination

Varicella-zoster virus (VZV), or the chickenpox virus, is a highly contagious virus that causes rash, fever, and potentially severe, disseminated disease in persons with weakened immune systems. Prior to the introduction of the varicella vaccine and the incorporation of this vaccine into the routine childhood immunization schedule, chickenpox was very common in the United States general population, causing infection in more than 4 million persons each year. Primary varicella-zoster virus infection is uncommon in adults with HIV since most have acquired immunity through childhood infection or varicella immunization.[85]

Vaccines

The varicella vaccine is a live attenuated vaccine that poses a significant risk to persons with HIV who have advanced immunosuppression.[1,85] The duration of protection from varicella vaccine is not known. In addition to providing protection against primary varicella infection, the varicella vaccine has also been shown in studies to reduce the risk of herpes zoster (when compared with wild-type infection).[86,87]

Recommendations

The following summarizes recommendations from the Adult and Adolescent OI Guidelines for administering varicella vaccine to adults with HIV.[1,85]

- **General Approach**: Adults with HIV should receive varicella vaccine if (1) they do not have immunity to VZV, and (2) they have a CD4 count of at least 200 cells/mm^3.
- **Varicella Serologic Screening**: To identify persons with HIV who lack immunity to VZV, some experts would obtain varicella antibody titers (quantitative IgG) if the individual does not have any of the following: prior varicella immunization, prior clinical varicella (or zoster) infection, or a documented protective varicella IgG titer. The varicella titer does not have optimal sensitivity, especially in persons who have previously received varicella vaccine.
- **Dosing Recommendation**: If varicella vaccine is indicated, administer two doses 4–8 weeks apart.
- **Varicella Vaccine in Pregnancy**: The varicella vaccine is contraindicated during pregnancy, regardless of HIV status. Pregnant women without evidence of varicella immunity and a CD4 count of at least 200 cells/mm^3 should receive (or complete) the varicella vaccine series immediately after delivery.
- **Contraindications**: Varicella vaccine is contraindicated in persons with HIV who have a CD4 count of less than 200 cells/mm^3 and in pregnant women. Further, the quadrivalent measles-mumps-rubella-varicella vaccine is not recommended for individuals with HIV. The zoster vaccine should not be used interchangeably with the varicella vaccine.

Zoster Vaccination

Although primary varicella-zoster virus infection is unusual in persons with HIV, the incidence of zoster among adults with HIV who are not receiving antiretroviral therapy is at least 15-fold higher than among age-matched immunocompetent adults, and the risk is highest in persons with a CD4 count less than 200 cells/mm^3.[85,88,89] Individuals with HIV have an additional increased risk in the first 4 months after starting effective antiretroviral therapy, likely as a result of immune reconstitution.[90] Following the widespread use of potent antiretroviral therapy, the incidence rate of zoster has markedly decreased compared with the early years of the HIV epidemic.[91] Zoster is typically limited to a painful, dermatomal vesicular rash but can result in severe and complicated disease in adults with HIV, especially those with a low CD4 count.[92] The goal of using the zoster vaccine in persons with HIV is twofold: prevent zoster and reduce the severity of zoster if it does occur.

Zoster Vaccine

There is only one zoster vaccine currently available in the United States: the recombinant zoster vaccine (RZV, *Shingrix*). The RZV vaccine contains varicella-zoster glycoprotein E combined with a novel adjuvant ($AS01_B$) virus (Figure 17).[93,94] As of June 30, 2020, the zoster vaccine live (ZVL, *Zostavax*) vaccine was no longer manufactured and sold in the United States. Therefore, the following discussion will address only the RZV vaccine. The RZV is licensed as a 2-dose vaccine series, given 2 to 6 months apart (minimum interval allowed 4 weeks).[2,94] In July 2021, the FDA expanded the indicated use of RZV to include individuals aged 18 years and older who are or will be at increased risk of developing herpes zoster because of immunodeficiency or immunosuppression.[95] The RZV does not contain live varicella-zoster virus and, therefore, poses no risk of causing varicella-zoster infection.

Vaccine Efficacy in People with HIV

The RZV has shown efficacy of greater than 95% in preventing herpes zoster in phase 3 trials that enrolled immunocompetent older adults.[96,97,98] A phase 1/2a trial evaluated RZV in persons with HIV and found it was safe and immunogenic, but this trial did not evaluate the impact of RZV in preventing zoster.[99]

Recommendations

The following summarizes recommendations in the Adult and Adolescent OI Guidelines for the use of RZV in persons with HIV.[1]

- **General Approach**: The RZV is recommended for adults with HIV who are 18 years of age or older, regardless of previous zoster history or previous receipt of ZVL. This vaccine is considered safe regardless of the CD4 cell count.
- **Vaccine Schedule**: The RZV vaccine should be administered as a 2-dose series given 2 months apart (Figure 18) (**AIII**). The two-dose series should ideally be administered 2 to 6 months apart; if more than 6 months have elapsed by the second dose, the RZV series does not need to be restarted. If, however, the second dose is administered sooner than 4 weeks after the first dose, then another (third) RZV dose should be administered (more than 4 weeks after the dose that was given too early).[95]
- **Timing of Vaccine Administration**: In general, the RZV vaccine is recommended regardless of CD4 count. To maximize immunologic response to the vaccine, some experts recommend delaying vaccination until the individual has started antiretroviral therapy and (1) achieved virologic suppression and/or (2) obtained immune reconstitution, with a CD4 count recovery of at least 200 cells/mm^3 (**CIII**).
- **Prior History of Zoster**: The RZV vaccine is recommended regardless of whether the person with HIV has a history of zoster, but the RZV vaccine should not be given during an episode of acute herpes zoster (**AIII**).

- **Prior Receipt of ZVL**: If an individual with HIV has previously received ZVL, they should undergo revaccination and receive the standard two-dose series of RZV.
- **Contraindications**: The RZV vaccine should be deferred in women who are pregnant, women who are breastfeeding, or anyone who has a current episode of herpes zoster.[95]

Travel Vaccines

An estimated 8% of travelers to resource-limited regions of the world require treatment during travel, and major disease risks include vaccine-preventable illnesses.[100] Vaccines related to travel are generally not part of the initial evaluation process of persons with HIV. Many persons with HIV may, at some point, travel to regions of the world that require multiple preventive vaccinations, such as typhoid fever, cholera, yellow fever virus, Japanese encephalitis virus, and rabies virus. Recommendations for appropriate travel-related vaccines can be very complex and depend on numerous factors, including the immune status of the person with HIV, the specific region of travel, and the types of exposure likely to occur in that region.[101]

Recommendations

All persons with HIV who are planning international travel should undergo an evaluation by a medical provider who has expertise in travel-related issues, and this travel evaluation should occur well in advance of the travel date to allow time for all appropriate immunizations to be given. The CDC provides an online resource for general information regarding HIV and travel.[101,102] The Adult and Adolescent OI Guidelines provide information for vaccines to prevent cholera, typhoid, yellow fever, and polio.[1]

Contraindicated Vaccines

The following summarizes vaccines that are available in the United States that are contraindicated in some or all adolescents and adults with HIV.[1] In general, caution should be exerted when considering the use of a live vaccine in any person with HIV.

Live vaccines contraindicated in all people with HIV regardless of CD4 cell count:

- Live intranasal influenza vaccine (LAIV) (*FluMist*)
- Live smallpox/mpox vaccine (ACAM2000)
- Quadrivalent measles-mumps-rubella-varicella vaccine (*Proquad*)

Live vaccines contraindicated in adults with HIV and CD4 count less than 200 cells/mm^3:

- Live attenuated oral typhoid vaccine (*Vivotif*)
- Live attenuated measles, mumps, and rubella (MMR) vaccine (*M-M-R* II; *Priorix*)
- Live attenuated varicella vaccine (*Varivax*)
- Live attenuated yellow fever vaccine (*YF-VAX*)

Live vaccine with inadequate safety and efficacy data in adults with HIV:

- Live cholera vaccine (lyophilized CVD 103-HgR) (*Vaxchora*)

Live vaccine considered safe in adults with HIV:

- Live smallpox/mpox vaccine (*JYNNEOS*): this vaccine contains nonreplicating virus and is considered safe to give to adults with HIV, regardless of CD4 cell count.

Summary Points

- Hepatitis A vaccine is recommended for all persons with HIV who are not immune to HAV. Postvaccination antibody testing should be performed 1 to 2 months after completion of the primary hepatitis A vaccine series.
- When giving the hepatitis B vaccine to adults with HIV, the preferred initial option is to use 2 doses of *Heplisav-B*. Postvaccination antibody titers should be checked 1 to 2 months after completion of the primary hepatitis B vaccine series.
- Three doses of 9vHPV should be administered to all persons with HIV who are 9 through 26 years of age. For persons with HIV who are 27 through 45 years of age, shared decision-making should be used to determine whether to administer this vaccine.
- All adults with HIV should receive two doses of conjugate meningococcal vaccine and booster doses every 5 years thereafter.
- Mpox vaccination should be offered for persons with HIV who are at risk for Mpox exposure.
- Pneumococcal vaccine-naïve persons should receive a single dose of either PCV20, PCV21, or PCV15. If they receive PCV15, a follow-up dose of PPSV23 should be given at least 8 weeks later.
- Two doses of RZV are recommended for persons with HIV who are 18 years of age and older, regardless of CD4 cell count and prior history of zoster.
- Some live virus vaccines are contraindicated in all persons with HIV, and other live vaccines are contraindicated in persons with HIV who have a CD4 count of less than 200 cells/mm^3. The MMR and varicella vaccines are live vaccines that can be administered to people with HIV who have a CD4 count of at least 200 cells/mm^3 if they lack immunity to these vaccine-preventable viruses.

Citations

1. Panel on Guidelines for the Prevention and Treatment of Opportunistic Infections in Adults and Adolescents with HIV. Guidelines for the prevention and treatment of opportunistic infections in adults and adolescents with HIV. National Institutes of Health, HIV Medicine Association, and Infectious Diseases Society of America. Immunizations for Preventable Diseases in Adults and Adolescents with HIV. Last updated: February 24, 2026.
[HIV.gov] -

2. Advisory Committee on Immunization Practices (ACIP). Recommended Immunization Schedule for Ages 19 Years or Older, United States, 2025.
[ACIP] -

3. Kemper CA, Haubrich R, Frank I, Dubin G, Buscarino C, McCutchan JA, Deresinski SC; California Collaborative Treatment Group. Safety and immunogenicity of hepatitis A vaccine in human immunodeficiency virus-infected patients: a double-blind, randomized, placebo-controlled trial. J Infect Dis. 2003;187:1327-31.
[PubMed Abstract] -

4. Lange CG, Lederman MM, Medvik K, Asaad R, Wild M, Kalayjian R, Valdez H. Nadir CD4+ T-cell count and numbers of CD28+ CD4+ T-cells predict functional responses to immunizations in chronic HIV-1 infection. AIDS. 2003;17:2015-23.
[PubMed Abstract] -

5. Wong EK, Bodsworth NJ, Slade MA, Mulhall BP, Donovan B. Response to hepatitis B vaccination in a primary care setting: influence of HIV infection, CD4+ lymphocyte count and vaccination schedule. Int J STD AIDS. 1996;7:490-4.
[PubMed Abstract] -

6. Tesoriero JM, Swain CE, Pierce JL, et al. COVID-19 Outcomes Among Persons Living With or Without Diagnosed HIV Infection in New York State. JAMA Netw Open. 2021;4:e2037069.
[PubMed Abstract] -

7. Dandachi D, Geiger G, Montgomery MW, et al. Characteristics, Comorbidities, and Outcomes in a Multicenter Registry of Patients With Human Immunodeficiency Virus and Coronavirus Disease 2019. Clin Infect Dis. 2021;73:e1964-e1972.
[PubMed Abstract] -

8. Bhaskaran K, Rentsch CT, MacKenna B, et al. HIV infection and COVID-19 death: a population-based cohort analysis of UK primary care data and linked national death registrations within the OpenSAFELY platform. Lancet HIV. 2021;8:e24-e32.
[PubMed Abstract] -

9. Ssentongo P, Heilbrunn ES, Ssentongo AE, et al. Epidemiology and outcomes of COVID-19 in HIV-infected individuals: a systematic review and meta-analysis. Sci Rep. 2021;11:6283.
[PubMed Abstract] -

10. Baden LR, El Sahly HM, Essink B, et al. Efficacy and Safety of the mRNA-1273 SARS-CoV-2 Vaccine. N Engl J Med. 2021;384:403-16.
[PubMed Abstract] -

11. Thompson MG, Stenehjem E, Grannis S, et al. Effectiveness of Covid-19 Vaccines in Ambulatory and Inpatient Care Settings. N Engl J Med. 2021;385:1355-71.

[PubMed Abstract] -

12. Dolgin E. The tangled history of mRNA vaccines. Nature. 2021;597:318-24.
[PubMed Abstract] -

13. Centers for Disease Control and Prevention. Interim Clinical Considerations for Use of COVID-19 Vaccines in the United States. Last updated November 4, 2025.
[CDC] -

14. Centers for Disease Control and Prevention. Staying Up to Date with COVID-19 Vaccines. Last updated November 19, 2025.
[CDC] -

15. Matheny SC, Kingery JE. Hepatitis A. Am Fam Physician. 2012;86:1027-34.
[PubMed Abstract] -

16. Centers for Disease Control and Prevention (CDC). 2022 Viral Hepatitis Surveillance Report—Hepatitis A Surveillance 2023. Published April 15, 2025.
[CDC] -

17. Foster MA, Hofmeister MG, Kupronis BA, et al. Increase in Hepatitis A Virus Infections - United States, 2013-2018. MMWR Morb Mortal Wkly Rep. 2019;68:413-5.
[PubMed Abstract] -

18. Nelson NP, Weng MK, Hofmeister MG, et al. Prevention of Hepatitis A Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices, 2020. MMWR Recomm Rep. 2020;69:1-38.
[PubMed Abstract] -

19. Wallace MR, Brandt CJ, Earhart KC, Kuter BJ, Grosso AD, Lakkis H, Tasker SA. Safety and immunogenicity of an inactivated hepatitis A vaccine among HIV-infected subjects. Clin Infect Dis. 2004;39:1207-13.
[PubMed Abstract] -

20. Riekkinen M, Pakkanen SH, Hutse V, et al. Coadministered pneumococcal conjugate vaccine decreases immune response to hepatitis A vaccine: a randomized controlled trial. Clin Microbiol Infect. 2023;29:1553-60.
[PubMed Abstract] -

21. Thio CL, Seaberg EC, Skolasky R Jr, et al. HIV-1, hepatitis B virus, and risk of liver-related mortality in the Multicenter Cohort Study (MACS). Lancet. 2002;360:1921-6.
[PubMed Abstract] -

22. Panel on Guidelines for the Prevention and Treatment of Opportunistic Infections in Adults and Adolescents with HIV. Guidelines for the prevention and treatment of opportunistic infections in adults and adolescents with HIV. National Institutes of Health, HIV Medicine Association, and Infectious Diseases Society of America. Hepatitis B virus infection. Last updated: December 16, 2024.
[HIV.gov] -

23. Schillie S, Harris A, Link-Gelles R, Romero J, Ward J, Nelson N. Recommendations of the Advisory Committee on Immunization Practices for Use of a Hepatitis B Vaccine with a Novel Adjuvant. MMWR Morb Mortal Wkly Rep. 2018;67:455-458.
[PubMed Abstract] -

24. Kim HN, Harrington RD, Crane HM, Dhanireddy S, Dellit TH, Spach DH. Hepatitis B vaccination in HIV-infected adults: current evidence, recommendations, and practical considerations. Int J STD AIDS. 2009;20:595-600.
[PubMed Abstract] -

25. Whitaker JA, Rouphael NG, Edupuganti S, Lai L, Mulligan MJ. Strategies to increase responsiveness to hepatitis B vaccination in adults with HIV-1. Lancet Infect Dis. 2012;12:966-76.
[PubMed Abstract] -

26. Wiedmann M, Liebert UG, Oesen U, et al. Decreased immunogenicity of recombinant hepatitis B vaccine in chronic hepatitis C. Hepatology. 2000;31:230-4.
[PubMed Abstract] -

27. Rey D, Krantz V, Partisani M, et al. Increasing the number of hepatitis B vaccine injections augments anti-HBs response rate in HIV-infected patients. Effects on HIV-1 viral load. Vaccine. 2000;18:1161-5.
[PubMed Abstract] -

28. Launay O, van der Vliet D, Rosenberg AR, et al. Safety and immunogenicity of 4 intramuscular double doses and 4 intradermal low doses vs standard hepatitis B vaccine regimen in adults with HIV-1: a randomized controlled trial. JAMA. 2011;305:1432-40.
[PubMed Abstract] -

29. Marks KM, Kang M, Umbleja T, et al. Immunogenicity and Safety of Hepatitis B Virus (HBV) Vaccine With a Toll-Like Receptor 9 Agonist Adjuvant in HBV Vaccine-Naïve People With Human Immunodeficiency Virus. Clin Infect Dis. 2023;77:414-8.
[PubMed Abstract] -

30. Rubin LG, Levin MJ, Ljungman P, et al. 2013 IDSA clinical practice guideline for vaccination of the immunocompromised host. Clin Infect Dis. 2014;58:309-18.
[PubMed Abstract] -

31. Marks KM, Kang M, Umbleja T, et al. HepB-CpG vs HepB-Alum Vaccine in People With HIV and Prior Vaccine Nonresponse: The BEe-HIVe Randomized Clinical Trial. JAMA. 2024 Dec 1:e2424490. Online ahead of print.
[PubMed Abstract] -

32. Piroth L, Launay O, Michel ML, et al. Vaccination Against Hepatitis B Virus (HBV) in HIV-1-Infected Patients With Isolated Anti-HBV Core Antibody: The ANRS HB EP03 CISOVAC Prospective Study. J Infect Dis. 2016;213:1735-42.
[PubMed Abstract] -

33. Aberg JA, Gallant JE, Ghanem KG, Emmanuel P, Zingman BS, Horberg MA. Primary care guidelines for the management of persons infected with HIV: 2013 update by the HIV medicine association of the Infectious Diseases Society of America. Clin Infect Dis. 2014;58:e1-34.
[HIVMA] -

34. Gaisa M, Sigel K, Hand J, Goldstone S. High rates of anal dysplasia in HIV-infected men who have sex with men, women, and heterosexual men. AIDS. 2014;28:215-22.
[PubMed Abstract] -

35. Simard EP, Pfeiffer RM, Engels EA. Spectrum of cancer risk late after AIDS onset in the United States. Arch Intern Med. 2010;170:1337-45.
[PubMed Abstract] -

36. Schiller JT, Davies P. Delivering on the promise: HPV vaccines and cervical cancer. Nat Rev Microbiol. 2004;2:343-7.
[PubMed Abstract] -

37. Petrosky E, Bocchini JA Jr, Hariri S, et al. Use of 9-Valent Human Papillomavirus (HPV) Vaccine: Updated HPV Vaccination Recommendations of the Advisory Committee on Immunization Practices. MMWR Morb Mortal Wkly Rep. 2015;64:300-4.
[PubMed Abstract] -

38. U.S. Food and Drug Administration. FDA News Release: FDA approves expanded use of Gardasil 9 to include individuals 27 through 45 years old.
[U.S. FDA] -

39. Kahn JA, Xu J, Kapogiannis BG, et al. Immunogenicity and safety of the human papillomavirus 6, 11, 16, 18 vaccine in HIV-infected young women. Clin Infect Dis. 2013;57:735-44.
[PubMed Abstract] -

40. Wilkin T, Lee JY, Lensing SY, et al. Safety and immunogenicity of the quadrivalent human papillomavirus vaccine in HIV-1-infected men. J Infect Dis. 2010;202:1246-53.
[PubMed Abstract] -

41. Panel on Guidelines for the Prevention and Treatment of Opportunistic Infections in Adults and Adolescents with HIV. Guidelines for the prevention and treatment of opportunistic infections in adults and adolescents with HIV. National Institutes of Health, HIV Medicine Association, and Infectious Diseases Society of America. Human papillomavirus disease. July 9, 2024.
[HIV.gov] -

42. Grohskopf LA, Olsen SJ, Sokolow LZ, et al. Prevention and control of seasonal influenza with vaccines: recommendations of the Advisory Committee on Immunization Practices (ACIP) -- United States, 2014-15 influenza season. MMWR Morb Mortal Wkly Rep. 2014;63:691-7.
[MMWR] -

43. Lin JC, Nichol KL. Excess mortality due to pneumonia or influenza during influenza seasons among persons with acquired immunodeficiency syndrome. Arch Intern Med. 2001;161:441-6.
[PubMed Abstract] -

44. Centers for Disease Control and Prevention. Measles Cases and Outbreaks.
[CDC] -

45. Watson JC, Hadler SC, Dykewicz CA, Reef S, Phillips L. Measles, mumps, and rubella--vaccine use and strategies for elimination of measles, rubella, and congenital rubella syndrome and control of mumps: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR Recomm Rep. 1998;47(RR-8):1-57.
[MMWR] -

46. Scott P, Moss WJ, Gilani Z, Low N. Measles vaccination in HIV-infected children: systematic review and meta-analysis of safety and immunogenicity. J Infect Dis. 2011;204 Suppl 1:S164-78.
[PubMed Abstract] -

47. Sprauer MA, Markowitz LE, Nicholson JK, et al. Response of human immunodeficiency virus-infected adults to measles-rubella vaccination. J Acquir Immune Defic Syndr (1988). 1993;6:1013-6.
[PubMed Abstract] -

48. Stermole BM, Grandits GA, Roediger MP, et al. Long-term safety and serologic response to measles,

mumps, and rubella vaccination in HIV-1 infected adults. Vaccine. 2011;29:2874-80.
[PubMed Abstract] -

49. Angel JB, Walpita P, Lerch RA, et al. Vaccine-associated measles pneumonitis in an adult with AIDS. Ann Intern Med. 1998;129:104-6.
[PubMed Abstract] -

50. Centers for Disease Control and Prevention. Measles pneumonitis following measles-mumps-rubella vaccination of a patient with HIV infection, 1993. MMWR Morb Mortal Wkly Rep. 1996;45:603-6.
[PubMed Abstract] -

51. McLean HQ, Fiebelkorn AP, Temte JL, Wallace GS. Prevention of measles, rubella, congenital rubella syndrome, and mumps, 2013: summary recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR Recomm Rep. 2013;62:1-34.
[PubMed Abstract] -

52. MacNeil JR, Rubin LG, Patton M, Ortega-Sanchez IR, Martin SW. Recommendations for Use of Meningococcal Conjugate Vaccines in HIV-Infected Persons - Advisory Committee on Immunization Practices, 2016. MMWR Morb Mortal Wkly Rep. 2016;65:1189-94.
[PubMed Abstract] -

53. Mbaeyi SA, Bozio CH, Duffy J, et al. Meningococcal Vaccination: Recommendations of the Advisory Committee on Immunization Practices, United States, 2020. MMWR Recomm Rep. 2020;69:1-41.
[PubMed Abstract] -

54. Harris CM, Wu HM, Li J, et al. Meningococcal Disease in Patients With Human Immunodeficiency Virus Infection: A Review of Cases Reported Through Active Surveillance in the United States, 2000-2008. Open Forum Infect Dis. 2016;3:ofw226.
[PubMed Abstract] -

55. Kamiya H, MacNeil J, Blain A, et al. Meningococcal disease among men who have sex with men - United States, January 2012-June 2015. MMWR Morb Mortal Wkly Rep. 2015;64:1256-7.
[PubMed Abstract] -

56. Centers for Disease Control and Prevention (CDC). Notes from the field: serogroup C invasive meningococcal disease among men who have sex with men - New York City, 2010-2012. MMWR Morb Mortal Wkly Rep. 2013;61:1048.
[MMWR] -

57. Rubis AB, Howie RL, Marasini D, Sharma S, Marjuki H, McNamara LA. Notes from the Field: Increase in Meningococcal Disease Among Persons with HIV - United States, 2022. MMWR Morb Mortal Wkly Rep. 2023;72:663-4.
[PubMed Abstract] -

58. Centers for Disease Control and Prevention (CDC). Updated recommendations for use of meningococcal conjugate vaccines--Advisory Committee on Immunization Practices (ACIP), 2010. MMWR Morb Mortal Wkly Rep. 2011;60;72-6.
[MMWR] -

59. Lujan-Zilbermann J, Warshaw MG, Williams PL, et al. Immunogenicity and safety of 1 vs 2 doses of quadrivalent meningococcal conjugate vaccine in youth infected with human immunodeficiency virus. J Pediatr. 2012;161:676-81.e2.
[PubMed Abstract] -

60. Panel on Guidelines for the Prevention and Treatment of Opportunistic Infections in Adults and Adolescents with HIV. Guidelines for the prevention and treatment of opportunistic infections in adults and adolescents with HIV. National Institutes of Health, HIV Medicine Association, and Infectious Diseases Society of America. Mpox. Last updated: July 14, 2025.
[HIV.gov] -

61. Philpott D, Hughes CM, Alroy KA, et al. Epidemiologic and Clinical Characteristics of Monkeypox Cases - United States, May 17-July 22, 2022. MMWR Morb Mortal Wkly Rep. 2022;71:1018-22.
[PubMed Abstract] -

62. Curran KG, Eberly K, Russell OO, et al. HIV and Sexually Transmitted Infections Among Persons with Monkeypox - Eight U.S. Jurisdictions, May 17-July 22, 2022. MMWR Morb Mortal Wkly Rep. 2022;71:1141-7.
[CDC] -

63. Philpott DC, Bonacci RA, Weidle PJ, et al. Low CD4 Count or Being Out of Care Increases the Risk for Mpox Hospitalization Among People with HIV and Mpox. Clin Infect Dis. 2023 Aug 17.Online ahead of print.
[PubMed Abstract] -

64. Rao AK, Petersen BW, Whitehill F, et al. Use of JYNNEOS (Smallpox and Monkeypox Vaccine, Live, Nonreplicating) for Preexposure Vaccination of Persons at Risk for Occupational Exposure to Orthopoxviruses: Recommendations of the Advisory Committee on Immunization Practices - United States, 2022. MMWR Morb Mortal Wkly Rep. 2022;71:734-42.
[PubMed Abstract] -

65. Deputy NP, Deckert J, Chard AN, et al. Vaccine Effectiveness of JYNNEOS against Mpox Disease in the United States. N Engl J Med. 2023;388:2434-2443.
[PubMed Abstract] -

66. Centers for Disease Control and Prevention (CDC). Use of 13-valent pneumococcal conjugate vaccine and 23-valent pneumococcal polysaccharide vaccine for adults with immunocompromising conditions: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR Morb Mortal Wkly Rep. 2012;61:816-9.
[PubMed Abstract] -

67. Isaacman DJ, Fletcher MA, Fritzell B, Ciuryla V, Schranz J. Indirect effects associated with widespread vaccination of infants with heptavalent pneumococcal conjugate vaccine (PCV7; Prevnar). Vaccine. 2006;25:2420-7.
[PubMed Abstract] -

68. Flannery B, Heffernan RT, Harrison LH, et al. Changes in invasive pneumococcal disease among HIV-infected adults living in the era of childhood pneumococcal immunization. Ann Intern Med. 2006;144:1-9.
[PubMed Abstract] -

69. Vadlamudi NK, Chen A, Marra F. Impact of the 13-Valent Pneumococcal Conjugate Vaccine Among Adults: A Systematic Review and Meta-analysis. Clin Infect Dis. 2019;69:34-49.
[PubMed Abstract] -

70. Marcus JL, Baxter R, Leyden WA, et al. Invasive Pneumococcal Disease Among HIV-Infected and HIV-Uninfected Adults in a Large Integrated Healthcare System. AIDS Patient Care STDS. 2016;30:463-470.
[PubMed Abstract] -

71. Kobayashi M, Farrar JL, Gierke R, et al. Use of 15-Valent Pneumococcal Conjugate Vaccine and 20-Valent Pneumococcal Conjugate Vaccine Among U.S. Adults: Updated Recommendations of the Advisory Committee on Immunization Practices - United States, 2022. MMWR Morb Mortal Wkly Rep. 2022;71:109-17.
[PubMed Abstract] -

72. Kobayashi M, Leidner AJ, Gierke R, et al. Use of 21-Valent Pneumococcal Conjugate Vaccine Among U.S. Adults: Recommendations of the Advisory Committee on Immunization Practices - United States, 2024. MMWR Morb Mortal Wkly Rep. 2024;73:793-8.
[PubMed Abstract] -

73. Mohapi L, Pinedo Y, Osiyemi O, et al. Safety and immunogenicity of V114, a 15-valent pneumococcal conjugate vaccine, in adults living with HIV. AIDS. 2022;36:373-82.
[PubMed Abstract] -

74. Wildenbeest JG, Lowe DM, Standing JF, Butler CC. Respiratory syncytial virus infections in adults: a narrative review. Lancet Respir Med. 2024;12:822-36.
[PubMed Abstract] -

75. Havers FP, Whitaker M, Melgar M, et al. Characteristics and Outcomes Among Adults Aged ≥60 Years Hospitalized with Laboratory-Confirmed Respiratory Syncytial Virus - RSV-NET, 12 States, July 2022-June 2023. MMWR Morb Mortal Wkly Rep. 2023;72:1075-82.
[PubMed Abstract] -

76. Landi SN, Garofalo DC, Reimbaeva M, et al. Hospitalization Following Outpatient Diagnosis of Respiratory Syncytial Virus in Adults. JAMA Netw Open. 2024;7:e2446010.
[PubMed Abstract] -

77. Papi A, Ison MG, Langley JM, et al. Respiratory Syncytial Virus Prefusion F Protein Vaccine in Older Adults. N Engl J Med. 2023;388:595-608.
[PubMed Abstract] -

78. Kampmann B, Madhi SA, Munjal I, et al. Bivalent Prefusion F Vaccine in Pregnancy to Prevent RSV Illness in Infants. N Engl J Med. 2023;388:1451-64.
[PubMed Abstract] -

79. Walsh EE, Pérez Marc G, Zareba AM, et al. Efficacy and Safety of a Bivalent RSV Prefusion F Vaccine in Older Adults. N Engl J Med. 2023;388:1465-77.
[PubMed Abstract] -

80. Wilson E, Goswami J, Baqui AH, et al. Efficacy and Safety of an mRNA-Based RSV PreF Vaccine in Older Adults. N Engl J Med. 2023;389:2233-44.
[PubMed Abstract] -

81. Liang JL, Tiwari T, Moro P, et al. Prevention of Pertussis, Tetanus, and Diphtheria with Vaccines in the United States: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR Recomm Rep. 2018;67:1-44.
[PubMed Abstract] -

82. Kroon, FP, van Dissel JT, Labadie J, van Loon AM, van Furth R. Antibody response to diphtheria, tetanus, and poliomyelitis vaccines in relation to the number of CD4+ T lymphocytes in adults infected with human immunodeficiency virus. Clin Infect Dis. 1995;21:1197-2003.
[PubMed Abstract] -

83. Centers for Disease Control and Prevention (CDC). Updated recommendations for use of tetanus toxoid, reduced diphtheria toxoid and acellular pertussis (Tdap) vaccine from the Advisory Committee on Immunization Practices, 2010. MMWR Morb Mortal Wkly Rep. 2011;60:13-5.
[MMWR] -

84. Panel on Guidelines for the Prevention and Treatment of Opportunistic Infections in Adults and Adolescents with HIV. Guidelines for the prevention and treatment of opportunistic infections in adults and adolescents with HIV. National Institutes of Health, HIV Medicine Association, and Infectious Diseases Society of America. Varicella-zoster virus disease. Last updated: February 25, 2026.
[HIV.gov] -

85. Marin M, Güris D, Chaves SS, Schmid S, Seward JF; Advisory Committee on Immunization Practices, Centers for Disease Control and Prevention (CDC). Prevention of varicella: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR Recomm Rep. 2007;56(RR-4):1-4.
[MMWR] -

86. Weinmann S, Naleway AL, Koppolu P, et al. Incidence of Herpes Zoster Among Children: 2003-2014. Pediatrics. 2019;144:e20182917.
[PubMed Abstract] -

87. Buchbinder SP, Katz MH, Hessol NA, Liu JY, O'Malley PM, Underwood R, Holmberg SD. Herpes zoster and human immunodeficiency virus infection. J Infect Dis. 1992;166:1153-6.
[PubMed Abstract] -

88. Donahue JG, Choo PW, Manson JE, Platt R. The incidence of herpes zoster. Arch Intern Med. 1995;155:1605-9.
[PubMed Abstract] -

89. Domingo P, Torres OH, Ris J, Vazquez G. Herpes zoster as an immune reconstitution disease after initiation of combination antiretroviral therapy in patients with human immunodeficiency virus type-1 infection. Am J Med. 2001;110:605-9.
[PubMed Abstract] -

90. Moanna A, Rimland D. Decreasing incidence of herpes zoster in the highly active antiretroviral therapy era. Clin Infect Dis. 2013;57:122-5.
[PubMed Abstract] -

91. Vafai A, Berger M. Zoster in patients infected with HIV: a review. Am J Med Sci. 2001;321:372-80.
[PubMed Abstract] -

92. Chlibek R, Bayas JM, Collins H, et al. Safety and immunogenicity of an AS01-adjuvanted varicella-zoster virus subunit candidate vaccine against herpes zoster in adults >=50 years of age. J Infect Dis. 2013;208:1953-61.
[PubMed Abstract] -

93. Dooling KL, Guo A, Patel M, et al. Recommendations of the Advisory Committee on Immunization Practices for Use of Herpes Zoster Vaccines. MMWR Morb Mortal Wkly Rep. 2018;67:103-108.
[PubMed Abstract] -

94. Anderson TC, Masters NB, Guo A, et al. Use of Recombinant Zoster Vaccine in Immunocompromised Adults Aged ≥19 Years: Recommendations of the Advisory Committee on Immunization Practices - United States, 2022. MMWR Morb Mortal Wkly Rep. 2022;71:80-4.
[PubMed Abstract] -

95. Lal H, Cunningham AL, Godeaux O, et al. Efficacy of an adjuvanted herpes zoster subunit vaccine in older adults. N Engl J Med. 2015;372:2087-96.
[PubMed Abstract] -

96. Godeaux O, Kovac M, Shu D, et al. Immunogenicity and safety of an adjuvanted herpes zoster subunit candidate vaccine in adults ≥ 50 years of age with a prior history of herpes zoster: A phase III, non-randomized, open-label clinical trial. Hum Vaccin Immunother. 2017;:1-8.
[PubMed Abstract] -

97. Cunningham AL, Lal H, Kovac M, et al. Efficacy of the Herpes Zoster Subunit Vaccine in Adults 70 Years of Age or Older. N Engl J Med. 2016;375:1019-32.
[PubMed Abstract] -

98. Berkowitz EM, Moyle G, Stellbrink HJ, et al. Safety and immunogenicity of an adjuvanted herpes zoster subunit candidate vaccine in HIV-infected adults: a phase 1/2a randomized, placebo-controlled study. J Infect Dis. 2015;211:1279-87.
[PubMed Abstract] -

99. Smith DS. Travel medicine and vaccines for HIV-infected travelers. Top Antivir Med. 2012;20:111-5.
[PubMed Abstract] -

100. Kotton CN. Vaccination and immunization against travel-related diseases in immunocompromised hosts. Expert Rev Vaccines. 2008;7:663-72.
[PubMed Abstract] -

101. Kotton CN, Freedman DO. Immunocompromised travelers. In: CDC Health Information for International Travel (The Yellow Book). 2014
[CDC] -

References

- Armbruster C, Junker W, Vetter N, Jaksch G. Disseminated bacille Calmette-Guérin infection in an AIDS patient 30 years after BCG vaccination. J Infect Dis. 1990;162:1216.
[PubMed Abstract] -

- Brennan J, Moore K, Sizemore L, et al. Notes from the Field: Acute Hepatitis A Virus Infection Among Previously Vaccinated Persons with HIV Infection - Tennessee, 2018. MMWR Morb Mortal Wkly Rep. 2019;68:328-9.
[PubMed Abstract] -

- Briere EC, Rubin L, Moro PL, Cohn A, Clark T, Messonnier N. Prevention and control of haemophilus influenzae type b disease: recommendations of the advisory committee on immunization practices (ACIP). MMWR Recomm Rep. 2014;63:1-14.
[MMWR] -

- Crum-Cianflone NF, Wilkins K, Lee AW, et al. Long-term durability of immune responses after hepatitis A vaccination among HIV-infected adults. J Infect Dis. 2011;203:1815-23.
[PubMed Abstract] -

- Faherty EAG, Holly T, Ogale YP, et al. Notes from the Field: Emergence of an Mpox Cluster Primarily Affecting Persons Previously Vaccinated Against Mpox - Chicago, Illinois, March 18-June 12, 2023. MMWR Morb Mortal Wkly Rep. 2023 Jun 23;72:696-8.
[PubMed Abstract] -

- Farley MM, Stephens DS, Brachman PS Jr, Harvey RC, Smith JD, Wenger JD. Invasive *Haemophilus influenzae* disease in adults. A prospective, population based surveillance. CDC Meningitis Surveillance Group. Ann Intern Med. 1992;116:806-12.
[PubMed Abstract] -

- Farrar JL, Lewis NM, Houck K, et al. Demographic and Clinical Characteristics of Mpox in Persons Who Had Previously Received 1 Dose of JYNNEOS Vaccine and in Unvaccinated Persons - 29 U.S. Jurisdictions, May 22-September 3, 2022. MMWR Morb Mortal Wkly Rep. 2022;71:1610-15.
[PubMed Abstract] -

- Goss MA, Lievano F, Buchanan KM, Seminack MM, Cunningham ML, Dana A. Final report on exposure during pregnancy from a pregnancy registry for quadrivalent human papillomavirus vaccine. Vaccine. 2015;33:3422-8.
[PubMed Abstract] -

- Huang SH, Huang CH, Wang NC, et al. Early Seroreversion After 2 Doses of Hepatitis A Vaccination in Human Immunodeficiency Virus-Positive Patients: Incidence and Associated Factors. Hepatology. 2019;70:465-75.
[PubMed Abstract] -

- Jackson S, Lentino J, Kopp J, et al. Immunogenicity of a two-dose investigational hepatitis B vaccine, HBsAg-1018, using a toll-like receptor 9 agonist adjuvant compared with a licensed hepatitis B vaccine in adults. Vaccine. 2018;36:668-674.
[PubMed Abstract] -

- Kroon FP, van Dissel JT, Ravensbergen E, Nibbering PH, van Furth R. Enhanced antibody response to pneumococcal polysaccharide vaccine after prior immunization with conjugate pneumococcal vaccine in HIV-infected adults. Vaccine. 2000;19:886-94.
[PubMed Abstract] -

- Kroon FP, van Dissel JT, Rijkers GT, Labadie J, van Furth R. Antibody response to *Haemophilus influenzae* type b vaccine in relation to the number of CD4+ T lymphocytes in adults infected with human immunodeficiency virus. Clin Infect Dis. 1997;25:600-6.
[PubMed Abstract] -

- Lei J, Ploner A, Elfström KM, et al. HPV Vaccination and the Risk of Invasive Cervical Cancer. N Engl J Med. 2020;383:1340-8.
[PubMed Abstract] -

- Lin KY, Hsieh SM, Sheng WH, et al. Comparable Serologic Responses to 2 Different Combinations of Inactivated Hepatitis A Virus Vaccines in HIV-Positive Patients During an Acute Hepatitis A Outbreak in Taiwan. J Infect Dis. 2018;218:734-8.
[PubMed Abstract] -

- Panel on Guidelines for the Prevention and Treatment of Opportunistic Infections in Adults and Adolescents with HIV. Guidelines for the prevention and treatment of opportunistic infections in adults and adolescents with HIV. National Institutes of Health, HIV Medicine Association, and Infectious Diseases Society of America. Community-acquired-pneumonia. Last updated: September 7, 2022.
[HIV.gov] -

- Payne AB, Ray LC, Cole MM, et al. Reduced Risk for Mpox After Receipt of 1 or 2 Doses of JYNNEOS Vaccine Compared with Risk Among Unvaccinated Persons - 43 U.S. Jurisdictions, July 31-October 1, 2022. MMWR Morb Mortal Wkly Rep. 2022;71:1560-64.

[PubMed Abstract] -

- Siberry GK, Williams PL, Lujan-Zilbermann J, et al. Phase I/II, open-label trial of safety and immunogenicity of meningococcal (groups A, C, Y, and W-135) polysaccharide diphtheria toxoid conjugate vaccine in human immunodeficiency virus-infected adolescents. Pediatr Infect Dis J. 2010;29:391-6.
[PubMed Abstract] -

- Veit O, Domingo C, Niedrig M, et al. Long-term Immune Response to Yellow Fever Vaccination in Human Immunodeficiency Virus (HIV)-Infected Individuals Depends on HIV RNA Suppression Status: Implications for Vaccination Schedule. Clin Infect Dis. 2018;66:1099-1108.
[PubMed Abstract] -

- Veit O, Niedrig M, Chapuis-Taillard C, et al. Immunogenicity and safety of yellow fever vaccination for 102 HIV-infected patients. Clin Infect Dis. 2009;48:659-66.
[PubMed Abstract] -

Figures

Figure 1 (Image Series) - COVID-19 mRNA Vaccines (Image Series) - Figure 1 (Image Series) - COVID-19 mRNA Vaccines
Image 1A: COVID-19 mRNA Vaccine

COVID-19 mRNA vaccines consist of mRNA surrounded by a lipid nanoparticle (LNP). The LNP protects the mRNA from being degraded and it facilitates cellular uptake of the mRNA. The coding region (orange) is a genetically engineered sequence of nucleoside-modified mRNA that encodes for the prefusion-stabilized SARS-CoV-2 spike protein. The Cap 5′ and 3′ UTR elements enhance the stability and translation of the mRNA

Illustration: Cognition Studio, Inc.

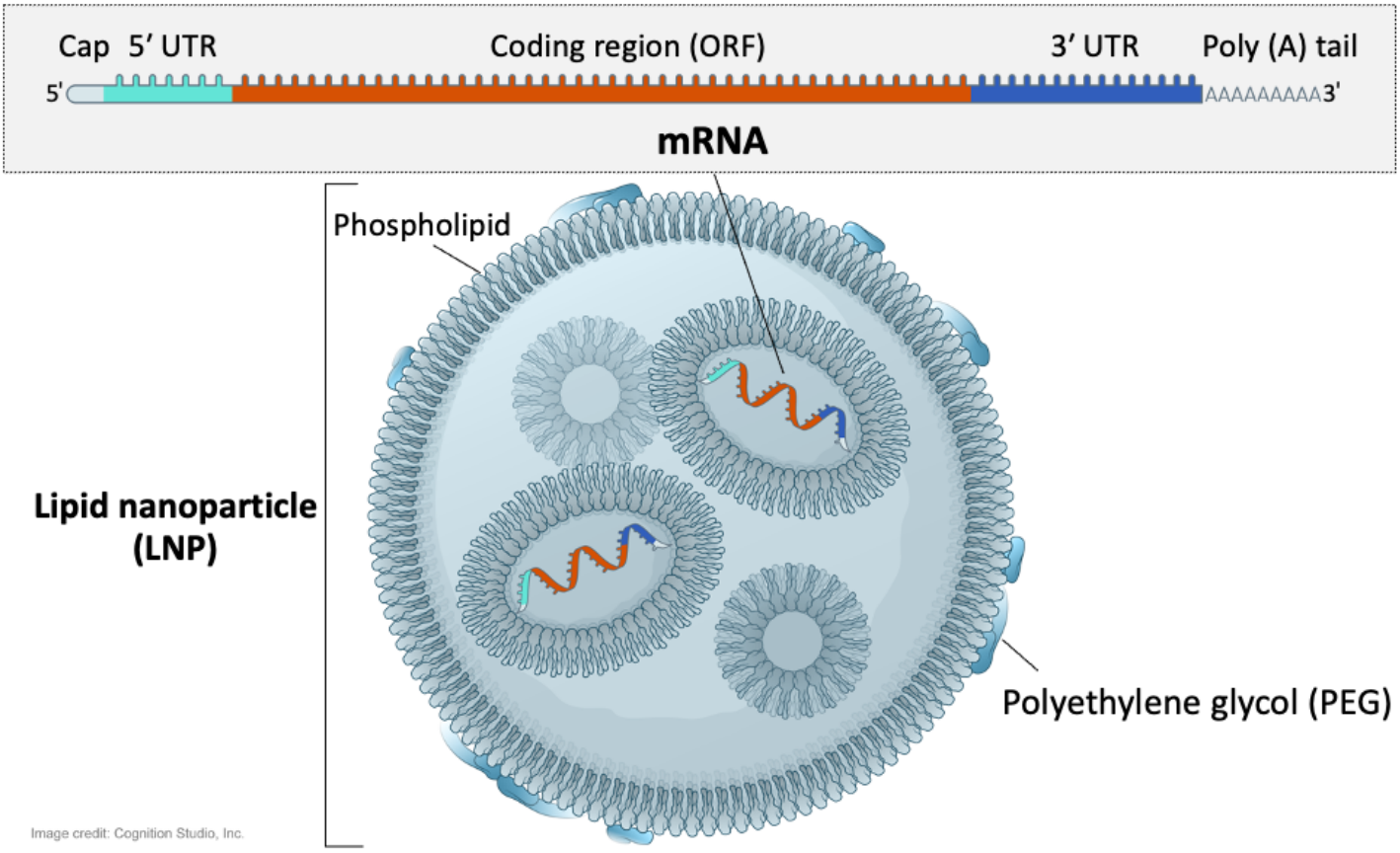

Figure 1 (Image Series) - COVID-19 mRNA Vaccines
Image 1B: COVID-19 mRNA Vaccines and Intracellular Mechanism of Action

The mRNA-1273 enters the cell cytoplasm and does not enter the nucleus. The mRNA is translated by the ribosomes to form prefusion-stabilized SARS-CoV-2 spike proteins. The spike proteins are shuttled to the surface of the cell and are presented to the immune system. The spike proteins are also processed into small peptides that also are presented to the immune system. With this process, the mRNA is non-replicating and is present transiently within the cell.

Illustration: Cognition Studio, Inc.

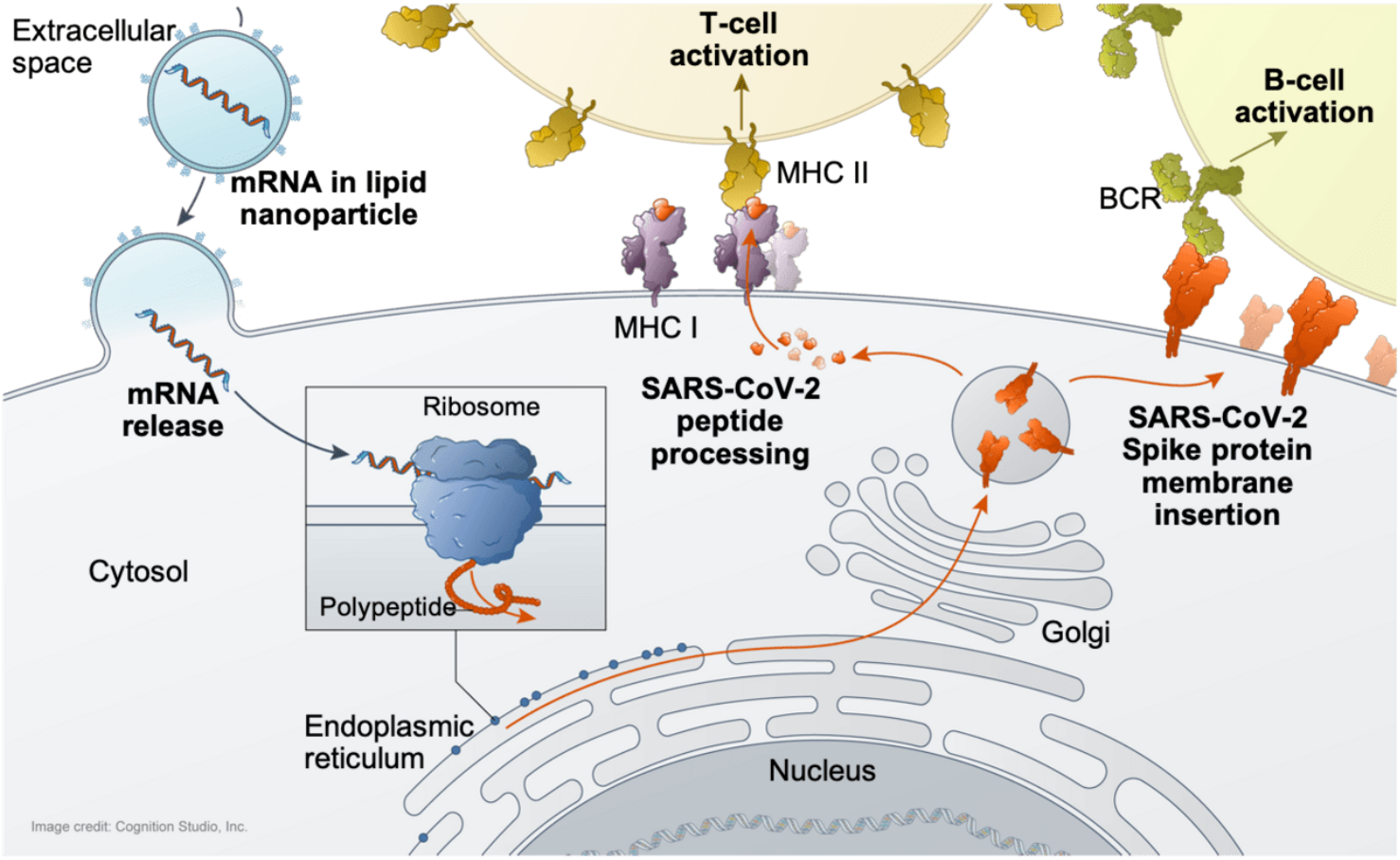

Figure 1 (Image Series) - COVID-19 mRNA Vaccines
Image 1C: COVID-19 mRNA Vaccines and Immune Responses

The immune system responds to the antigens on the surface of the cell produced by the COVID-19 mRNA vaccines. These vaccines generate cellular immune responses (T-cell) and humoral responses (B-cell). The immune response includes: activation of B cells to produce antibodies against SARS-CoV-2; activation of cytotoxic CD8 T-cells that can destroy cells infected with SARS-CoV-2; activation of CD4 T-cells that augment both CD8 T-cell and B-cell responses; generation of memory T and B cells that can quickly respond to future SARS-CoV-2 infection.

Illustration: Cognition Studio, Inc.

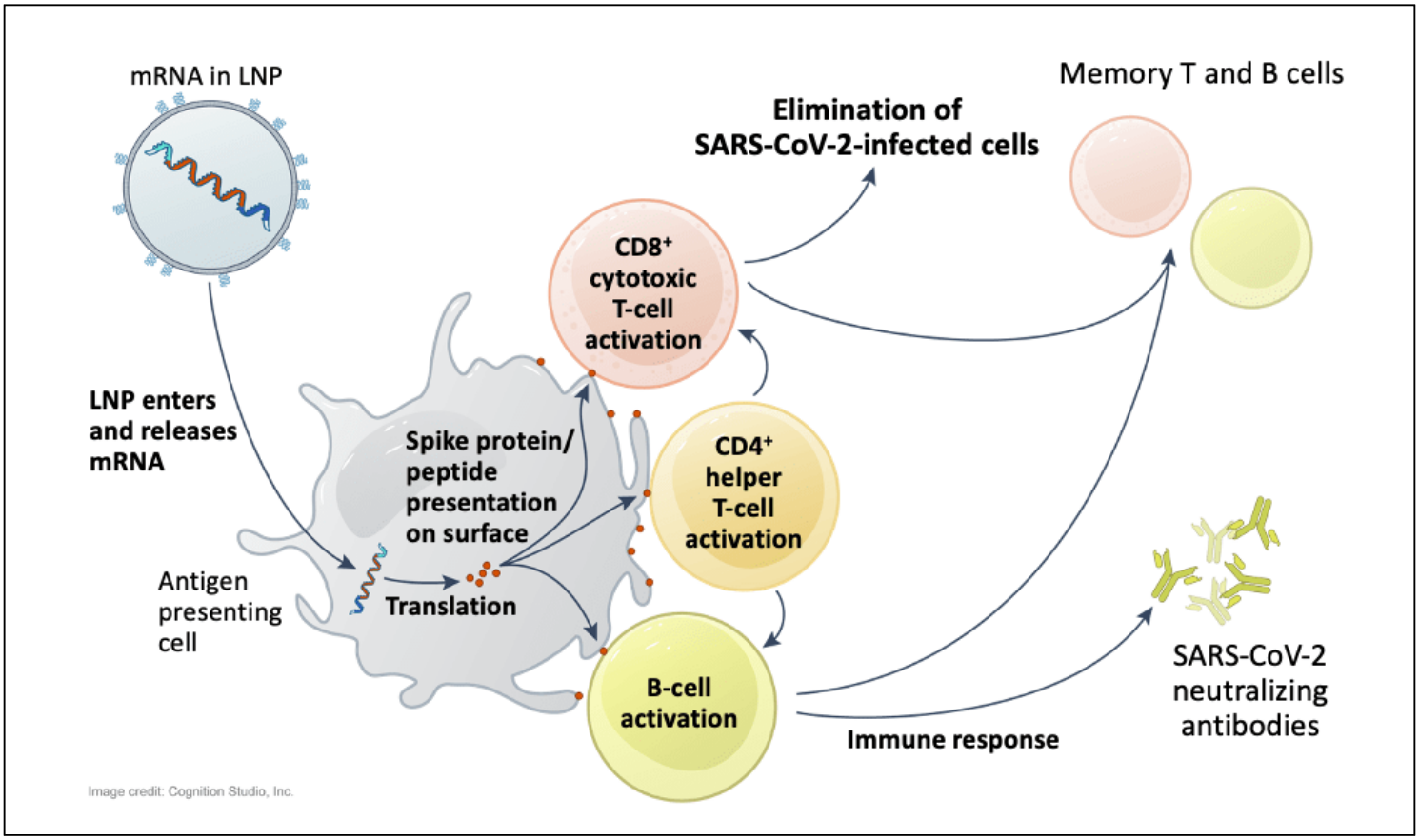

Figure 2 Number of Reported Cases of Hepatitis A Virus Infections, United States, 2015-2023

Source: Centers for Disease Control and Prevention (CDC). 2023 Viral Hepatitis Surveillance Report—Hepatitis A. Published April 15, 2025.

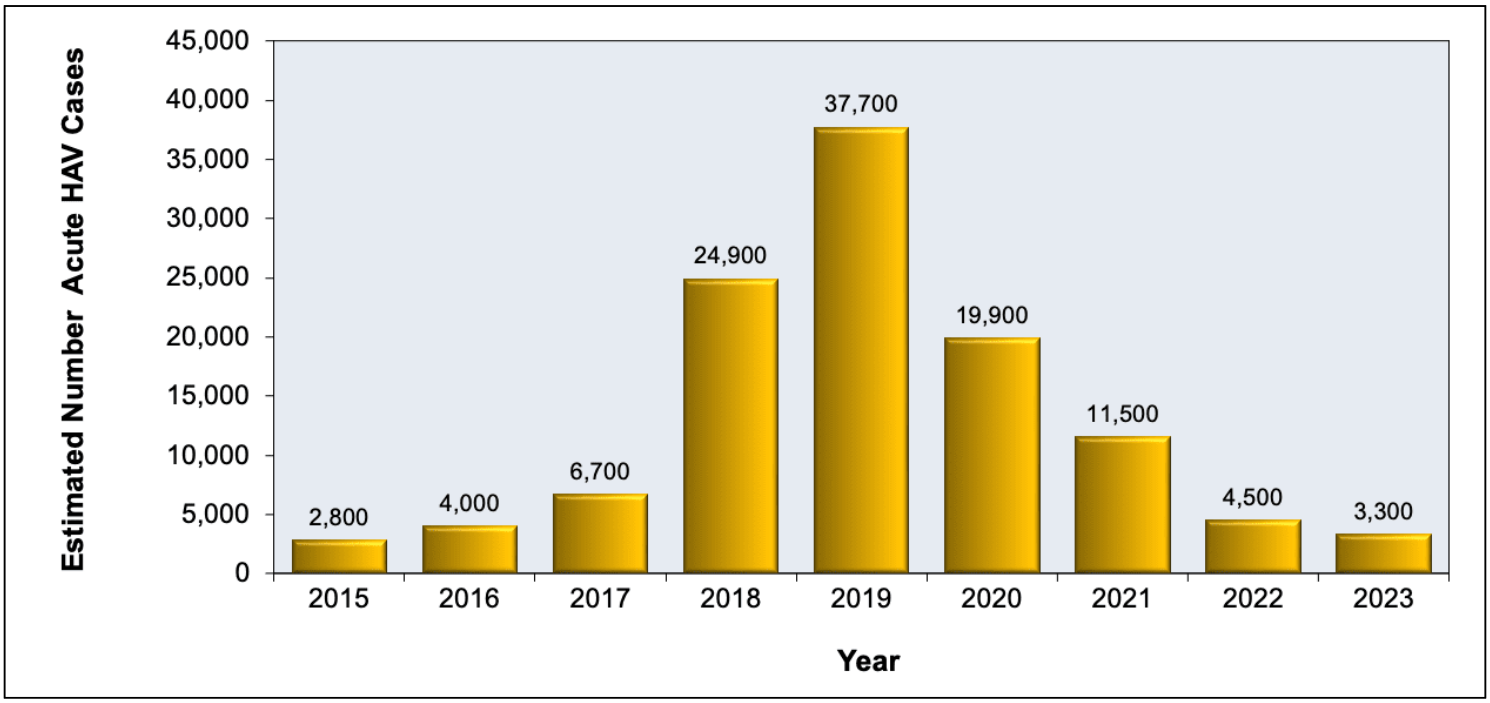

Figure 3 Hepatitis A Vaccine in People with HIV*

These recommendations are based on the CD4 cell count and risk of acquiring hepatitis A virus

Source: Panel on Opportunistic Infections in Adults and Adolescents with HIV. Guidelines for the prevention and treatment of opportunistic infections in adults and adolescents with HIV: recommendations from the Centers for Disease Control and Prevention, the National Institutes of Health, and the HIV Medicine Association of the Infectious Diseases Society of America. Immunizations for Preventable Diseases in Adults and Adolescents Living with HIV. Last updated: February 25, 2026.

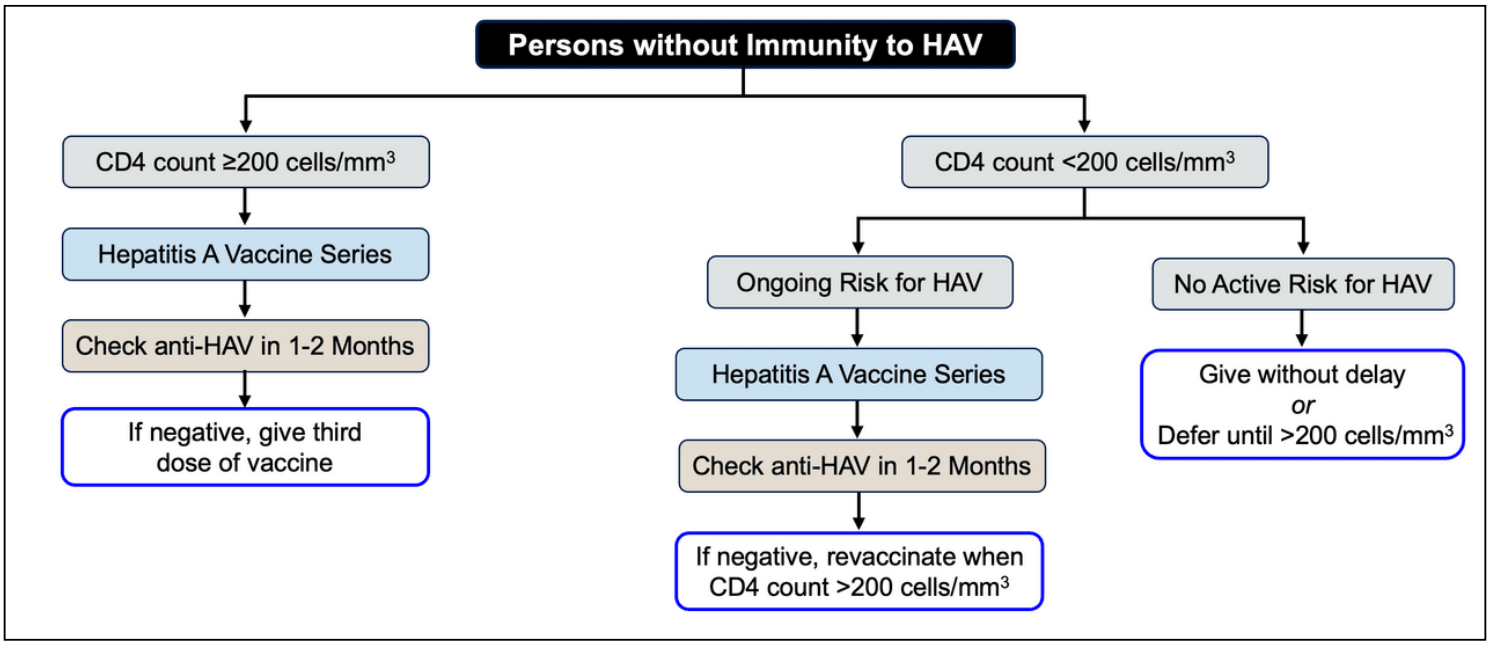

Figure 4 Heplisav-B Vaccine in HBV Vaccine-Naïve People With HIV

This bar graph shows the seroprotective response rates to three doses of Heplisav-B vaccine given at 0, 4, and 24 weeks.

Source: Marks KM, Kang M, Umbleja T, et al. Immunogenicity and Safety of Hepatitis B vaccine with a Toll-like Receptor 9 Agonist Adjuvant (HEPLISAV-B) in HBV Vaccine-naive People with HIV. Clin Infect Dis. 2023;77:414-8.

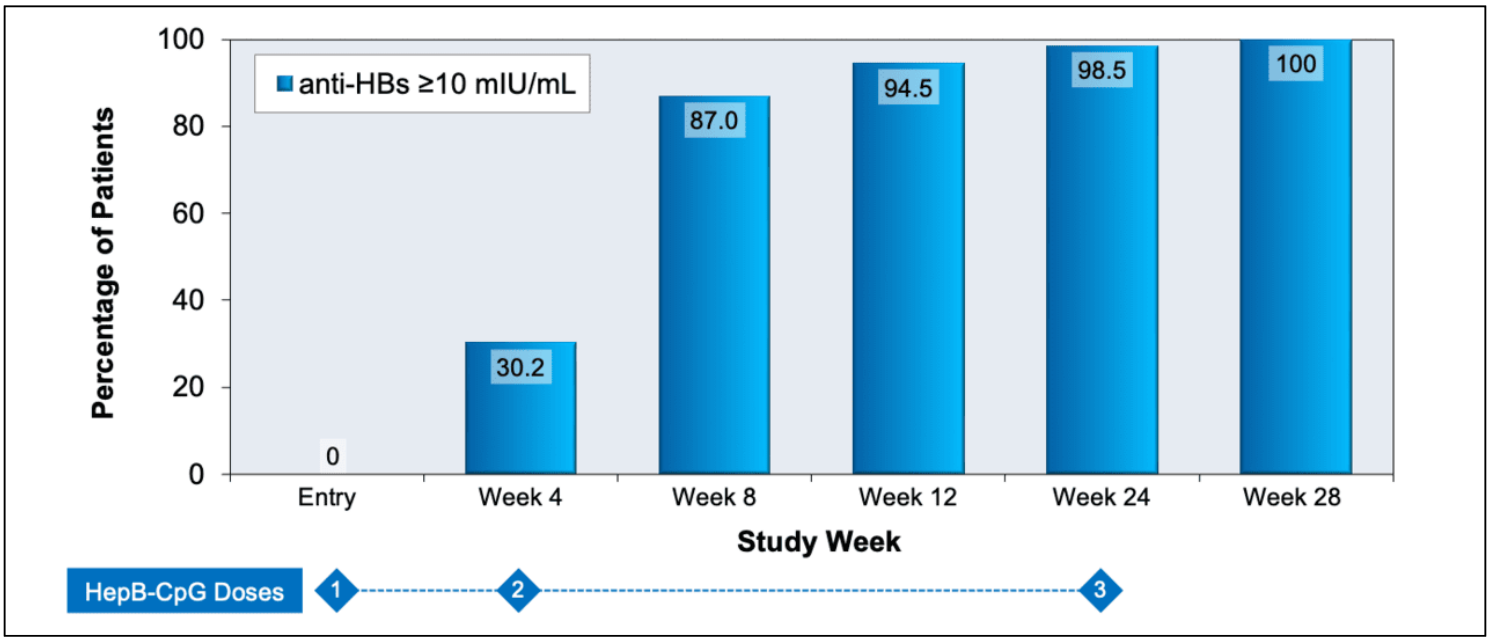

Figure 5 HBV Vaccine Schedule Options in Persons with HIV

Note: A 1.0 mL dose of *Twinrix* contains 720 ELISA units of inactivated hepatitis A virus (antigen component from Havrix) and 20 µg HBsAg (antigen component from Engerix-B). *Twinrix* can be given on an accelerated schedule, but the accelerated schedule requires a total of 4 doses (days 0, 7, and 21 to 30) followed by a booster dose at 12 months.

Source: Panel on Opportunistic Infections in Adults and Adolescents with HIV. Guidelines for the prevention and treatment of opportunistic infections in adults and adolescents with HIV: recommendations from the Centers for Disease Control and Prevention, the National Institutes of Health, and the HIV Medicine Association of the Infectious Diseases Society of America. Immunizations for Preventable Diseases in Adults and Adolescents Living with HIV. Last updated: February 25, 2026.

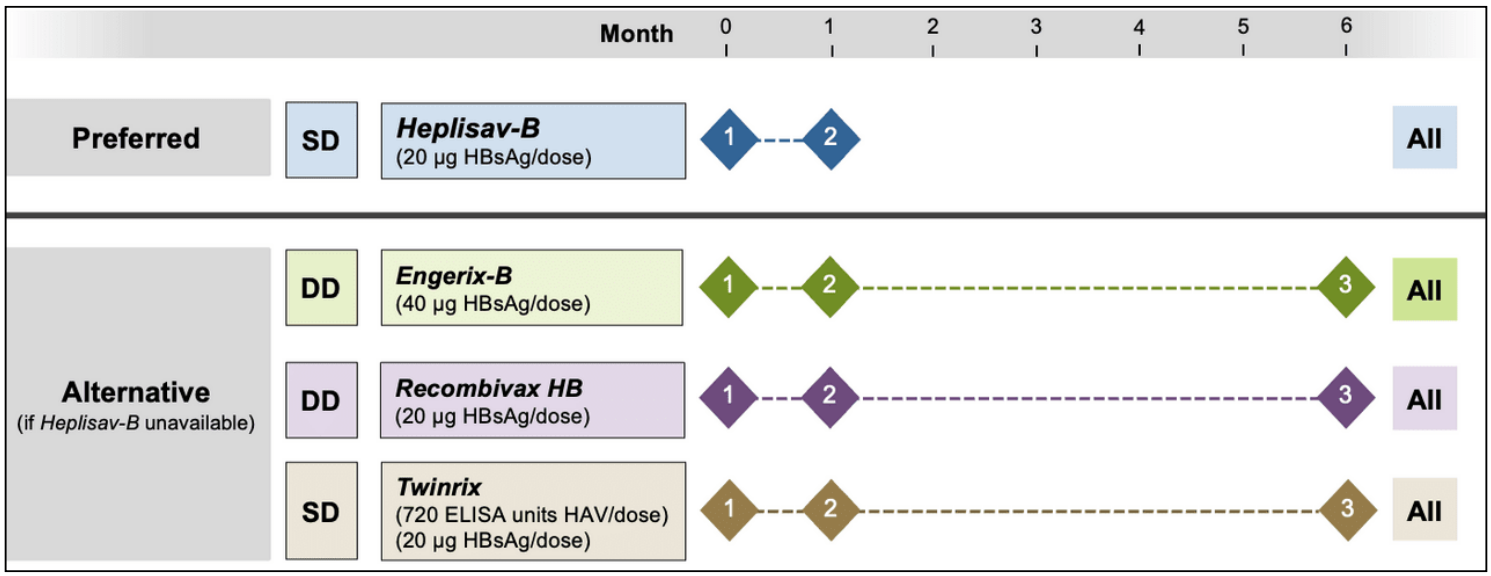

Figure 6 Approach to Isolated Anti-HBc in Persons with HIV

*The full vaccine series options include the 2-dose series using standard-dose *Heplisav-B* or the 3-dose series with double-dose vaccine using *Engerix-B* or *Recombivax HB*.

Source: Panel on Opportunistic Infections in Adults and Adolescents with HIV. Guidelines for the prevention and treatment of opportunistic infections in adults and adolescents with HIV: recommendations from the Centers for Disease Control and Prevention, the National Institutes of Health, and the HIV Medicine Association of the Infectious Diseases Society of America. Hepatitis B virus infection. Last Updated: Last updated: February 25, 2026.

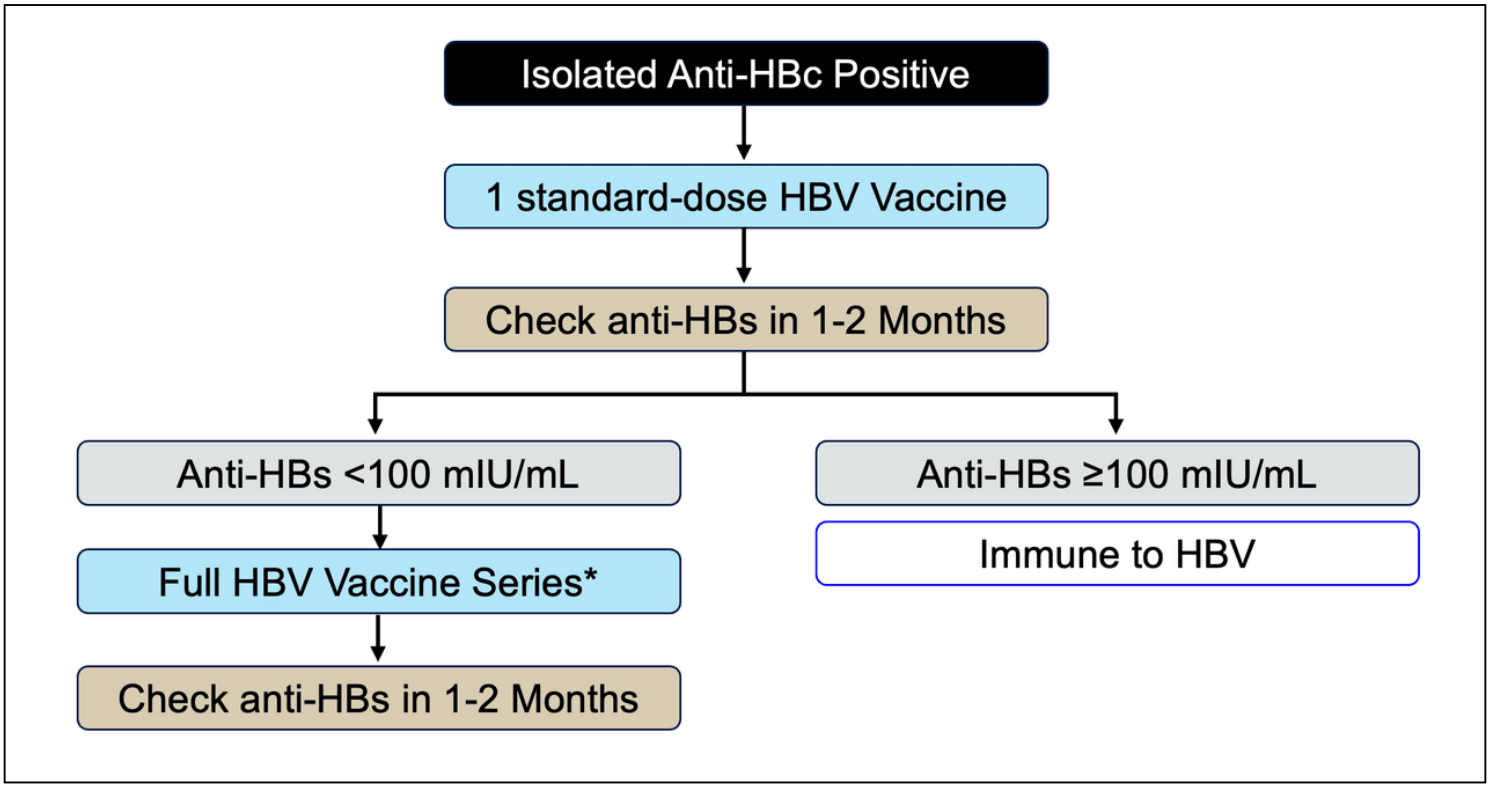

Figure 7 9-valent Human Papillomavirus Vaccine

Illustration: David H. Spach, MD

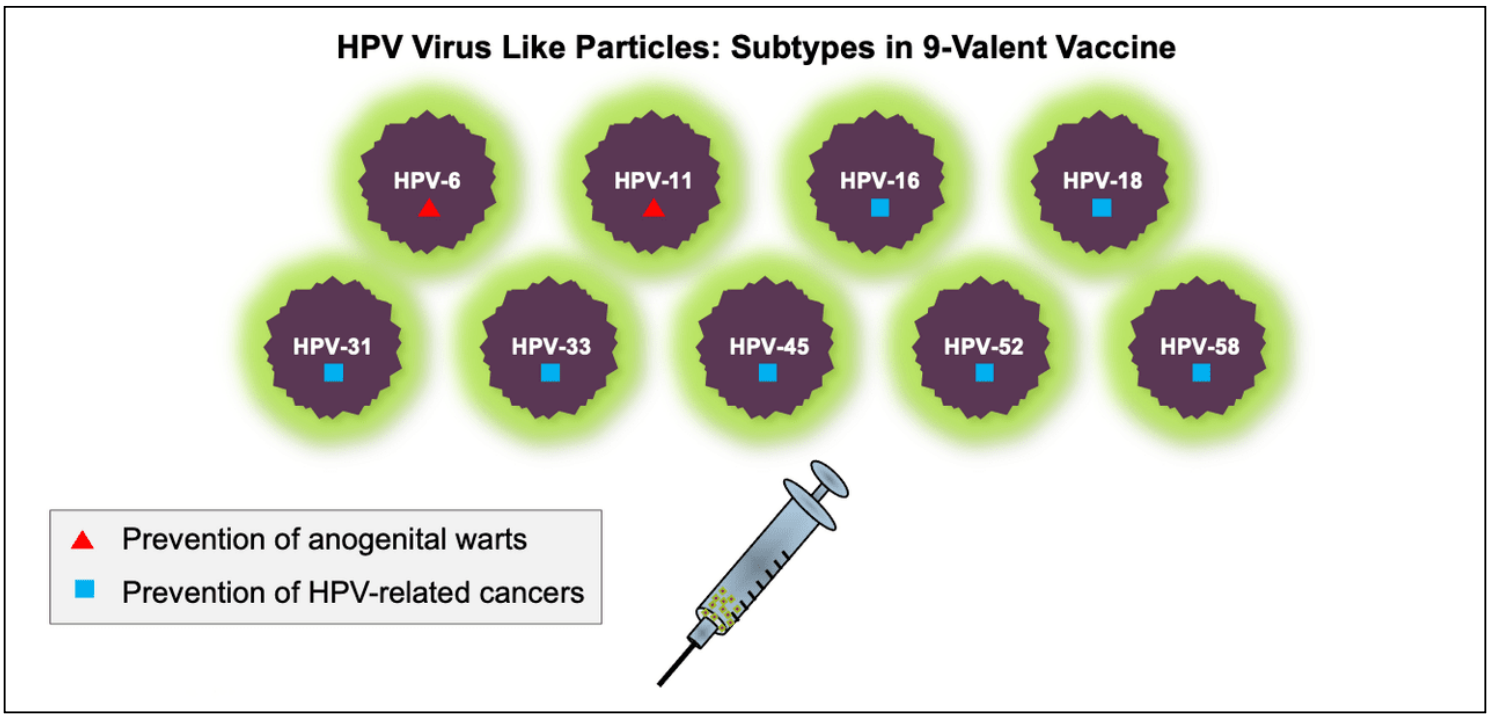

Figure 8 Number of Measles Cases in the United States General Population, Reported by Year, 2010-2026*

*Cases in 2026 indicate cases reported through April 6.

Source: Centers for Disease Control and Prevention

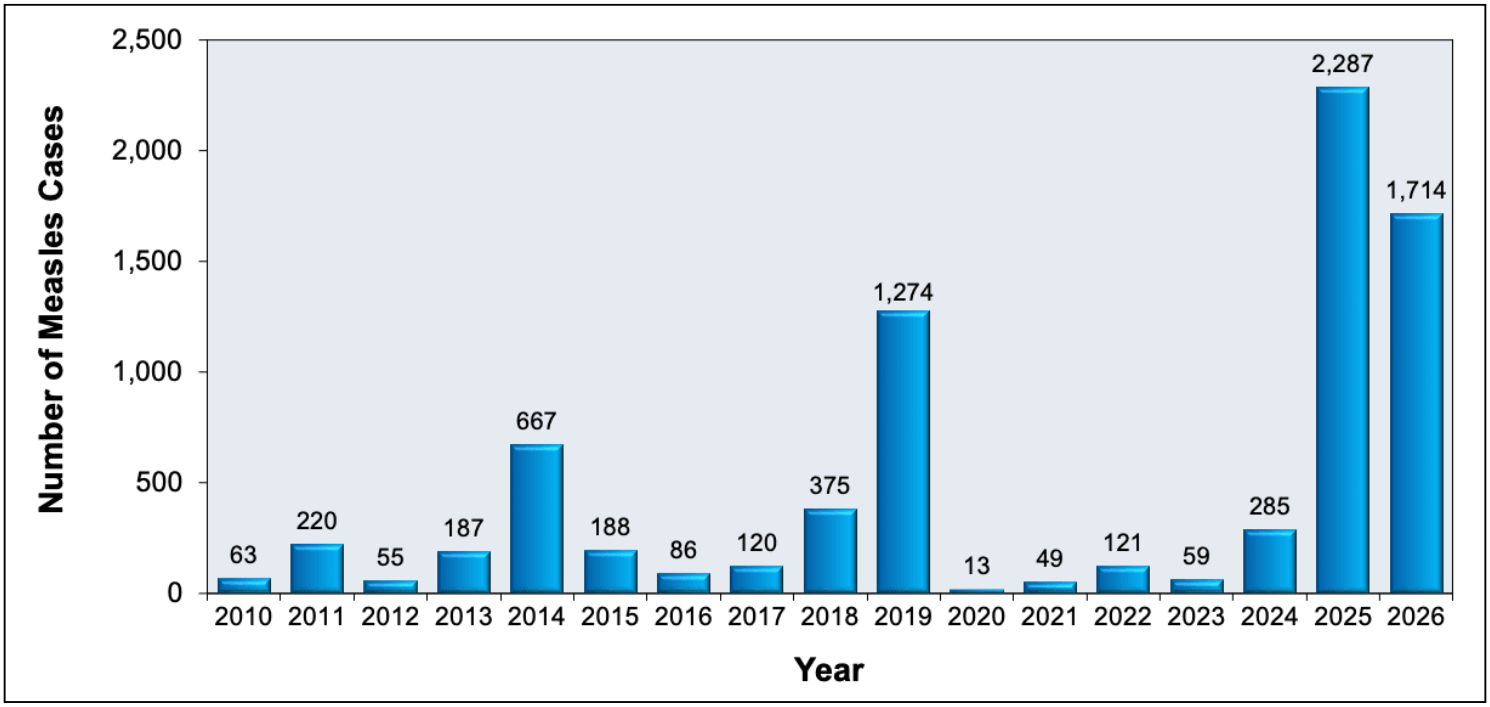

Figure 9 Meningococcal Disease Among People with HIV, United States, 2017-2022

Source: Rubis AB, Howie RL, Marasini D, Sharma S, Marjuki H, McNamara LA. Notes from the Field: Increase in Meningococcal Disease Among Persons with HIV - United States, 2022. MMWR Morb Mortal Wkly Rep. 2023;72:663-4.

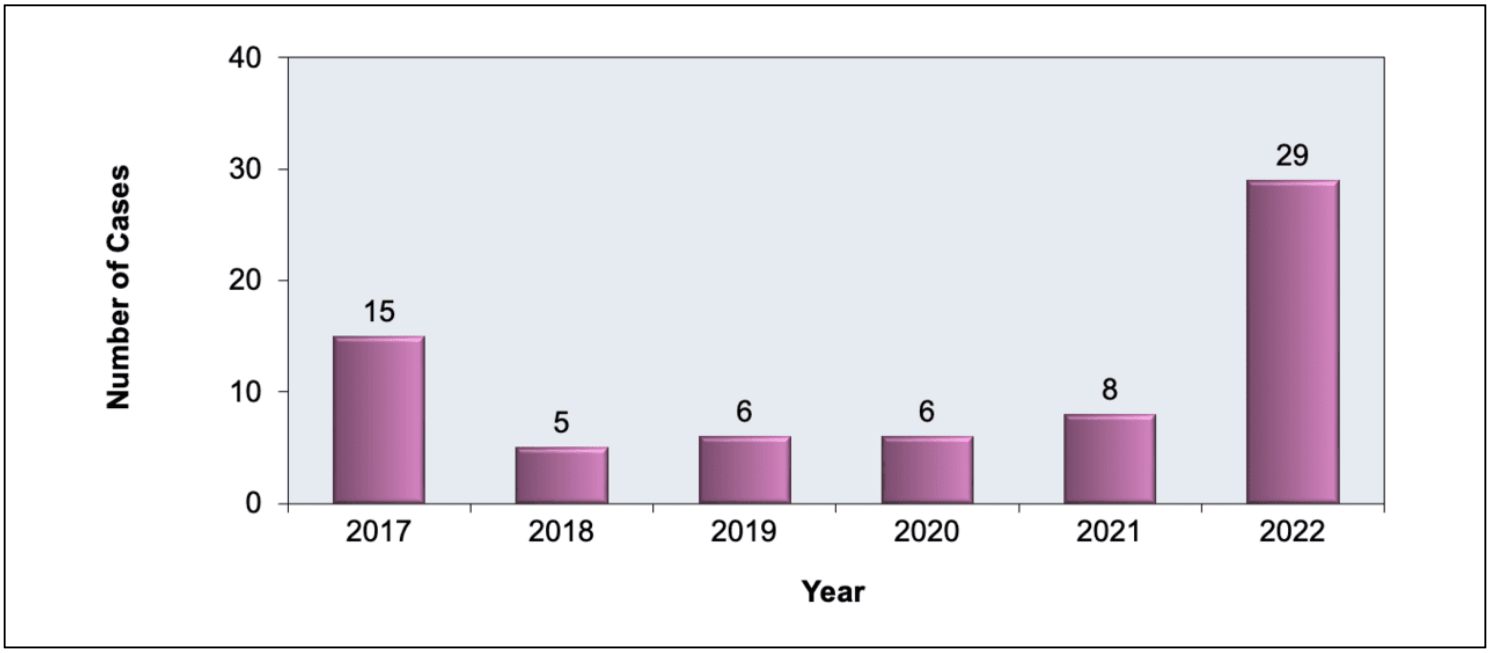

Figure 10 Serotype Composition of Quadrivalent Meningococcal Conjugate Vaccines

Illustration: David H. Spach, MD

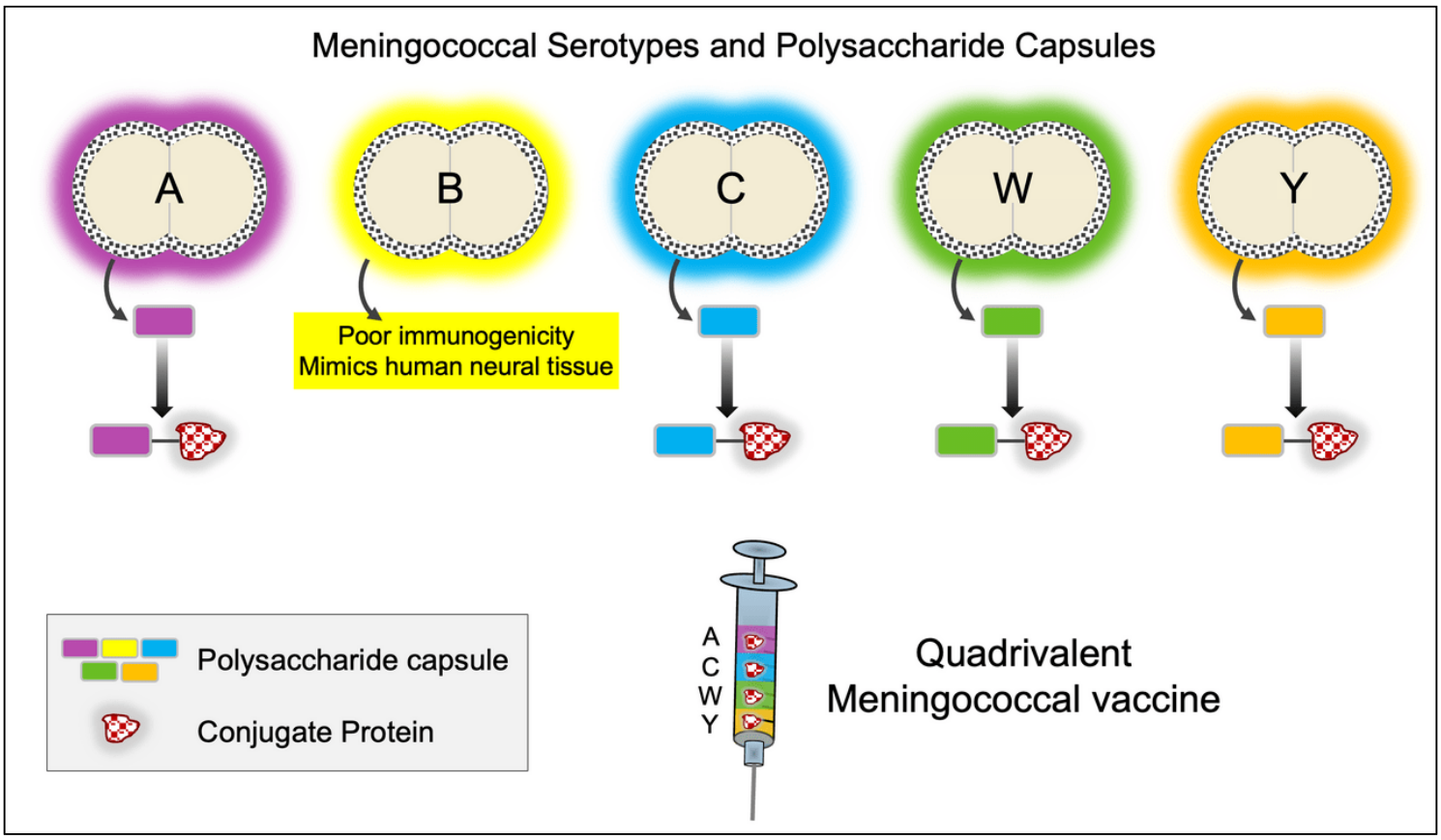

Figure 11 Conjugate Quadrivalent Meningococcal Vaccine in People with HIV

Source: Panel on Opportunistic Infections in Adults and Adolescents with HIV. Guidelines for the prevention and treatment of opportunistic infections in adults and adolescents with HIV: recommendations from the Centers for Disease Control and Prevention, the National Institutes of Health, and the HIV Medicine Association of the Infectious Diseases Society of America. Immunizations for Preventable Diseases in Adults and Adolescents Living with HIV. Last Updated: February 25, 2026.

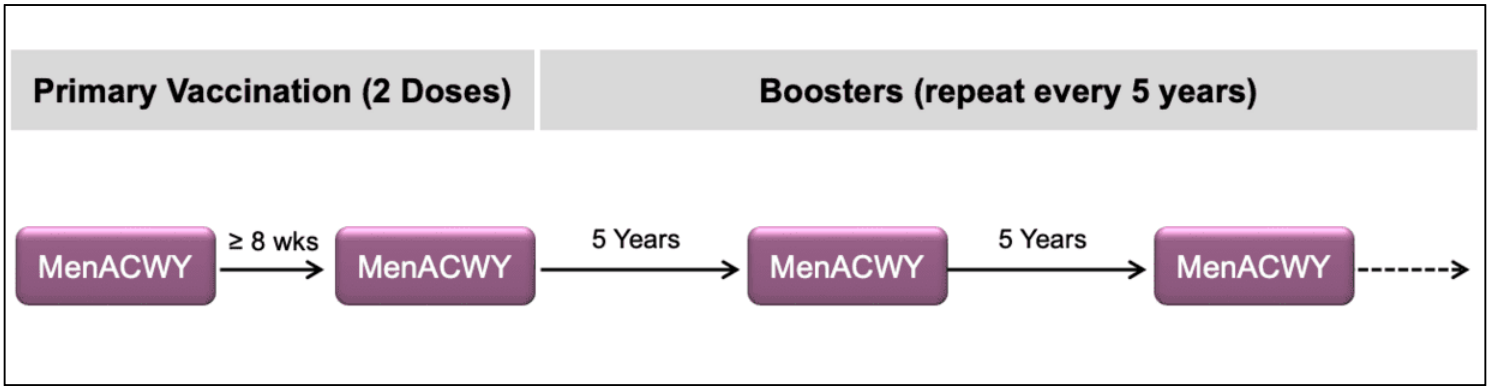

Figure 12 Administration of Mpox Vaccine: Subcutaneous and Intradermal Routes

Illustration: Cognition Studio, Inc. and David H. Spach, MD

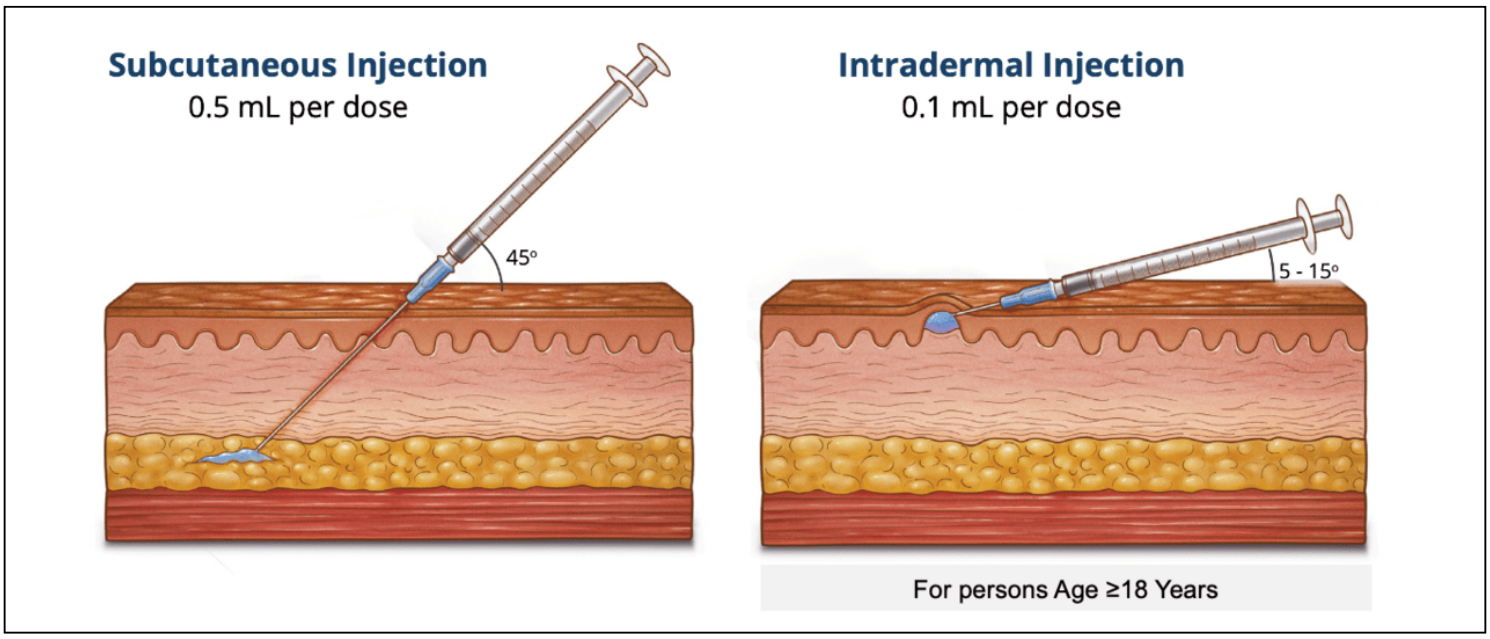

Figure 13 (Image Series) - Mpox Prevention Vaccination in People with HIV (Image Series) -
Figure 13 (Image Series) - Mpox Prevention Vaccination in People with HIV
Image 13A: Mpox Postexposure Prophylaxis in People with HIV

Source: Panel on Opportunistic Infections in Adults and Adolescents with HIV. Guidelines for the prevention and treatment of opportunistic infections in adults and adolescents with HIV: recommendations from the Centers for Disease Control and Prevention, the National Institutes of Health, and the HIV Medicine Association of the Infectious Diseases Society of America. Immunizations for Preventable Diseases in Adults and Adolescents Living with HIV. Last Updated: February 25, 2026.

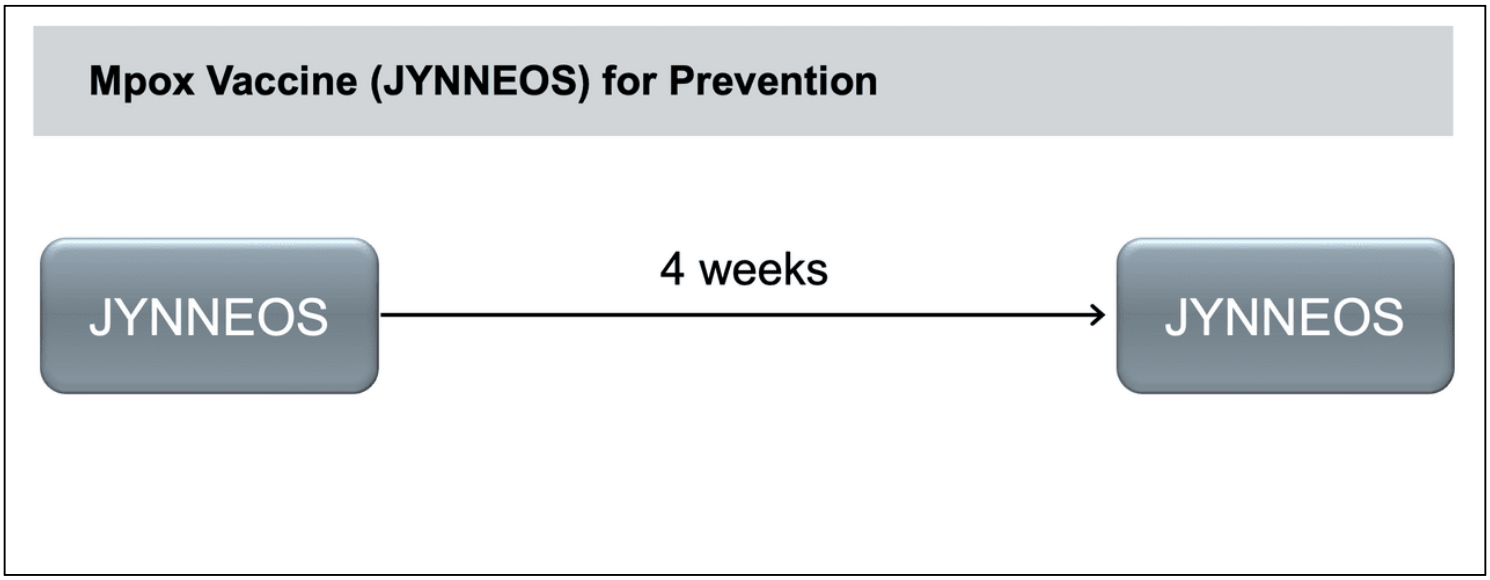

Figure 13 (Image Series) - Mpox Prevention Vaccination in People with HIV
Image 13B: Recommendation for Mpox Postexposure Prophylaxis in People with HIV

Source: Panel on Opportunistic Infections in Adults and Adolescents with HIV. Guidelines for the prevention and treatment of opportunistic infections in adults and adolescents with HIV: recommendations from the Centers for Disease Control and Prevention, the National Institutes of Health, and the HIV Medicine Association of the Infectious Diseases Society of America. Immunizations for Preventable Diseases in Adults and Adolescents Living with HIV. Last Updated: February 25, 2026.

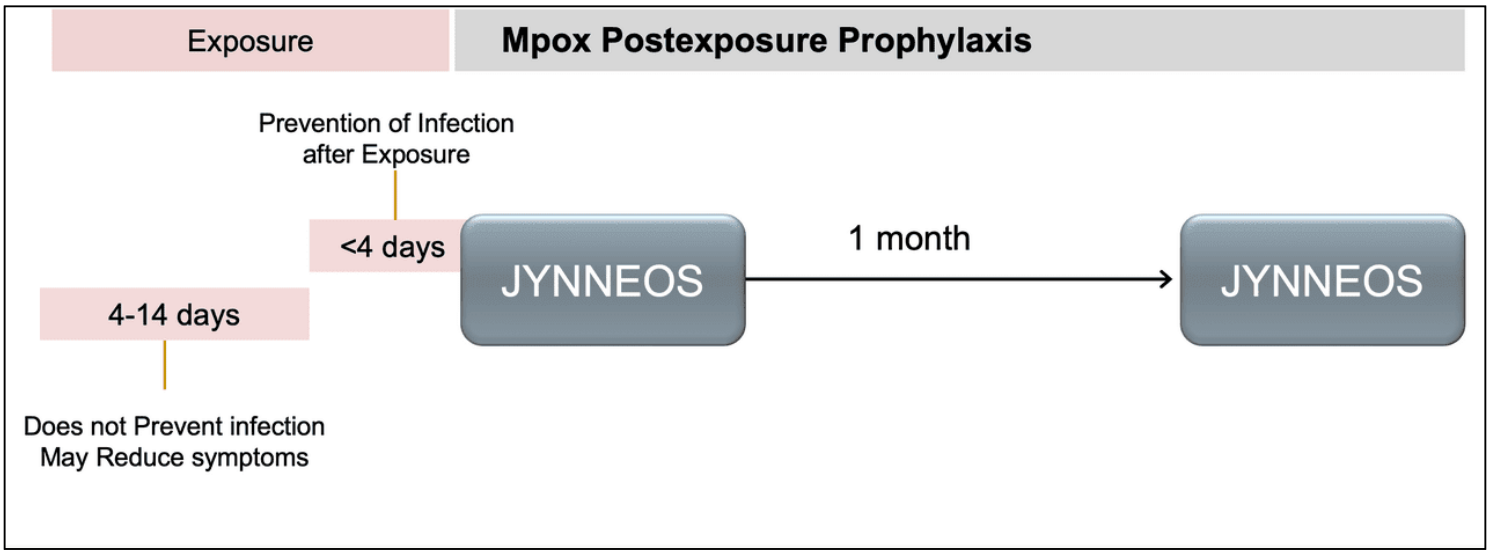

Figure 14 Pneumococcal Serotype in Conjugate Pneumococcal Vaccines

Source: Kobayashi M, Leidner AJ, Gierke R, et al. Use of 21-Valent Pneumococcal Conjugate Vaccine Among U.S. Adults: Recommendations of the Advisory Committee on Immunization Practices - United States, 2024. MMWR Morb Mortal Wkly Rep. 2024;73:793-8.

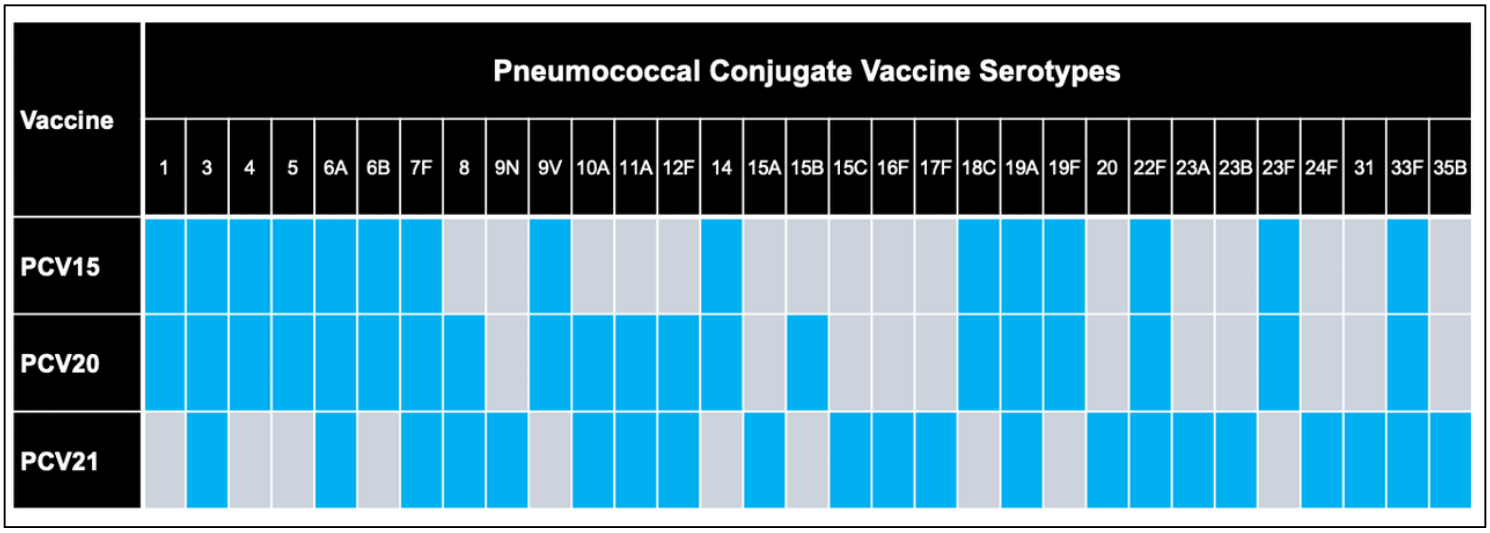

Figure 15 Recommendations for Pneumococcal Immunization in Adults with HIV and No Prior Pneumococcal Immunization

Note: PCV21 is not recommended if the prevalence of pneumococcal serotype 4 is >30% in the region.

Source: Panel on Opportunistic Infections in Adults and Adolescents with HIV. Guidelines for the prevention and treatment of opportunistic infections in adults and adolescents with HIV: recommendations from the Centers for Disease Control and Prevention, the National Institutes of Health, and the HIV Medicine Association of the Infectious Diseases Society of America. Immunizations for Preventable Diseases in Adults and Adolescents Living with HIV. Last Updated: February 25, 2026.

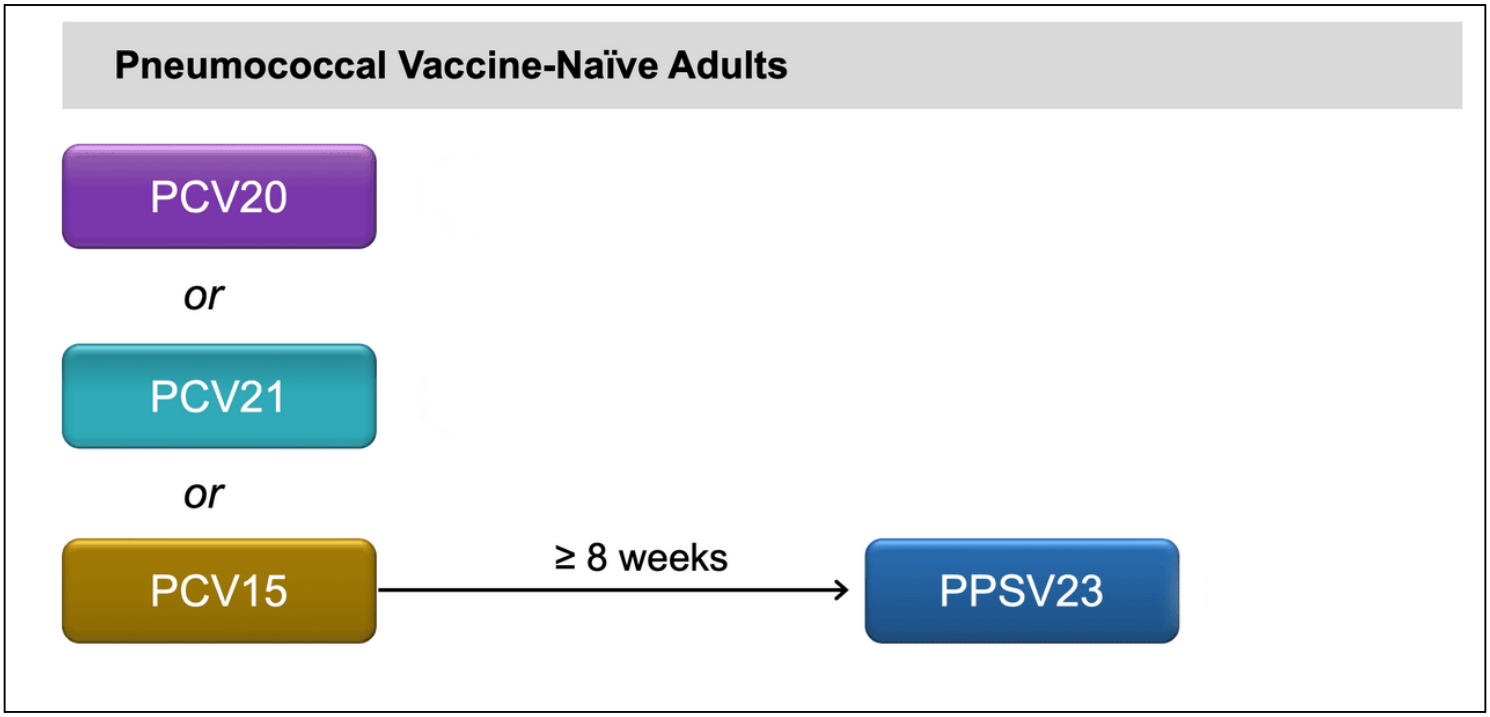

Figure 16 (Image Series) - Prior Receipt of Pneumococcal Vaccine (Image Series) - Figure 16 (Image Series) - Prior Receipt of Pneumococcal Vaccine
Image 16A: Prior Receipt of PCV13 Only

Note: PCV21 is not recommended if the prevalence of pneumococcal serotype 4 is >30% in the region.

Source: Panel on Opportunistic Infections in Adults and Adolescents with HIV. Guidelines for the prevention and treatment of opportunistic infections in adults and adolescents with HIV: recommendations from the Centers for Disease Control and Prevention, the National Institutes of Health, and the HIV Medicine Association of the Infectious Diseases Society of America. Immunizations for Preventable Diseases in Adults and Adolescents Living with HIV. Last Updated: February 25, 2026.

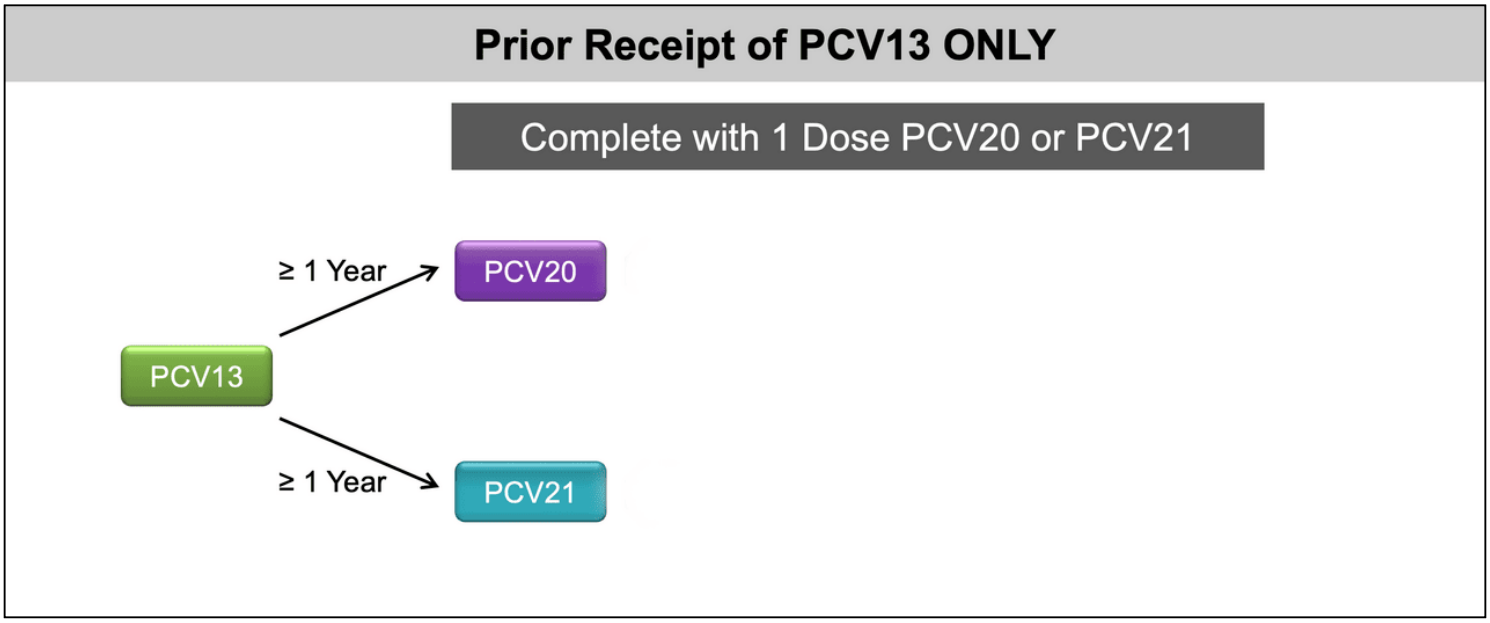

Figure 16 (Image Series) - Prior Receipt of Pneumococcal Vaccine
Image 16B: Prior Receipt of PCV13 and ≥1 Dose PPSV23 (all Prior to Age 65 Years)

Note: PCV21 is not recommended if the prevalence of pneumococcal serotype 4 is >30% in the region.

Source: Panel on Opportunistic Infections in Adults and Adolescents with HIV. Guidelines for the prevention and treatment of opportunistic infections in adults and adolescents with HIV: recommendations from the Centers for Disease Control and Prevention, the National Institutes of Health, and the HIV Medicine Association of the Infectious Diseases Society of America. Immunizations for Preventable Diseases in Adults and Adolescents Living with HIV. Last Updated: February 25, 2026.

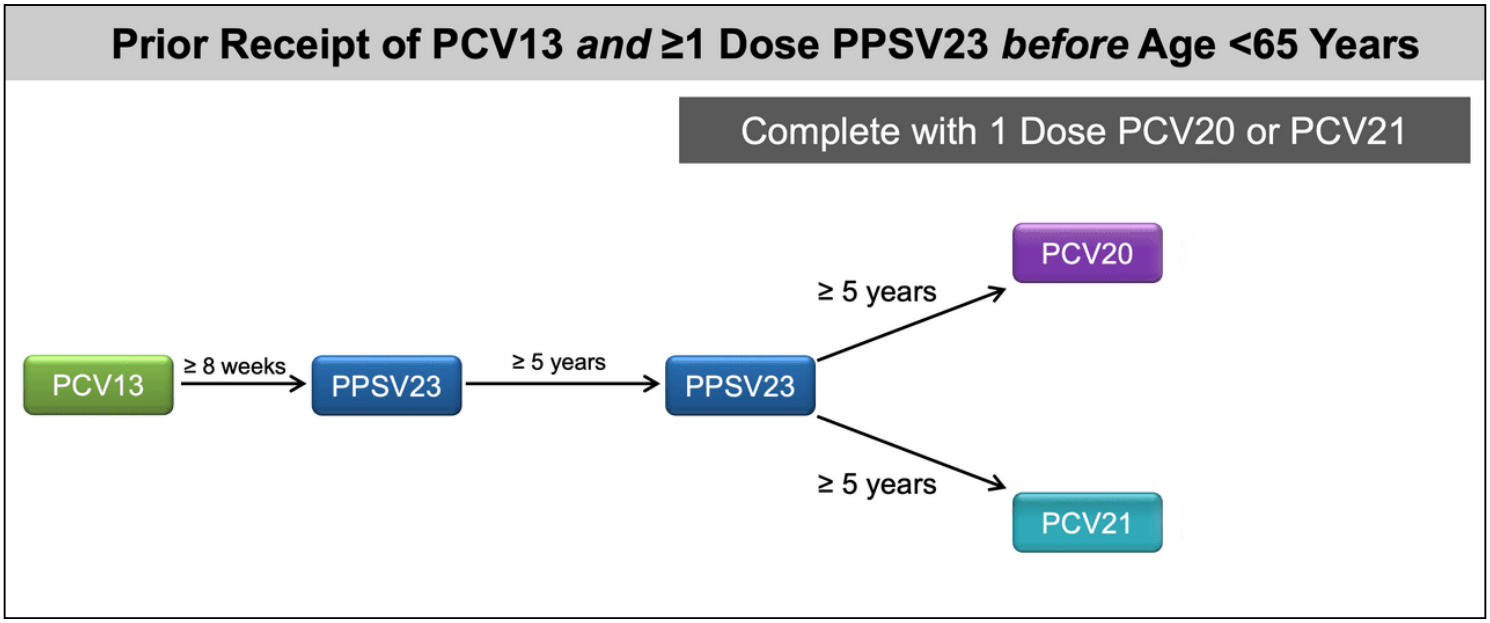

Figure 16 (Image Series) - Prior Receipt of Pneumococcal Vaccine
Image 16C: Prior Receipt of PCV13 and ≥1 Dose PPSV23 (Last Dose ≥Age 65 Years)

Note: PCV21 is not recommended if the prevalence of pneumococcal serotype 4 is >30% in the region.

Source: Panel on Opportunistic Infections in Adults and Adolescents with HIV. Guidelines for the prevention and treatment of opportunistic infections in adults and adolescents with HIV: recommendations from the Centers for Disease Control and Prevention, the National Institutes of Health, and the HIV Medicine Association of the Infectious Diseases Society of America. Immunizations for Preventable Diseases in Adults and Adolescents Living with HIV. Last Updated: February 25, 2026.

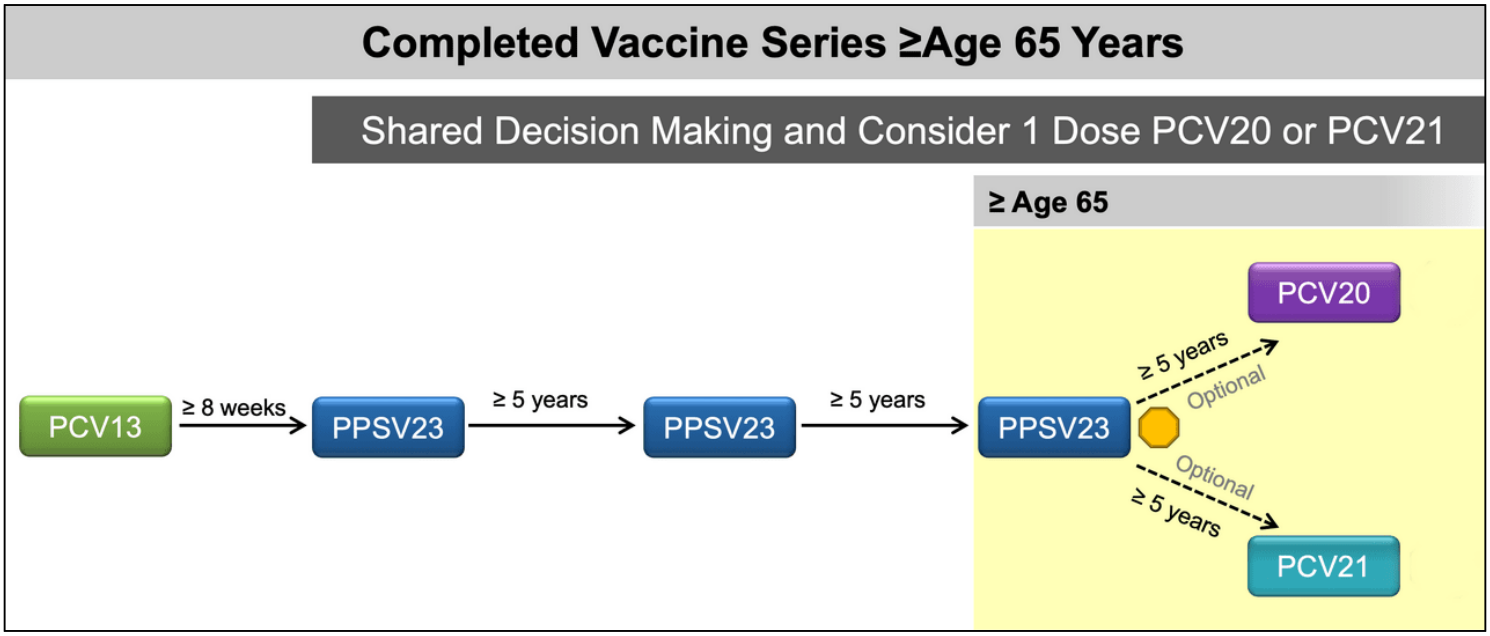

Figure 16 (Image Series) - Prior Receipt of Pneumococcal Vaccine
Image 16D: Prior Receipt of PPSV23 Only

Note: PCV21 is not recommended if the prevalence of pneumococcal serotype 4 is >30% in the region.

Source: Panel on Opportunistic Infections in Adults and Adolescents with HIV. Guidelines for the prevention and treatment of opportunistic infections in adults and adolescents with HIV: recommendations from the Centers for Disease Control and Prevention, the National Institutes of Health, and the HIV Medicine Association of the Infectious Diseases Society of America. Immunizations for Preventable Diseases in Adults and Adolescents Living with HIV. Last Updated: February 25, 2026.

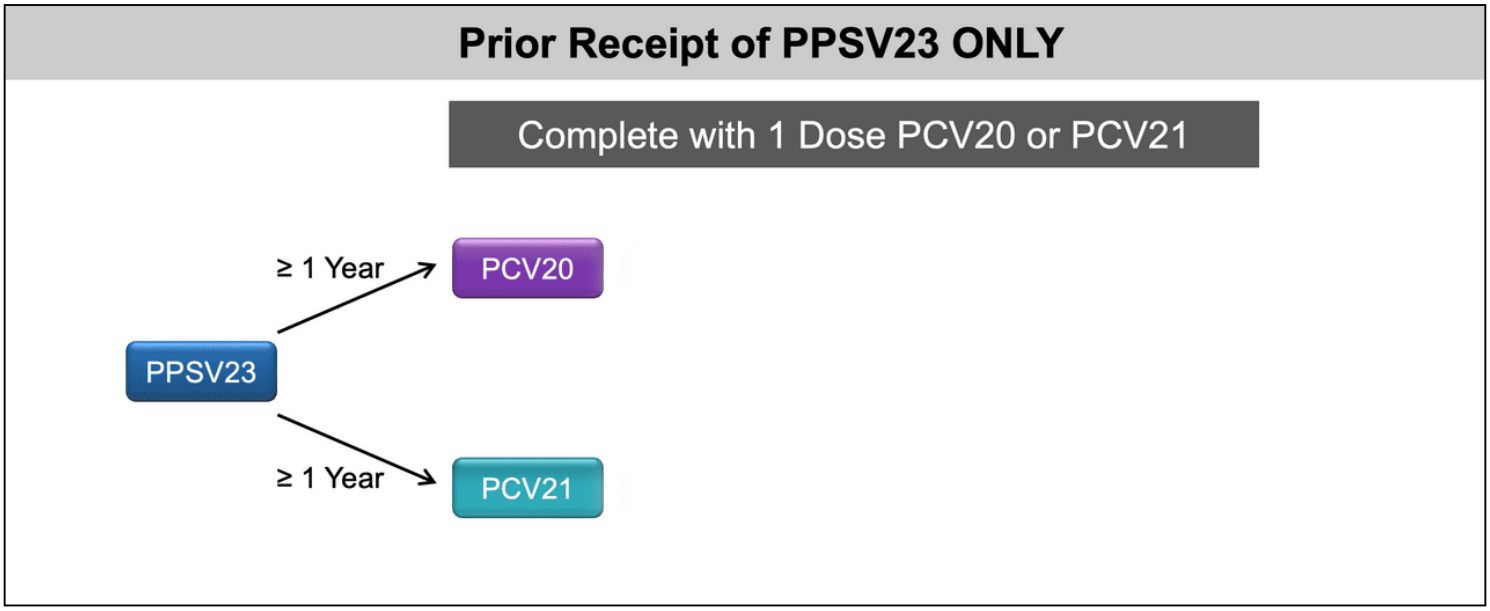

Figure 17 Recombinant Zoster Vaccine

Illustration: David H. Spach, MD

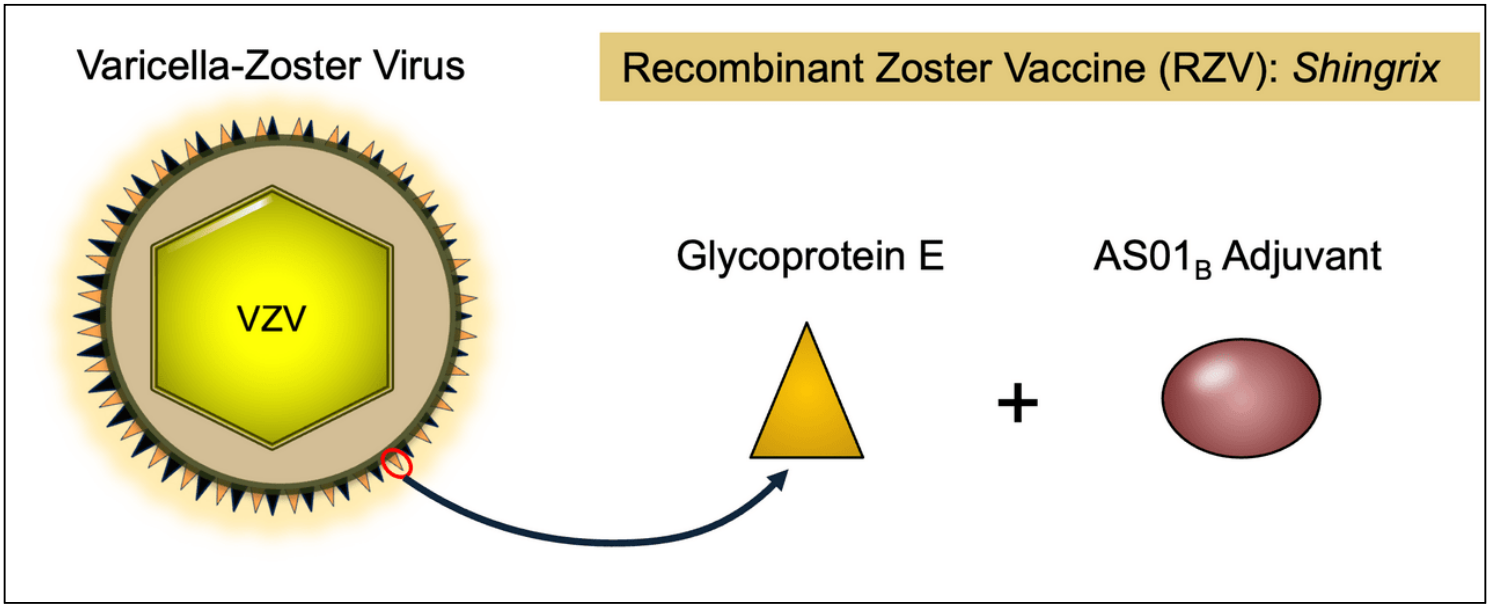

Figure 18 Recommendation for Zoster Vaccine in Persons with HIV

Source: Panel on Opportunistic Infections in Adults and Adolescents with HIV. Guidelines for the prevention and treatment of opportunistic infections in adults and adolescents with HIV: recommendations from the Centers for Disease Control and Prevention, the National Institutes of Health, and the HIV Medicine Association of the Infectious Diseases Society of America. Immunizations for Preventable Diseases in Adults and Adolescents Living with HIV. Last Updated: February 25, 2026.

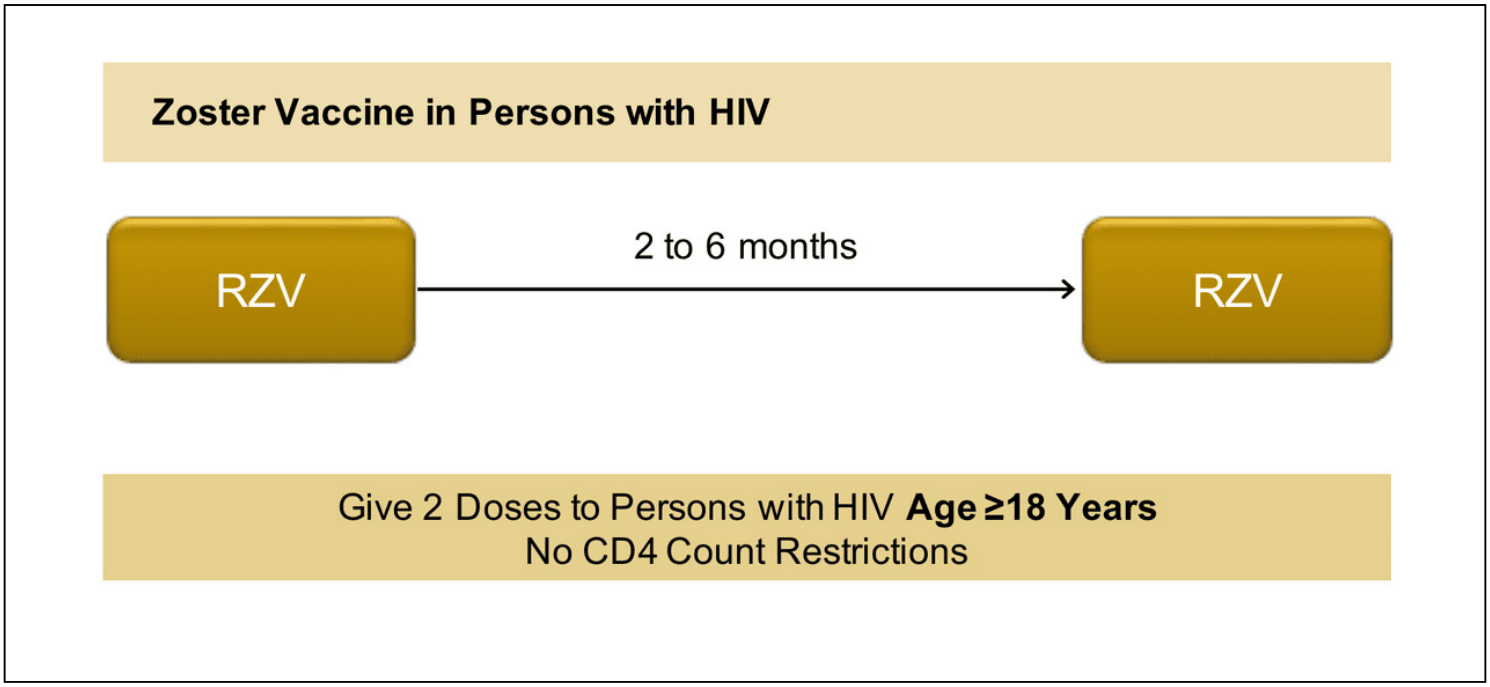

Table 1. Recommended Immunizations for Adults with HIV

Guidelines for the Prevention and Treatment of Opportunistic Infections in Adults and Adolescents with HIV

Recommended Immunizations for Adults with HIV

Vaccines	Abbreviations	CD4 count <200 cells/mm^3	CD4 count ≥200 cells/mm^3	Pr
COVID-19	1vCOV-mRNA 1vCOV-aps	**Recommended** Number of doses depends on vaccine and prior COVID immunization history Consider an additional dose 6 months after the last dose	**Recommended** Number of doses depends on vaccine and prior COVID immunization history	
Hepatitis A	HepA	**Recommended** 2 or 3 doses depending on vaccine formulation		
Hepatitis B	HepB	**Recommended** 2 or 3 doses depending on vaccine formulation		
Human papillomavirus	9vHPV	**Recommended** 3 doses through age 26 years (0, 1–2, and 6 months)		
		Consider (with shared decision-making) 3 doses for ages 27–45 years (0, 1–2, and 6 months)		
Influenza inactivated 3, or Influenza recombinant 3	IIV3 RIV3	**Recommended** 1 dose annually		
Influenza live, attenuated	LAIV3	**Contraindicated**		
Measles-mumps-rubella	MMR	**Contraindicated**	*With no evidence of immunity* **Recommended** 2 doses (≥4 weeks apart)	rec
Meningococcal serogroups A, C, W, Y	MenACWY-CRM MenACWY-TT	**Recommended** 2 doses (at least 8 weeks apart), then revaccinate every 5 years		
Meningococcal serogroup B	MenB-4C MenB-FHbp	**Consider for Persons at Risk** Shared Decision-Making 3 doses (0, 1, and 6 months)		
Mpox		**Recommended for Persons at Risk** 2 doses (28 days apart)		Sl
Pneumococcal	PCV15 PCV20 PCV21 PPSV23	**Recommended** 1 dose PCV20 or PCV21 *or* 1 dose PCV15 followed ≥8 weeks by 1 dose PPSV23		
Respiratory Syncytial Virus	RSV	**Recommended** (for adults aged ≥75 years) *or* Adults aged 60-74 years with comorbid condition) 1 dose		
		Consider (if aged 60-74 years and CD4 count <200 cells/mm^3) 1 dose		
Tetanus-diphtheria-	Tdap	**Recommended**		

Vaccines	Abbreviations	CD4 count <200 cells/mm^3	CD4 count ≥200 cells/mm^3	Pr
acellular pertussis Tetanus-diphtheria	Td	1 dose Tdap then Td or Tdap booster every 10 years		e
Varicella	VAR	**Contraindicated**	*With no evidence of immunity* **Consider** 2 doses (3 months apart)	Con
Zoster, recombinant	RZV	**Recommended** 2 doses (2–6 months apart) at age ≥19 years		

Source:

- Panel on Guidelines for the Prevention and Treatment of Opportunistic Infections in Adults and Adolescents with HIV. Guidelines for the prevention and treatment of opportunistic infections in adults and adolescents with HIV. National Institutes of Health, HIV Medicine Association, and Infectious Diseases Society of America. Immunizations for Preventable Diseases in Adults and Adolescents with HIV. Last updated: February 24, 2026. [HIV.gov]

Table 2. Vaccines Routinely Administered to Adults with HIV

Vaccines	Abbreviations	Trade Names
COVID-19 vaccine	1vCoVmRNA	*Comirnaty* *Spikevax* *mNexspike*
	1vCoVaPS	*Novavax*
Hepatitis A vaccine	HepA	*Havrix* *Vaqta*
Hepatitis A and hepatitis B vaccine	HepA-HepB	*Twinrix*
Hepatitis B vaccine	HepB	*Engerix-B* *Heplisav-B* *Recombivax H*
Human papillomavirus vaccine	HPV	*Gardasil* 9
Influenza vaccine (inactivated, egg-based)	IIV3	Multiple optior
	aIIV3	*Fluad*
	HD-IIV3	*Fluzone* High-D
Influenza vaccine (inactivated, cell culture)	ccIIV3	*Flucelvax*
Influenza vaccine (recombinant)	RIV3	*Flublok*
Measles, mumps, and rubella vaccine	MMR	M-M-R II *Priorix*
Meningococcal serogroups A, C, W, Y vaccine	MenACWY-CRM	*Menveo*
	MenACWY-TT	*MenQuadfi*
Meningococcal serogroup B vaccine	MenB-4C	*Bexsero*
	MenB-FHbp	*Trumenba*
Meningococcal serogroups A, B, C, W, Y vaccine	MenACWY-TT/Men B-FHbp	*Penbraya*
	MenACWY-CRM/Men B-4C	*Penmenvy*
Mpox vaccine	Mpox	*Jynneos*
Pneumococcal conjugate vaccine	PCV15	*Vaxneuvance*
	PCV20	*Prevnar* 20
	PCV21	*Capvaxive*
Pneumococcal polysaccharide vaccine	PPSV23	*Pneumovax* 23
Respiratory syncytial virus vaccine	RSV	*Abrysvo* *Arexvy* *mResvia*
Tetanus and diphtheria toxoid vaccine	Td	*Tenivac*
Tetanus and diphtheria toxoids and acellular pertussis vaccine	Tdap	*Adacel* *Boostrix*
Varicella vaccine	VAR	*Varivax*
Zoster vaccine, recombinant vaccine	RZV	*Shingrix*

Table 3. Recommended Hepatitis A Vaccines in Adults with HIV

Vaccine	Dosage	Dosing and Route
Hepatitis A Vaccines		
Havrix	1440 EL.U	2-Dose Schedule: 1 mL given IM at 0 and 6-12 months
Vaqta	50 U	2-Dose Schedule: 1 mL given IM at 0 and 6-18 months
Combined Hepatitis A and B Vaccine		
Twinrix	HAV: 720 EL.U *plus* HBsAg: 20 mcg	Standard 3-dose series: 1 mL given IM at 0, 1, and 6 months Accelerated 4-dose series (for travel): 1 mL given IM on days 0, 7, ar followed by a booster dose at month 12
Abbreviations: HAV = hepatitis A virus; HBsAg = hepatitis B surface antigen; IM = intramuscular		

Table 4. RSV Vaccines in People with HIV

Guidelines for the Prevention and Treatment of Opportunistic Infections in Adults and Adolescents with HIV

Recommendations for RSV Vaccines in People with HIV

Patient Populations	Recommendation	Timing of Vaccine
Aged ≥75 years	Single dose of one of the following: • *Arexvy* • *Abrysvo* • *mRSEVIA*	Ideally prior to the fall and winter RSV season
Age 50-74 years with: • CD4 count <200 cells/mm^3, *or* • Comorbid conditions associated with increased risk for severe RSV disease*	Single dose of one of the following: • *Arexvy* • *Abrysvo* • *mRSEVIA*	Ideally prior to the fall and winter RSV season
Pregnant women	Single dose of: • *Abrysvo*	Give during weeks 32–36 of pregnancy (if during the months of September to January)

Abbreviations: RSV = Respiratory syncytial virus
*Comorbid conditions that increase risk for severe RSV: chronic cardiovascular disease, chronic lung or respiratory disease, end-stage renal disease or dependence on hemodialysis or other renal replacement therapy, diabetes mellitus with complication or requiring treatment with insulin or sodium-glucose cotransporter-2 (SGLT2) inhibitor, neurologic or neuromuscular conditions causing impaired airway clearance or respiratory muscle weakness, chronic liver disease, chronic hematologic conditions, severe obesity (body mass index ≥40 kg/m^2), moderate or severe immune compromise, residence in a nursing home, other chronic medical conditions or risk factors that a health care provider determines would increase the risk for severe disease due to viral respiratory infection.

Source:

- Panel on Guidelines for the Prevention and Treatment of Opportunistic Infections in Adults and Adolescents with HIV. Guidelines for the prevention and treatment of opportunistic infections in adults and adolescents with HIV. National Institutes of Health, HIV Medicine Association, and Infectious Diseases Society of America. Immunizations for Preventable Diseases in Adults and Adolescents with HIV. Last updated: February 24, 2026. [HIV.gov]