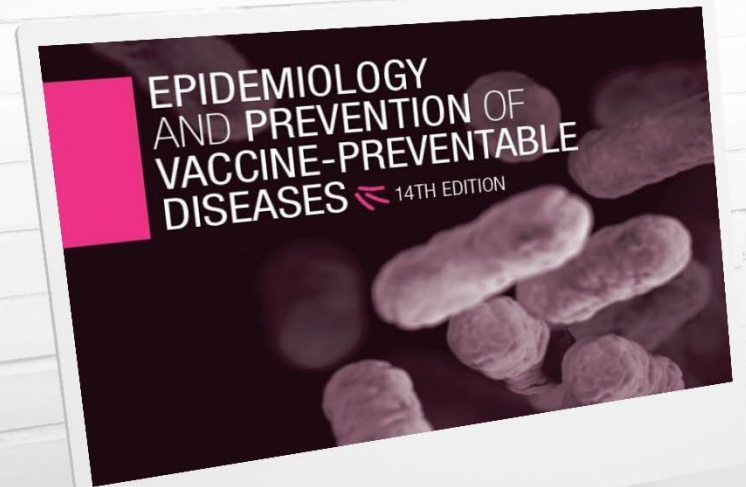


# Principles of Vaccination

Pink Book Web-on-Demand Series

July 2, 2024

JoEllen Wolicki, BSN, RN  
Nurse Educator  
Immunization Services Division  
National Center for Immunization and Respiratory Diseases  
Centers for Disease Control and Prevention





## Learning Objectives

- Describe the fundamental principles of the immune response.
- Describe immunization best practices.
- Describe an emerging immunization issue.
- For each vaccine-preventable disease, identify those for whom routine immunization is recommended.
- For each vaccine-preventable disease, describe characteristics of the vaccine used to prevent the disease.
- Locate current immunization resources to increase knowledge of team's role in program implementation for improved team performance.

# Continuing Education Information

- To claim continuing education (CE) for this course, please follow the steps below by **July 2, 2026**.
- Search and register for course WD4810-070224 in CDC TRAIN.
- Pass the post-assessment at 80%.
- Complete the evaluation.
- Visit “Your Learning” to access your certificates and transcript.
- If you have any questions, contact CDC TRAIN at [train@cdc.gov](mailto:train@cdc.gov) or CE Coordinator, Melissa Barnett, at [MBarnett2@cdc.gov](mailto:MBarnett2@cdc.gov)



# Disclosure Statements

- In compliance with continuing education requirements, all planners and presenters must disclose all financial relationships, in any amount, with ineligible companies during the previous 24 months as well as any use of unlabeled product(s) or products under investigational use.
- CDC, our planners, and content experts, wish to disclose they have no financial relationship(s) with ineligible companies whose primary business is producing, marketing, selling, reselling, or distributing healthcare products used by or on patients.
- Content will not include any discussion of the unlabeled use of a product or a product under investigational use.
- CDC did not accept financial or in-kind support from any ineligible company for this continuing education activity.

# Disclosure Statements

The findings and conclusions in this presentation are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

**1**

**Immunity**

# Human Immune System

- Complex network of interacting cells and proteins whose purpose is to identify, and eliminate, foreign substances



American Academy of Pediatrics. Active and passive immunization. In: Kimberlin D, Brady M, Jackson M, et al., eds. Red Book: 2018 Report of the Committee on Infectious Diseases. 31st ed. Itasca, IL: American Academy of Pediatrics;2018:13–64.

[Pinkbook](#) | [Principles of Vaccination](#) | [Epidemiology of VPDs](#) | [CDC](#)

Plotkin S. Vaccines, vaccination, and vaccinology. *J Infect Dis* 2003;187:1347–59.

Siegrist C. Vaccine immunology. In: Plotkin S, Orenstein W, Offit P, et al., eds. *Plotkin's Vaccines*. 7th ed. Elsevier;2018:16–34.

# Immunity

- The ability of the human body to:
  - Tolerate the presence of material indigenous to the body
  - Eliminate foreign substances
- Self vs. “non-self”

American Academy of Pediatrics. Active and passive immunization. In: Kimberlin D, Brady M, Jackson M, et al., eds. Red Book: 2018 Report of the Committee on Infectious Diseases. 31st ed. Itasca, IL: American Academy of Pediatrics;2018:13–64.

[Pinkbook](#) | [Principles of Vaccination](#) | [Epidemiology of VPDs](#) | [CDC](#)

Plotkin S. Vaccines, vaccination, and vaccinology. *J Infect Dis* 2003;187:1347–59.

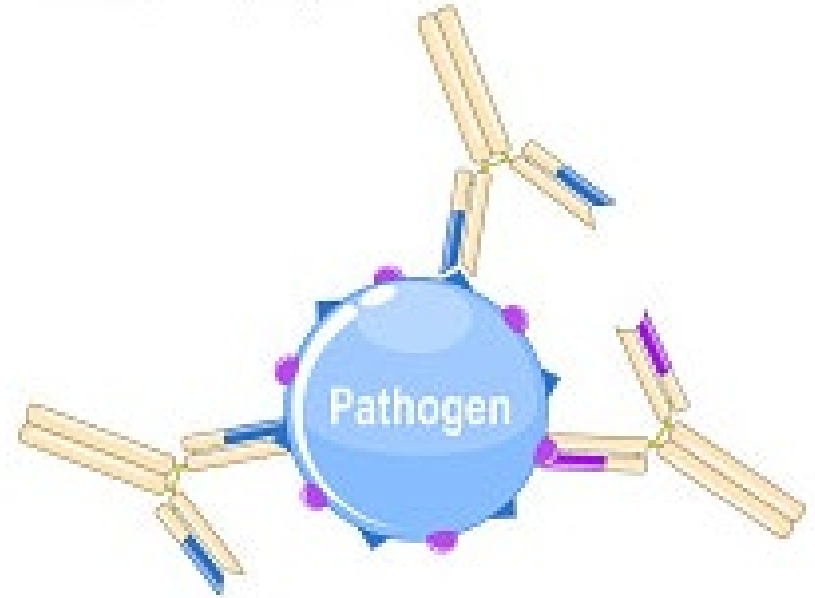
Siegrist C. Vaccine immunology. In: Plotkin S, Orenstein W, Offit P, et al., eds. *Plotkin's Vaccines*. 7th ed. Elsevier;2018:16–34.





# Immunity, cont.

- Most organisms recognized as foreign.
  - Virus, bacteria, fungi
  - Immune system provides protection from infectious diseases.
- Immunity is generally specific to a single organism.
  - E.g., immunity against a specific bacteria will not protect against a specific virus.



American Academy of Pediatrics. Active and passive immunization. In: Kimberlin D, Brady M, Jackson M, et al., eds. Red Book: 2018 Report of the Committee on Infectious Diseases. 31st ed. Itasca, IL: American Academy of Pediatrics;2018:13–64.

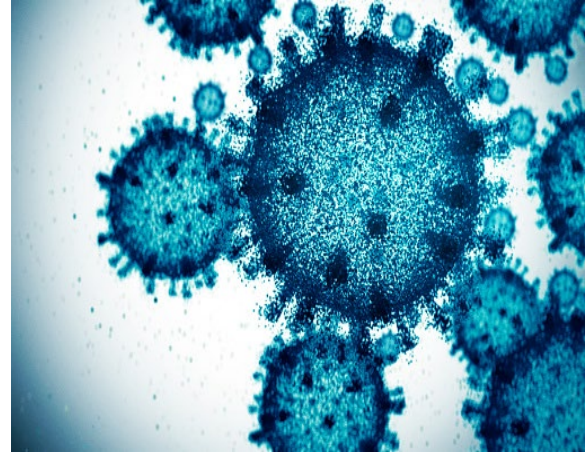
[Pinkbook](#) | [Principles of Vaccination](#) | [Epidemiology of VPDs](#) | [CDC](#)

Plotkin S. Vaccines, vaccination, and vaccinology. *J Infect Dis* 2003;187:1347–59.

Siegrist C. Vaccine immunology. In: Plotkin S, Orenstein W, Offit P, et al., eds. *Plotkin's Vaccines*. 7th ed. Elsevier;2018:16–34.

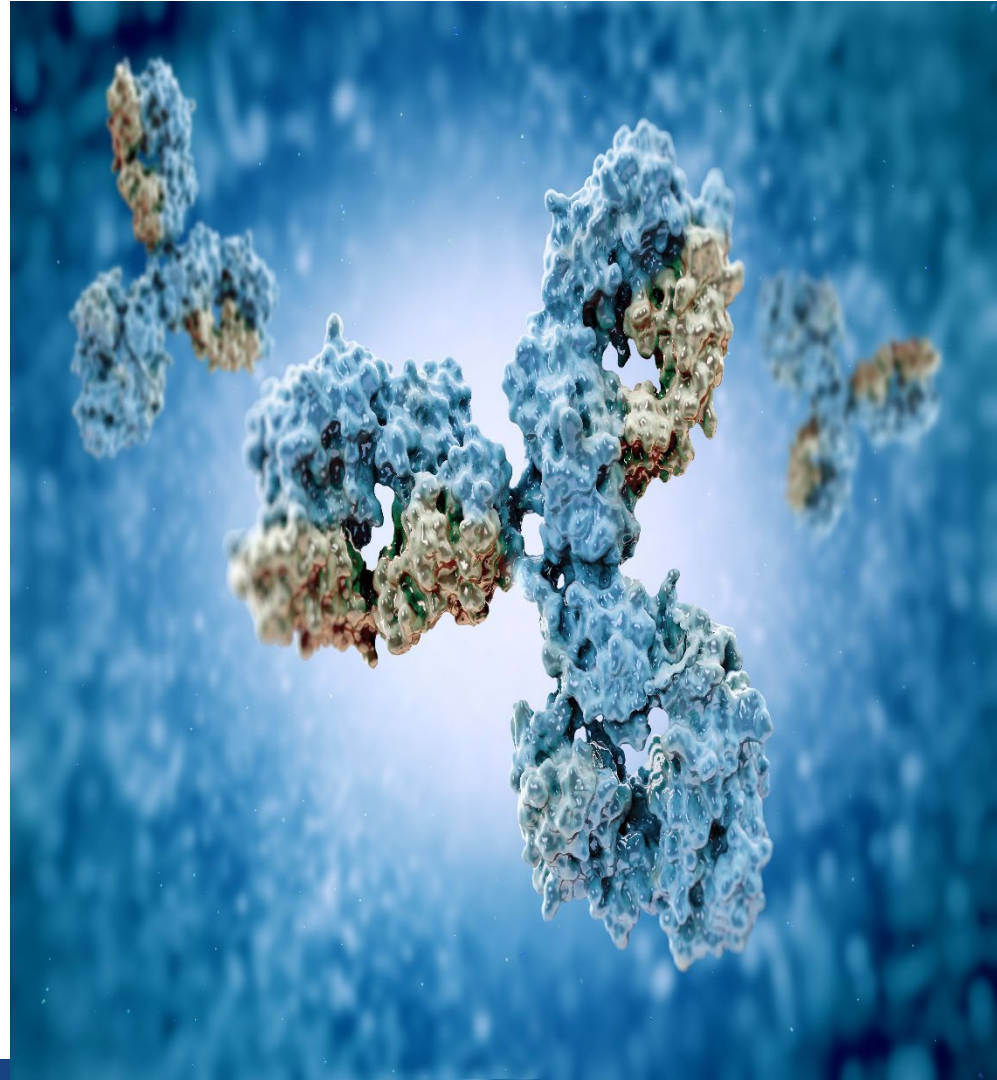
# Antigen

- Live or inactivated substances (e.g., viruses, bacteria, toxins)
  - Capable of stimulating an immune response
- Antigen = antibody generator



# Antibody

- Protein molecules (immunoglobulins)
- Help infection-fighting cells recognize and kill foreign organisms, including viruses
- Antibodies are produced by the body



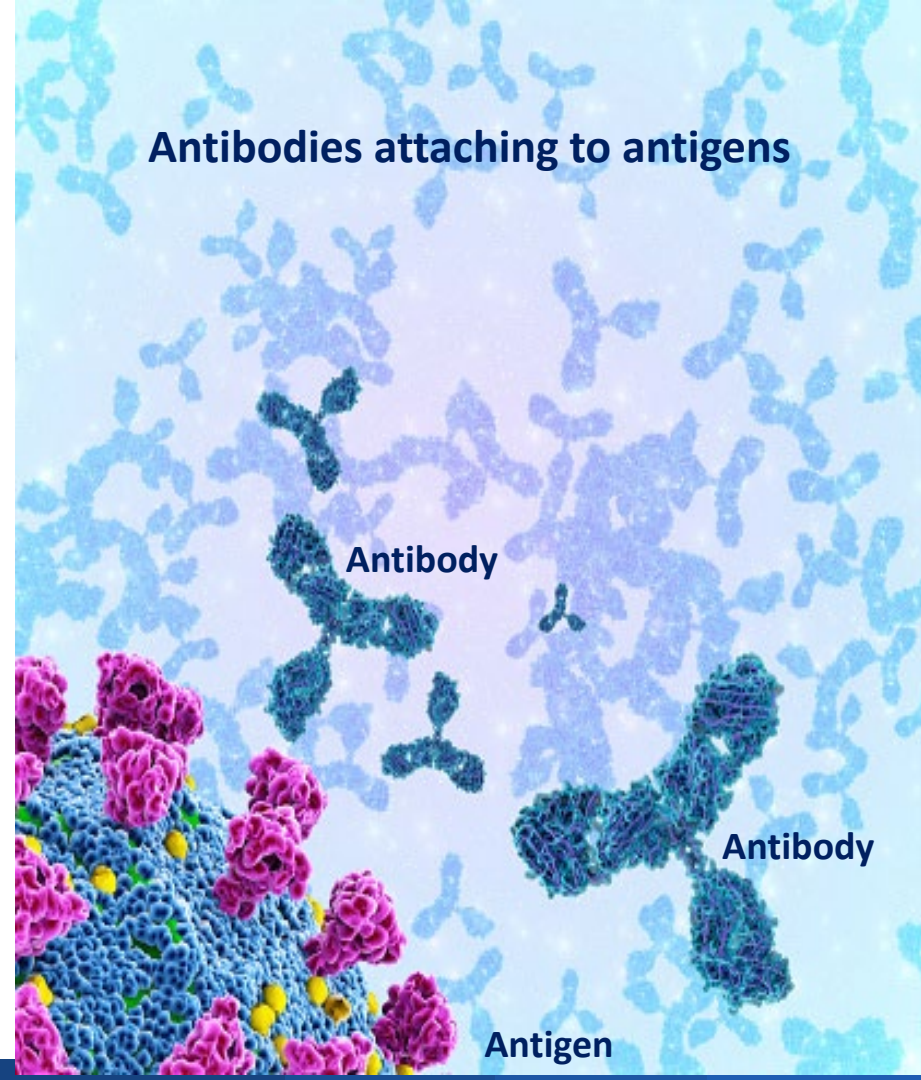
# Arms of the Immune System

- Humoral
- Cell-mediated

Antigen

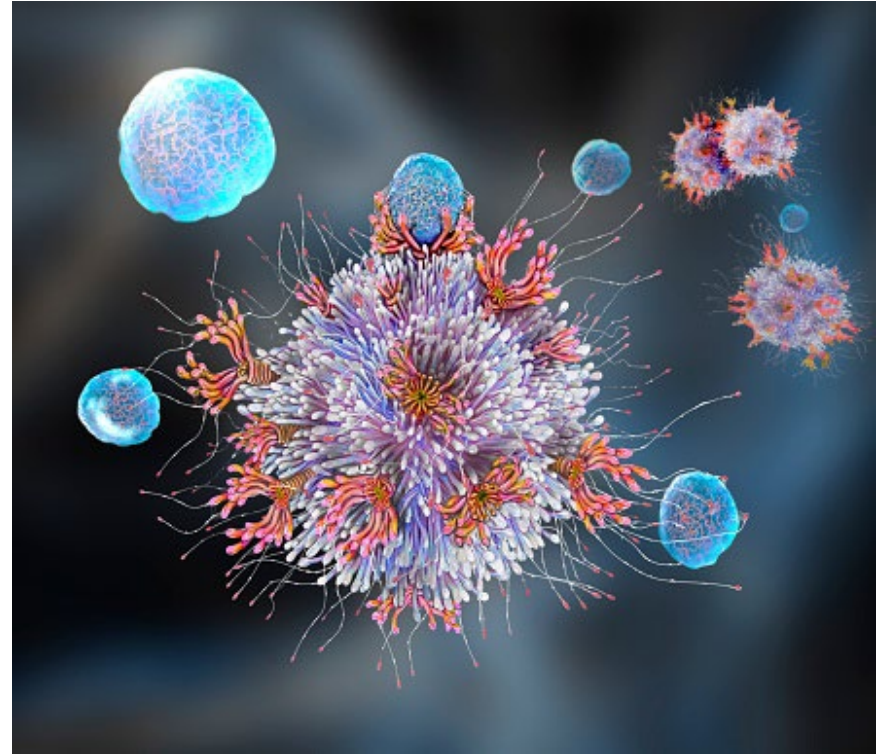
# Arms of the Immune System, cont.

- Humoral
  - Antibodies attach to invading organisms and interfere with its ability to produce more invading organisms.
  - Antibodies are produced by B-cells (lymphocytes) to bind to a corresponding antigen, such as a virus (lock and key mechanism).

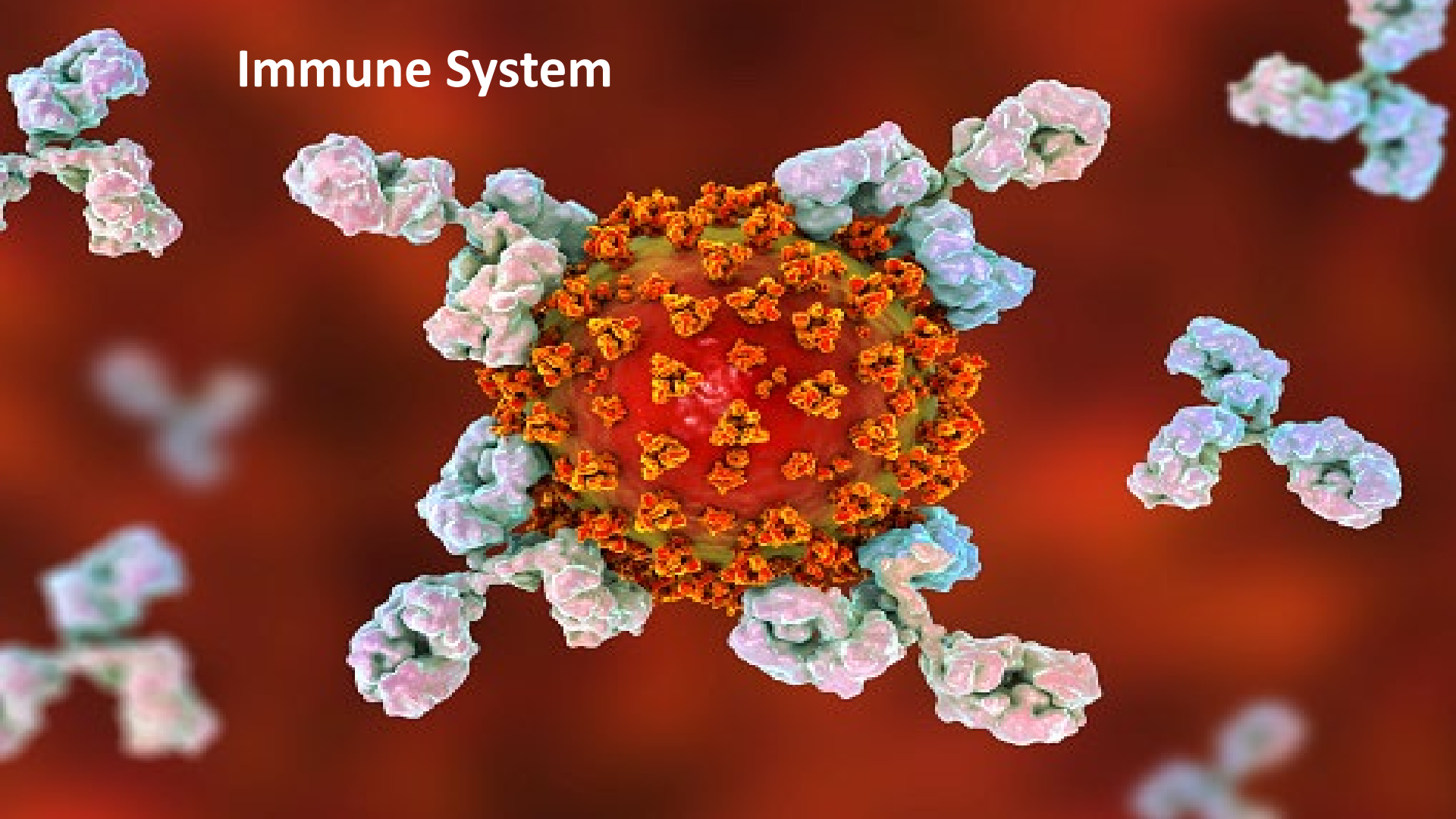


# Arms of the Immune System, cont.

- Cell-mediated
  - Involves the activation of T-cells, macrophages, and other substances that eliminate the antigen.
  - T-cells mature in the thymus gland.



# Immune System





## Knowledge Check

Which of the following helps infection-fighting cells recognize and kill a microorganism?

- A. Antigen
- B. Antibody







## Answer

Which of the following helps infection-fighting cells recognize and kill a microorganism?

A. Antigen

**B. Antibody**

# 2

## **Types of Immunity: Passive and Active**

# Types of Immunity

- Passive immunity
- Active immunity

# Passive Immunity

- Passive immunity is the transfer of antibody produced by one human, animal, or recombinant technology, to another.
- It is temporary protection that wanes with time.
- There are different sources.

# Sources of Passive Immunity (1)

- Transfer of antibody from the mother through placenta to the infant.
- These antibodies can help protect the baby from some diseases during the first few months of life.



## Sources of Passive Immunity (2)

- Many types of blood or blood products
- Homologous pooled human antibody (immune globulin or IG)
  - IgG antibody from the blood of thousands of adult donors
  - Hepatitis A and measles post-exposure prophylaxis (PEP)



# Sources of Passive Immunity (3)

- Homologous human hyperimmune globulin
- From donors with high concentrations of a specific antibody
  - Hepatitis B Immune Globulin (HBIG), Human Rabies Immune Globulin (HRIG), Tetanus Immune globulin (TIG), Varicella Zoster Immune Globulin (Human) (VariZIG), Vaccinia Immune Globulin Intravenous (Human) (VIGIV)
- Heterologous hyperimmune serum
  - Antitoxin (e.g., diphtheria antitoxin)
  - Serum sickness

# Sources of Passive Immunity (4)

- Monoclonal antibodies are derived from a single type, or clone, of antibody-producing cells (B-cells) or through recombinant technology.
  - Immune globulin from human sources is polyclonal (contains many kinds of antibodies).
  - Monoclonal antibody is specific to a single antigen or closely related group of antigens.
  - Used for diagnosis of and therapy for certain cancers and autoimmune and infectious diseases (e.g., COVID-19)
  - Used for prevention of certain infectious diseases and transplant rejection.
  - Monoclonal-antibody-derived drugs end in –mab.



# Antibody for Prevention of RSV

- Nirsevimab (Beyfortus)
  - Monoclonal
  - Contains only RSV antibody
  - Will not interfere with the response to a live-virus vaccine

# Active Immunity

- Protection produced by a person's own immune system
- The process of developing antibodies takes time.
  - It can take up to a few weeks.
- Lasts for many years, often lifetime



# Sources of Active Immunity

- Infection with disease-causing form of organism
- Vaccination



# Vaccination

- Active immunity produced by vaccine
  - Vaccine delivers an attenuated (weakened, nonpathogenic) or non-live (dead or disrupted) form of the pathogen.
- Vaccination primes the body to make antibodies when exposed to the specific organism the vaccine was designed to protect against.
  - Immunologic memory allows for an anamnestic response after the primary immune response so that antibody reappears when the antigen is introduced.





## Knowledge Check

Which type of immunity lasts longer?

- A. Passive immunity
- B. Active immunity





## Answer

Which type of immunity lasts longer?

A. Passive immunity

**B. Active Immunity**

# 3

## Principles of Vaccination

# Principles of Vaccination

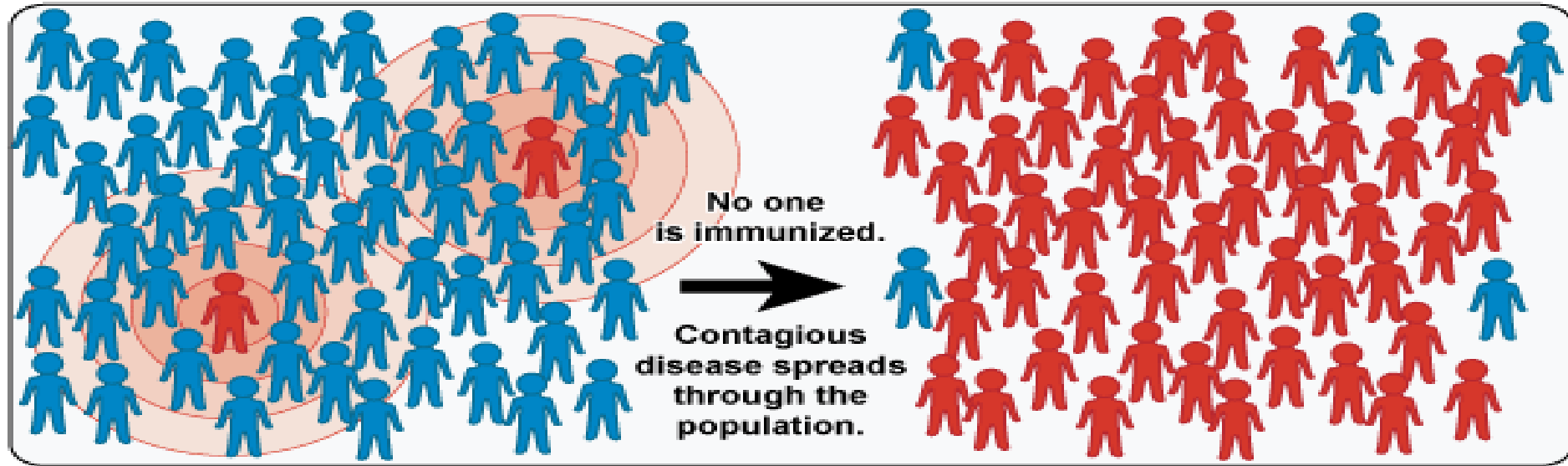
- The more similar the antibody [or immune response] produced by vaccination is to antibody produced by natural disease (infection), the better the protection provided by the vaccine.



# Factors that Affect Immune Response to Vaccines

- Presence of maternal antibodies
- Nature and amount of antigen in vaccine
- Route of administration
- Presence of an adjuvant (ingredient that promotes a stronger immune response)
- Storage and handling of vaccine
- Vaccine recipient
  - Age
  - Nutritional status
  - Genetics
  - Coexisting disease
  - Immune suppression

# Community Immunity

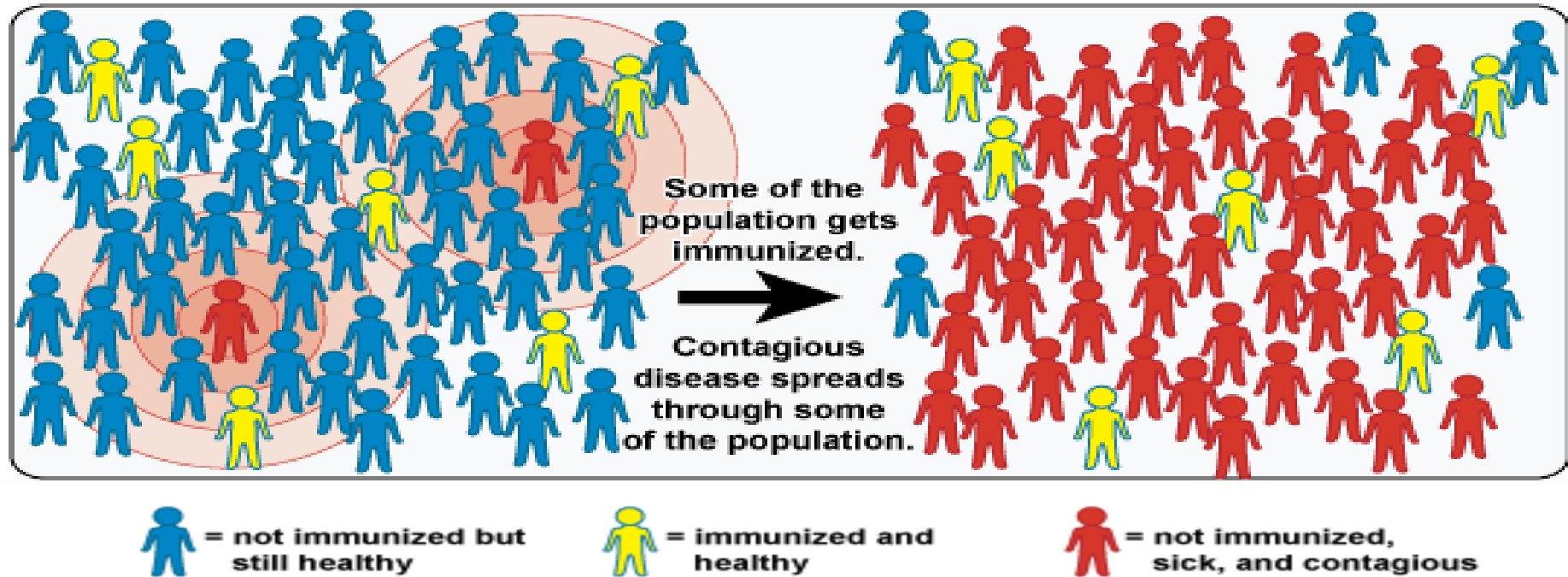


 = not immunized but still healthy

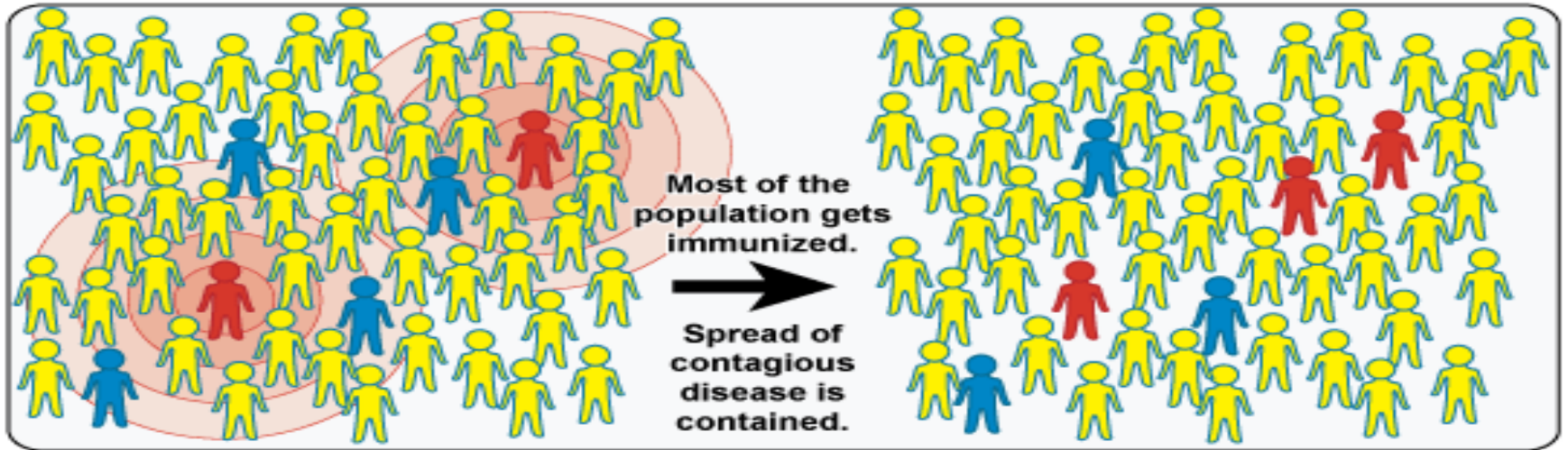
 = immunized and healthy

 = not immunized, sick, and contagious

## Community Immunity, cont.



# Community Immunity, cont.



 = not immunized but still healthy

 = immunized and healthy

 = not immunized, sick, and contagious

# 4

## Classification of Vaccines

# Classification of Vaccines

- Live
  - Most live vaccines used in the United States are “live, attenuated,” meaning that the microbe in the vaccine is alive but has been weakened (attenuated).
- Non-live
  - A non-live vaccine contains inactivated or dead virus or bacterium, or a fraction of the organism.
  - Non-live vaccines are sometimes referred to as inactivated vaccines.

# Classification of Vaccines (2)

- Live
  - Viral or bacterial
- Non-live
  - Viral or bacterial

# Classification of Vaccines (3)

- Live, attenuated
- Non-live
  - Whole-cell
  - Subunit
  - Toxoid
  - Recombinant
  - mRNA



# Live, Attenuated Vaccines

- “Wild” virus or bacterium weakened by repeated passage in culture media
- Must replicate to produce an immune response
- Immune response similar to natural infection
- Usually produce long-lasting immunity with 1-2 doses
  - Except those administered orally or intranasally

## Live, Attenuated Vaccines (2)

- Severe reactions possible in persons with immune compromise.
- Interference from circulating antibody, including:
  - Maternal antibody
  - Other sources of passive immunity, i.e., blood products
- Fragile – must be stored and handled carefully

# Live, Attenuated Vaccines

- Viral
  - Live Attenuated Influenza Vaccine (LAIV), Measles Mumps Rubella (MMR), Measles Mumps Rubella Varicella (MMRV), Mpox (Mpox)<sup>‡</sup>, Varicella (VAR), Rotavirus (RV1,RV5), Dengue (DEN4CYD), Chikungunya, Yellow fever (YF), oral adenovirus<sup>\*</sup>, oral polio<sup>†</sup>, Ebola
- Bacterial
  - Bacille Calmette-Guérin (BCG)<sup>§</sup>, oral typhoid, oral cholera

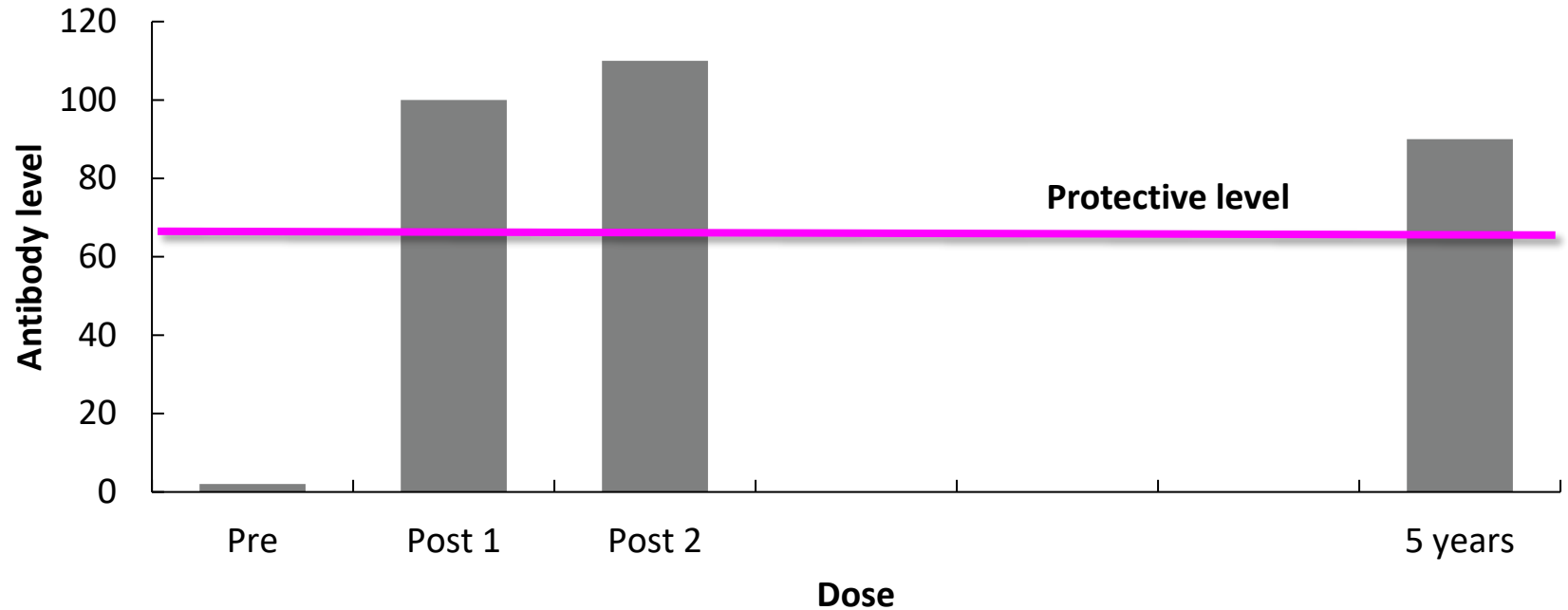
\*Live, but not attenuated. Limited use in the United States

†Not used in the United States

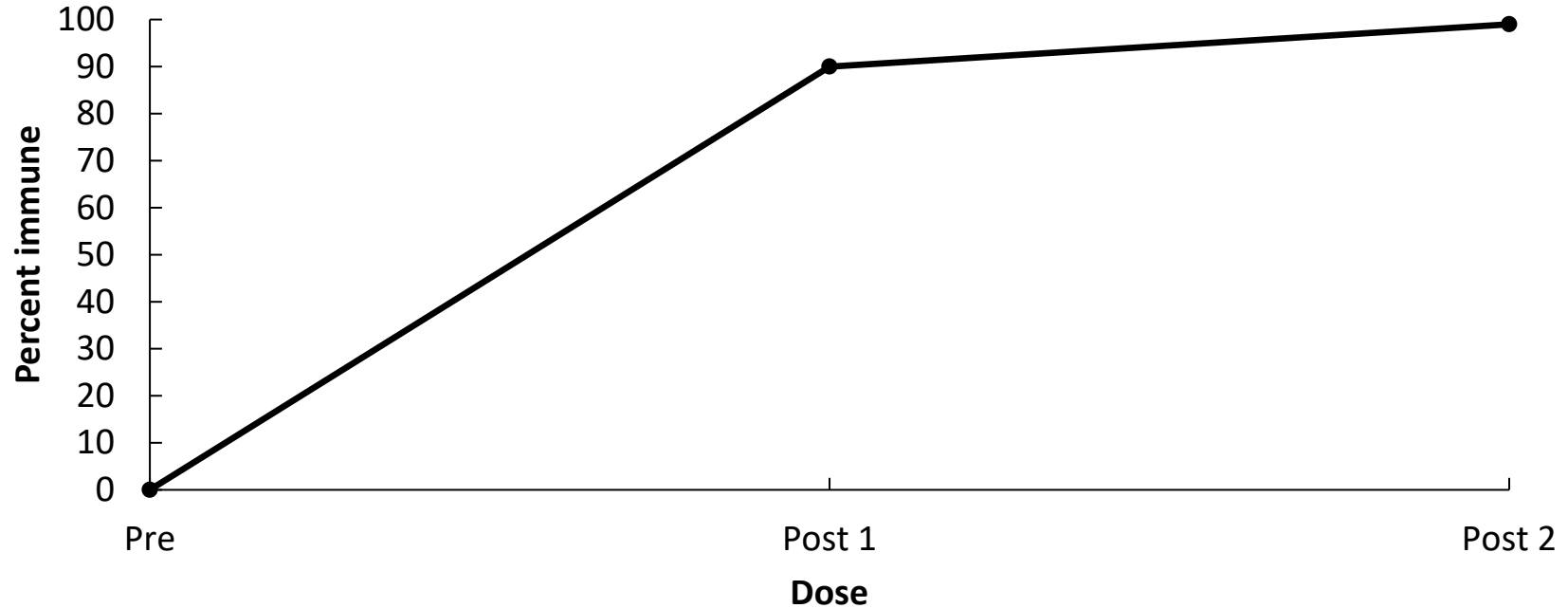
‡Jynneos vaccine does not replicate and behaves like non-live vaccines

§Not used in the United States for routine TB protection

# Individual Response to a Hypothetical Live, Attenuated Vaccine



# Population Response to a Hypothetical Live, Attenuated Vaccine



# Non-live Vaccines

- Cannot replicate
- May be less affected by circulating antibody than live vaccines.
- May require multiple doses
- Antibody titer diminishes with time
- May include an adjuvant

# Non-live Vaccines

- Whole-cell, inactivated
  - Polio, hepatitis A, rabies
- Subunit
  - Antigens can be protein, polysaccharide, or combination of polysaccharide and protein molecule (i.e., conjugate vaccine)
- Toxoid
  - Diphtheria, tetanus
- Recombinant
  - Hepatitis B, HPV
- mRNA
  - COVID-19

# Adjuvants

- An adjuvant is an ingredient used in some vaccines that helps create a stronger immune response.
- Adjuvants have been used safely in vaccines for decades.

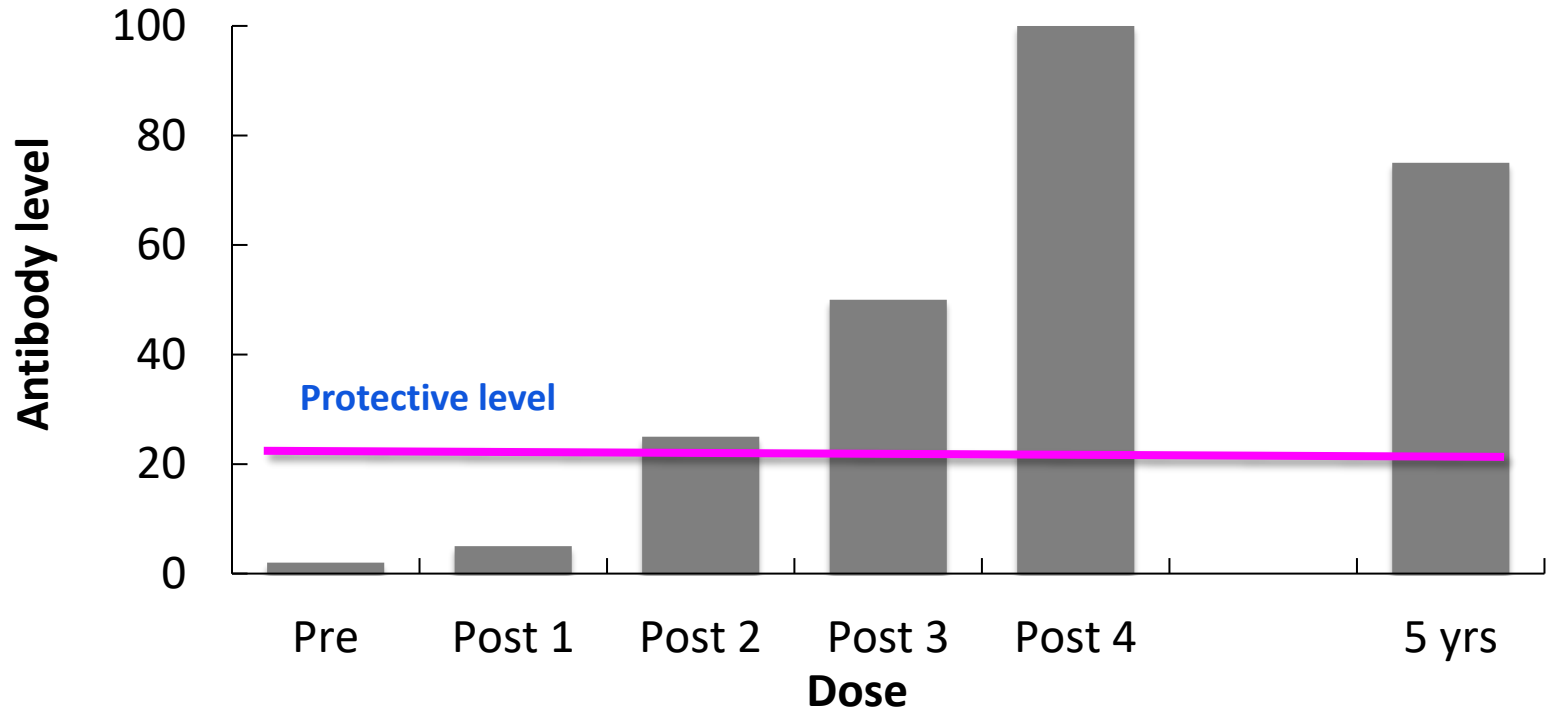




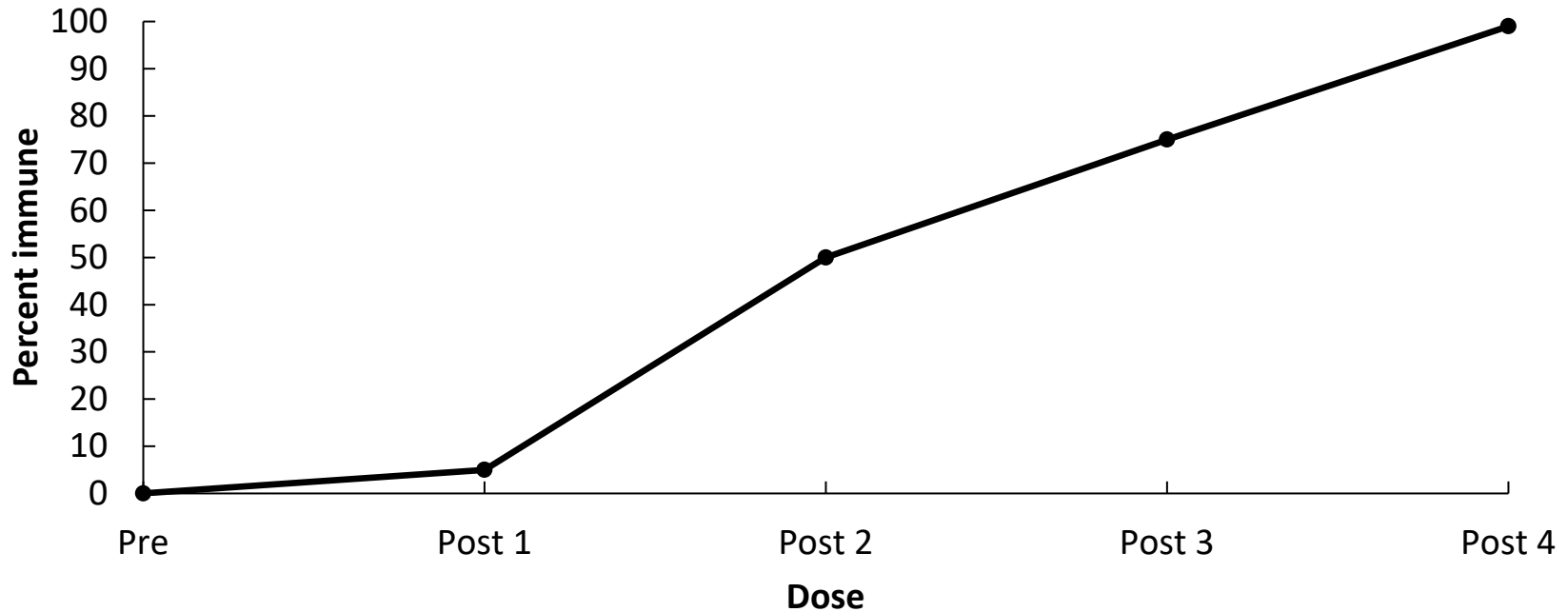
# Several Different Adjuvants are Used in U.S. Vaccines

Adjuvant	Vaccines
Aluminum	DTaP (Daptacel, Infanrix), DTaP-HepB-IPV (Pediatrix), DTaP-IPV (Kinrix, Quadracel), DTaP-IPV/Hib (Pentacel), DTaP-IPV-Hib-HepB (VAXELIS), HepA (Havrix, Vaqta), HepB (Engerix-B, PREHEVBRIO, Recombivax), HepA/HepB (Twinrix), HIB (PevaxHIB), HPV (Gardasil 9), MenB (Bexsero, Trumenba), Pneumococcal (Pevnar 20, VAXNEUVANCE), Td (Tenivac, no trade name), Tdap (Adacel, Boostrix),
AS01 <sub>B</sub>	RZV (Shingrix)
CpG1018	HepB (Heplisav-B)
Matrix-M™	COVID-19 (Novavax)
MF59	Influenza (Fluad and Fluad Quadrivalent)

# Individual Response to Hypothetical Non-live Vaccine



# Population Response to Hypothetical Non-live Vaccine





## Knowledge Check

Which type of vaccine must replicate to generate an immune response?

- A. Live, attenuated vaccines
- B. Non-live vaccines





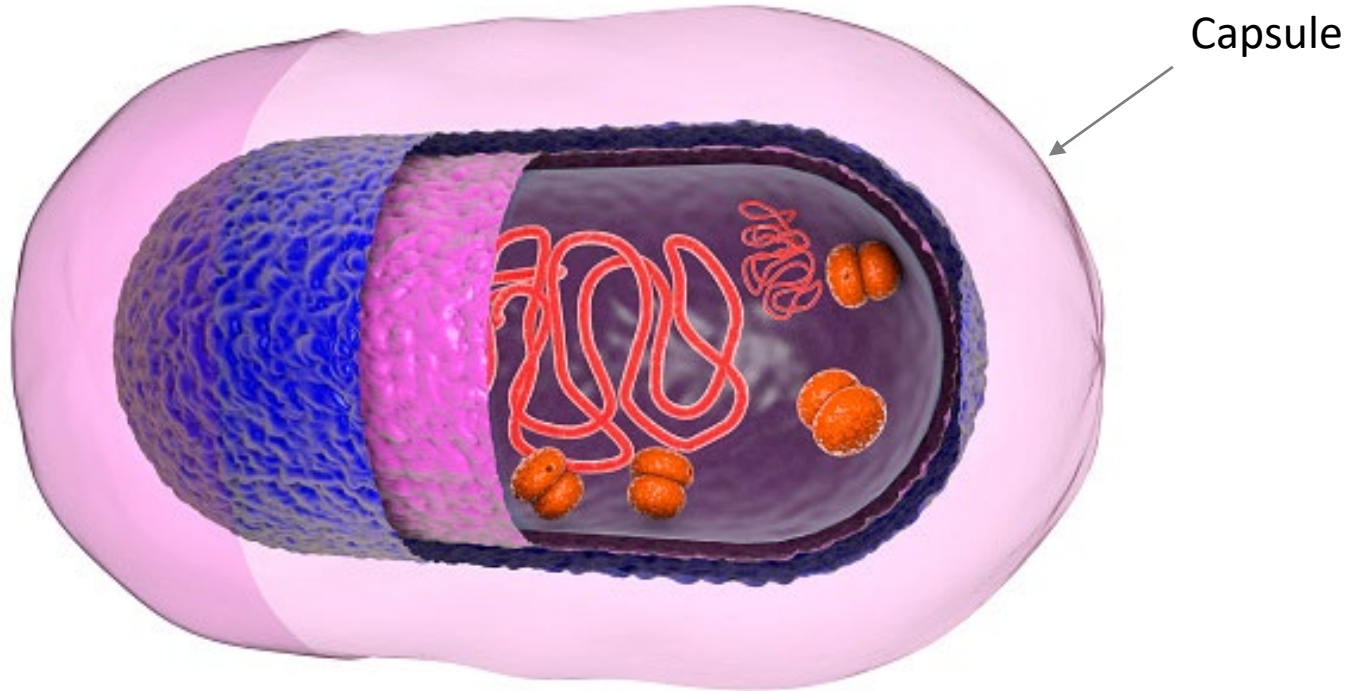
## Answer

Which type of vaccine must replicate to generate an immune response?

**A. Live, attenuated vaccines**

B. Non-live vaccines

# Capsular Polysaccharide



# Pure Polysaccharide Vaccines

- Immune response typically T-cell-independent
- Not consistently immunogenic in children younger than 2 years of age
- No booster response
- Antibody with less functional activity (IgM rather than IgG)
- Immunogenicity improved by conjugation
  - i.e., combined with a protein

# Polysaccharide Vaccines

- **Pure polysaccharide**

- Pneumococcal (PPSV23)
- *Salmonella typhi* (Vi)

- **Conjugate polysaccharide**

- *Haemophilus influenzae* type b (Hib)
- Pneumococcal (PCV13, PCV15, PCV20)
- Meningococcal ACWY





## Knowledge Check



Which type of polysaccharide vaccine has improved immunogenicity?

- A. Pure polysaccharide vaccine
- B. Conjugated polysaccharide vaccine



## Answer

Which type of polysaccharide vaccine has improved immunogenicity?

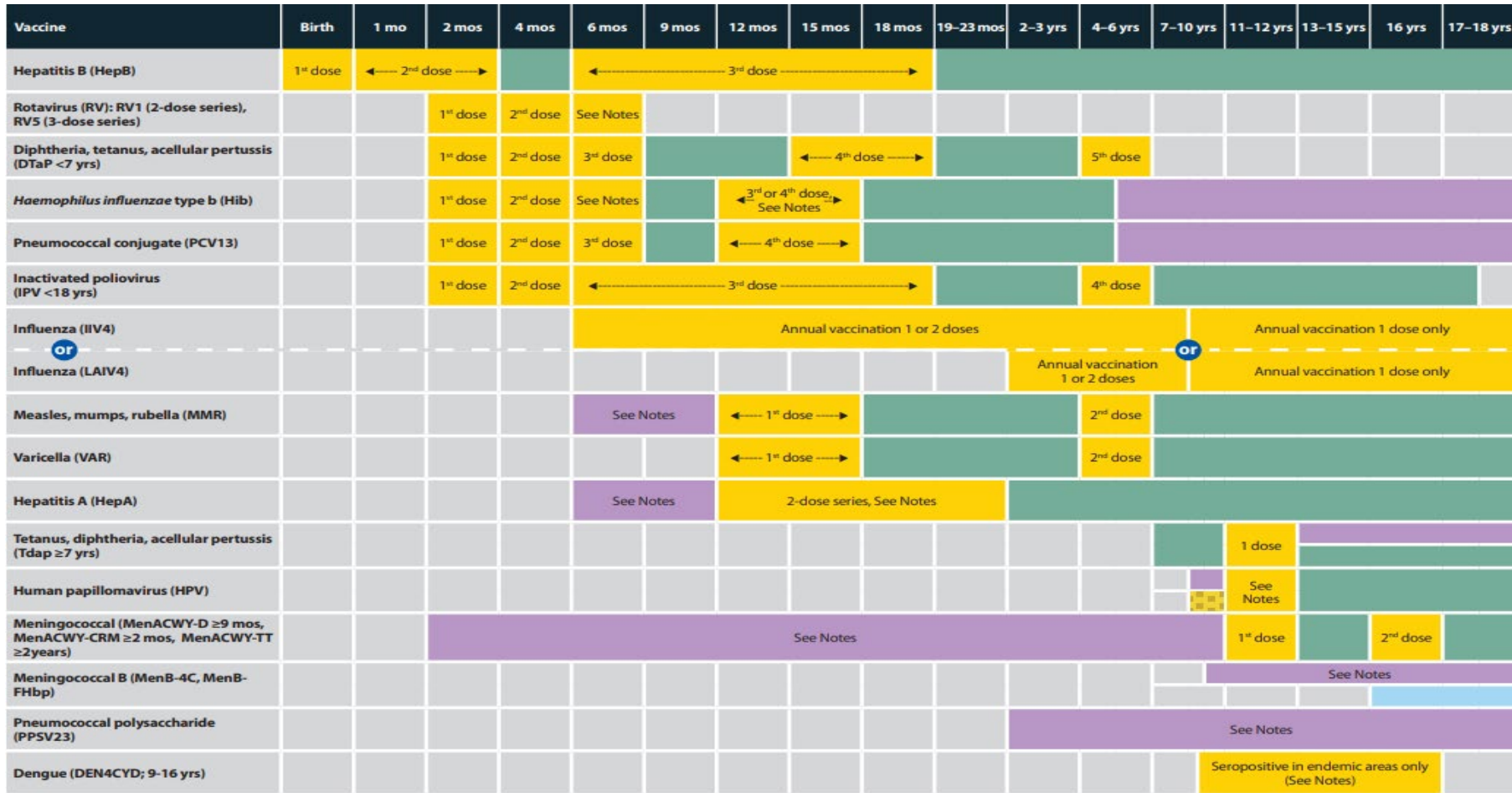
A. Pure polysaccharide vaccine

**B. Conjugated polysaccharide vaccine**

# 5

## ACIP Immunization Schedules

**Recommended Child and Adolescent Immunization Schedule  
for Ages 18 Years or Younger, United States, 2024**



Range of recommended ages for all children

Range of recommended ages for catch-up vaccination

Range of recommended ages for certain high-risk groups

Recommended vaccination can begin in this age group

Recommended vaccination based on shared clinical decision-making

No recommendation/not applicable

# Recommended Catch-up Immunization Schedule for Children and Adolescents Who Start Late or Who Are More than 1 Month Behind, United States, 2024

**Table 2** Recommended Catch-up Immunization Schedule for Children and Adolescents Who Start Late or Who Are More than 1 Month Behind, United States, 2024

The table below provides catch-up schedules and minimum intervals between doses for children whose vaccinations have been delayed. A vaccine series does not need to be restarted, regardless of the time that has elapsed between doses. Use the section appropriate for the child's age. **Always use this table in conjunction with Table 1 and the Notes that follow.**

Children age 4 months through 6 years					
Vaccine	Minimum Age for Dose 1	Minimum Interval Between Doses			
		Dose 1 to Dose 2	Dose 2 to Dose 3	Dose 3 to Dose 4	Dose 4 to Dose 5
Hepatitis B	Birth	4 weeks	8 weeks and at least 16 weeks after first dose minimum age for the final dose is 24 weeks		
Rotavirus	6 weeks Maximum age for first dose is 14 weeks, 6 days.	4 weeks	4 weeks maximum age for final dose is 8 months, 0 days		
Diphtheria, tetanus, and acellular pertussis	6 weeks	4 weeks	4 weeks	6 months	6 months A fifth dose is not necessary if the fourth dose was administered at age 4 years or older and at least 6 months after dose 3
Haemophilus influenzae type b	6 weeks	No further doses needed if first dose was administered at age 15 months or older. 4 weeks if first dose was administered before the 1 <sup>st</sup> birthday. 8 weeks (as final dose) if first dose was administered at age 12 through 14 months.	No further doses needed if previous dose was administered at age 15 months or older 4 weeks if current age is younger than 12 months and first dose was administered at younger than age 7 months and at least 1 previous dose was PRP-T (ActHib <sup>®</sup> , Pentacel <sup>®</sup> , Hibertix <sup>®</sup> , Vaxelis <sup>®</sup> or unknown) 8 weeks and age 12 through 59 months (as final dose) if current age is younger than 12 months and first dose was administered at age 7 through 11 months. OR if current age is 12 through 59 months and first dose was administered before the 1 <sup>st</sup> birthday and second dose was administered at younger than 15 months; OR if both doses were PedvaxHIB <sup>®</sup> and were administered before the 1st birthday	8 weeks (as final dose) This dose is only necessary for children age 12 through 59 months who received 3 doses before the 1 <sup>st</sup> birthday.	
Pneumococcal conjugate	6 weeks	No further doses needed for healthy children if first dose was administered at age 24 months or older 4 weeks if first dose was administered before the 1 <sup>st</sup> birthday 8 weeks (as final dose for healthy children) if first dose was administered at the 1 <sup>st</sup> birthday or after	No further doses needed for healthy children if previous dose was administered at age 24 months or older 4 weeks if current age is younger than 12 months and previous dose was administered at <7 months old 8 weeks (as final dose for healthy children) if previous dose was administered between 7-11 months (wait until at least 12 months old); OR if current age is 12 months or older and at least 1 dose was administered before age 12 months	8 weeks (as final dose) This dose is only necessary for children age 12 through 59 months regardless of risk, or age 60 through 71 months with any risk, who received 3 doses before age 12 months.	
Inactivated poliovirus	6 weeks	4 weeks	4 weeks if current age is <4 years 6 months (as final dose) if current age is 4 years or older	6 months (minimum age 4 years for final dose)	
Measles, mumps, rubella	12 months	4 weeks			
Varicella	12 months	3 months			
Hepatitis A	12 months	6 months			
Meningococcal ACWY	2 months/MenACWY-CRM 2 years/MenACWY-TT	8 weeks	See Notes	See Notes	
Children and adolescents age 7 through 18 years					
Meningococcal ACWY	Not applicable (N/A)	8 weeks			
Tetanus, diphtheria; tetanus, diphtheria, and acellular pertussis	7 years	4 weeks	4 weeks if first dose of DTaP/DT was administered before the 1 <sup>st</sup> birthday 6 months (as final dose) if first dose of DTaP/DT or Tdap/Td was administered at or after the 1 <sup>st</sup> birthday	6 months if first dose of DTaP/DT was administered before the 1 <sup>st</sup> birthday	
Human papillomavirus	9 years	Routine dosing intervals are recommended.			
Hepatitis A	N/A	6 months			
Hepatitis B	N/A	4 weeks	8 weeks and at least 16 weeks after first dose		
Inactivated poliovirus	N/A	4 weeks	6 months A fourth dose is not necessary if the third dose was administered at age 4 years or older and at least 6 months after the previous dose.	A fourth dose of IPV is indicated if all previous doses were administered at <4 years OR if the third dose was administered <6 months after the second dose.	
Measles, mumps, rubella	N/A	4 weeks			
Varicella	N/A	3 months if younger than age 13 years. 4 weeks if age 13 years or older			
Dengue	9 years	6 months	6 months		

**Table 3** Recommended Child and Adolescent Immunization Schedule by Medical Indication, United States, 2024

Always use this table in conjunction with Table 1 and the Notes that follow. Medical conditions are often not mutually exclusive. If multiple conditions are present, refer to guidance in all relevant columns. See Notes for medical conditions not listed.

Vaccine and other immunizing agents	Pregnancy	Immunocompromised (excluding HIV infection)	HIV infection CD4 percentage and count*		CSF leak or cochlear implant	Asplenia or persistent complement component deficiencies	Heart disease or chronic lung disease	Kidney failure, End-stage renal disease or on Dialysis	Chronic liver disease	Diabetes
			<15% or <200mm	≥15% and ≥200mm						
RSV-mAb (nirsevimab)		2nd RSV season	1 dose depending on maternal RSV vaccination status, See Notes				2nd RSV season for chronic lung disease (See Notes)	1 dose depending on maternal RSV vaccination status, See Notes		
Hepatitis B										
Rotavirus		SCID <sup>b</sup>								
DTaP/Tdap	DTaP Tdap: 1 dose each pregnancy									
Hib		HSCT: 3 doses	See Notes			See Notes				
Pneumococcal										
IPV										
COVID-19		See Notes								
IIV4										
LAIV4							Asthma, wheezing: 2–4 years <sup>c</sup>			
MMR	*									
VAR	*									
Hepatitis A										
HPV	*	3 dose series. See Notes								
MenACWY										
MenB										
RSV (Abrysvo)	Seasonal administration, See Notes									
Dengue										
Mpox	See Notes									


  Recommended for all age-eligible children who lack documentation of a complete vaccination series  
  Not recommended for all children, but is recommended for some children based on increased risk for or severe outcomes from disease  
  Recommended for all age-eligible children, and additional doses may be necessary based on medical condition or other indications. See Notes.  
  Precaution: Might be indicated if benefit of protection outweighs risk of adverse reaction  
  Contraindicated or not recommended  
  \*Vaccinate after pregnancy, if indicated  
  No Guidance/Not Applicable


## **Recommended Adult Immunization Schedule by Age Group, United States, 2024**





**Table 1** Recommended Adult Immunization Schedule by Age Group, United States, 2024

Vaccine	19–26 years	27–49 years	50–64 years	≥65 years
COVID-19	1 or more doses of updated (2023–2024 Formula) vaccine (See Notes)			
Influenza inactivated (IIV4) or Influenza recombinant (RIV4)	1 dose annually			
Influenza live, attenuated (LAIV4)	1 dose annually			
Respiratory Syncytial Virus (RSV)	Seasonal administration during pregnancy. See Notes.			≥60 years
Tetanus, diphtheria, pertussis (Tdap or Td)	1 dose Tdap each pregnancy; 1 dose Td/Tdap for wound management (see notes)			
	1 dose Tdap, then Td or Tdap booster every 10 years			
Measles, mumps, rubella (MMR)	1 or 2 doses depending on indication (if born in 1957 or later)			For healthcare personnel, see notes
Varicella (VAR)	2 doses (if born in 1980 or later)		2 doses	
Zoster recombinant (RZV)	2 doses for immunocompromising conditions (see notes)		2 doses	
Human papillomavirus (HPV)	2 or 3 doses depending on age at initial vaccination or condition	27 through 45 years		
Pneumococcal (PCV15, PCV20, PPSV23)				See Notes
				See Notes
Hepatitis A (HepA)	2, 3, or 4 doses depending on vaccine			
Hepatitis B (HepB)	2, 3, or 4 doses depending on vaccine or condition			
Meningococcal A, C, W, Y (MenACWY)	1 or 2 doses depending on indication, see notes for booster recommendations			
Meningococcal B (MenB)	19 through 23 years	2 or 3 doses depending on vaccine and indication, see notes for booster recommendations		
Haemophilus influenzae type b (Hib)	1 or 3 doses depending on indication			
Mpox				

 Recommended vaccination for adults who meet age requirement, lack documentation of vaccination, or lack evidence of immunity

 Recommended vaccination for adults with an additional risk factor or another indication

 Recommended vaccination based on shared clinical decision-making

 No recommendation/ Not applicable

## Table 2 Recommended Adult Immunization Schedule by Medical Condition or Other Indication, United States, 2024

Always use this table in conjunction with Table 1 and the Notes that follow. Medical conditions or indications are often not mutually exclusive. If multiple medical conditions or indications are present, refer to guidance in all relevant columns. See Notes for medical conditions or indications not listed.

VACCINE	Pregnancy	Immunocompromised (excluding HIV infection)	HIV infection CD4 percentage and count		Men who have sex with men	Asplenia, complement deficiency	Heart or lung disease	Kidney failure, End-stage renal disease or on dialysis	Chronic liver disease; alcoholism*	Diabetes	Healthcare Personnel <sup>b</sup>
			<15% or <200mm <sup>3</sup>	≥15% and ≥200mm <sup>3</sup>							
COVID-19		See Notes									
IIV4 or RIV4	1 dose annually										
LAIV4					1 dose annually if age 19–49 years		1 dose annually if age 19–49 years				
RSV	Seasonal administration. See Notes	See Notes				See Notes					
Tdap or Td	Tdap: 1 dose each pregnancy	1 dose Tdap, then Td or Tdap booster every 10 years									
MMR	*										
VAR	*			See Notes							
RZV		See Notes									
HPV	*	3 dose series if indicated									
Pneumococcal											
HepA											
Hep B	See Notes								Age ≥ 60 years		
MenACWY											
MenB											
Hib		HSCT: 3 doses <sup>c</sup>					Asplenia: 1 dose				
Mpox	See Notes				See Notes						

  Recommended for all adults who lack documentation of vaccination, **OR** lack evidence of immunity

  Not recommended for all adults, but recommended for some adults based on either age **OR** increased risk for or severe outcomes from disease

  Recommended based on shared clinical decision-making

  Recommended for all adults, and additional doses may be necessary based on medical condition or other indications. See Notes.

  Precaution: Might be indicated if benefit of protection outweighs risk of adverse reaction

  Contraindicated or not recommended \*Vaccinate after pregnancy, if indicated

  No Guidance/ Not Applicable

# Schedule Addendums

See revised schedules, including addenda, for new or updated ACIP vaccine recommendations.

- Child and Adolescent Recommended Immunization Schedule for ages 18 years or younger, United States, 2023
- Adult Recommended Immunization Schedule for ages 18 years or older, United States, 2023

**For Healthcare Providers**

**Child and Adolescent Schedule**  
Recommended vaccination schedule for ages 18 years or younger

**Birth to 18 Years**

**Clinical Vaccination Resources**  
Download Schedule App for Healthcare Providers

**Vaccination Resources for Healthcare Providers**

**Adult Schedule**  
Recommended vaccination schedule for ages 19 years or older

**19 Years or Older**

**Interim COVID-19 Immunization Schedule for Ages 6 months and older**  
Guidance for COVID-19 vaccination schedules based on age and medical condition

**COVID-19 Vaccination Schedule**

**For You and Your Family**

## Child Immunization Schedule Addendum

Recommendations for Ages 18 Years or Younger, United States, 2024

[Print](#)

[Back to Child and Adolescent Immunization Schedule home page](#)

### Vaccines and Other Immunizing Agents in the Child Immunization Schedule

#### How to use the schedule

To make vaccination recommendations, healthcare providers should:

- Determine recommended vaccine by age ([Table 1 - By Age](#))
- Determine recommended interval for catch-up vaccination ([Table 2 - Catch-up](#))
- Assess need for additional recommended vaccines by medical condition or other indication ([Table 3 - By Medical Indication](#))
- Review vaccine types, frequencies, intervals, and considerations for special situations ([Notes](#))
- Review contraindications and precautions for vaccine types ([Appendix](#))
- Review new or updated ACIP guidance ([Addendum](#))

In addition to the recommendations presented in the previous sections of this immunization schedule, ACIP has approved the following recommendations by majority vote since **October 26, 2023**. The following recommendations have been adopted by the CDC Director and are now official. Links are provided if these recommendations have been published in *Morbidity and Mortality Weekly Report (MMWR)*.

Vaccines	Recommendations	Effective Date of Recommendation*
No new vaccines or vaccine recommendations to report		

The effective date is the date when the CDC director adopted the recommendation and when the ACIP recommendation became official.

# Best Practice: Immunization Schedules

## Recommended Adult Immunization Schedule for ages 19 years or older UNITED STATES 2024

**Vaccines in the Adult Immunization Schedule\***

Vaccine	Abbreviation <sup>b</sup>	Trade name <sup>c</sup>
COVID-19 vaccine	T/C2D/4/5	Comirvax <sup>®</sup> /Pfizer/BioNTech COVID-19 Vaccine/Novavax/Moderna COVID-19 Vaccine
Tetanus/diphtheria/inactivated polio vaccine	TD	Adacel <sup>®</sup> /Flarix <sup>®</sup> /Pulsar <sup>®</sup>
Measles, mumps, and rubella vaccine	MM2	Merck <sup>®</sup> /Mumps <sup>®</sup>
Measles, mumps, and rubella vaccine	MM2	Merck <sup>®</sup> /Mumps <sup>®</sup>
Measles, mumps, and rubella vaccine	MM2	Merck <sup>®</sup> /Mumps <sup>®</sup>
Measles, mumps, and rubella vaccine	MM2	Merck <sup>®</sup> /Mumps <sup>®</sup>
Measles, mumps, and rubella vaccine	MM2	Merck <sup>®</sup> /Mumps <sup>®</sup>
Measles, mumps, and rubella vaccine	MM2	Merck <sup>®</sup> /Mumps <sup>®</sup>
Measles, mumps, and rubella vaccine	MM2	Merck <sup>®</sup> /Mumps <sup>®</sup>
Measles, mumps, and rubella vaccine	MM2	Merck <sup>®</sup> /Mumps <sup>®</sup>
Measles, mumps, and rubella vaccine	MM2	Merck <sup>®</sup> /Mumps <sup>®</sup>
Measles, mumps, and rubella vaccine	MM2	Merck <sup>®</sup> /Mumps <sup>®</sup>
Measles, mumps, and rubella vaccine	MM2	Merck <sup>®</sup> /Mumps <sup>®</sup>

**How to use the adult immunization schedule**

1. Determine if you are eligible for the vaccine based on age, medical conditions, and other factors.
2. Check if you have already received the vaccine.
3. Check if you are currently receiving the vaccine (e.g., for COVID-19).
4. Check if you are currently receiving the vaccine (e.g., for COVID-19).
5. Determine when to get the vaccine based on the schedule.

**Report**

• Submit a case of reportable vaccine-preventable disease or adverse reaction to the state health department

• Clinical reporting adverse events to the Vaccine Adverse Event Reporting System ([www.fda.gov/oc/oaers](https://www.fda.gov/oc/oaers))

**Questions or comments**

Contact your state or local health department or CDC (800-332-4630, in English or Spanish, 9 a.m. to 4 p.m. ET, Monday through Friday, and on holidays).

Download the CDC Vaccine Schedules app for providers at [www.cdc.gov/vaccines/imz/downloads/](https://www.cdc.gov/vaccines/imz/downloads/)

**Helpful information**

- Complete Advisory Committee recommendations on Provider-ACIP recommendations ([www.cdc.gov/vaccines/imz/downloads/](https://www.cdc.gov/vaccines/imz/downloads/))
- ACIP Standard Clinical Decision-Making Recommendations ([www.cdc.gov/vaccines/imz/downloads/](https://www.cdc.gov/vaccines/imz/downloads/))
- Genetic Carrier Status ([www.cdc.gov/vaccines/imz/downloads/](https://www.cdc.gov/vaccines/imz/downloads/))
- Vaccine information statements ([www.cdc.gov/vaccines/imz/downloads/](https://www.cdc.gov/vaccines/imz/downloads/))
- Manual for the Surveillance of Vaccine-Preventable Diseases ([www.cdc.gov/vaccines/imz/downloads/](https://www.cdc.gov/vaccines/imz/downloads/))
- Linking your state's immunization registry to the national immunization registry ([www.cdc.gov/vaccines/imz/downloads/](https://www.cdc.gov/vaccines/imz/downloads/))

U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention



Use the QR code located on the first page to access the online schedule to check for updates!

**Child Immunization Schedule UNITED STATES 2024**

**How to use the child and adolescent immunization schedule**

1. Determine recommended vaccines by age (Table 1)
2. Determine recommended vaccines by age (Table 1)
3. Assess need for additional vaccines (Table 1)
4. Review vaccine schedule (Table 1)
5. Review vaccine schedule (Table 1)
6. Review vaccine schedule (Table 1)

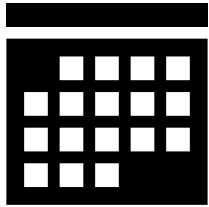
Download the CDC Vaccine Schedules app for providers at [www.cdc.gov/vaccines/imz/downloads/](https://www.cdc.gov/vaccines/imz/downloads/)

**Helpful information**

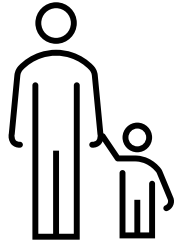
- Complete Advisory Committee recommendations on Provider-ACIP recommendations ([www.cdc.gov/vaccines/imz/downloads/](https://www.cdc.gov/vaccines/imz/downloads/))
- ACIP Standard Clinical Decision-Making Recommendations ([www.cdc.gov/vaccines/imz/downloads/](https://www.cdc.gov/vaccines/imz/downloads/))
- Genetic Carrier Status ([www.cdc.gov/vaccines/imz/downloads/](https://www.cdc.gov/vaccines/imz/downloads/))
- Vaccine information statements ([www.cdc.gov/vaccines/imz/downloads/](https://www.cdc.gov/vaccines/imz/downloads/))
- Manual for the Surveillance of Vaccine-Preventable Diseases ([www.cdc.gov/vaccines/imz/downloads/](https://www.cdc.gov/vaccines/imz/downloads/))
- Linking your state's immunization registry to the national immunization registry ([www.cdc.gov/vaccines/imz/downloads/](https://www.cdc.gov/vaccines/imz/downloads/))

U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention

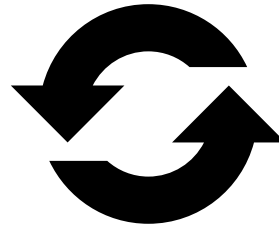
# Immunization Schedule Best Practices



Follow the  
current  
schedule



Use the  
schedule  
for the  
patient's  
age

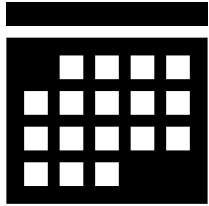


Check for  
updates



Know your  
patient's  
complete  
immunization  
history

# Immunization Schedule Best Practices



Follow the  
current  
schedule



Use the  
schedule  
for the  
patient's  
age



Check for  
updates

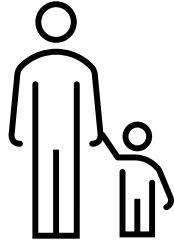


Know your  
patient's  
complete  
immunization  
history

# Immunization Schedule Best Practices



Follow the  
current  
schedule



Use the  
schedule  
for the  
patient's  
age



Check for  
updates



Know your  
patient's  
complete  
immunization  
history

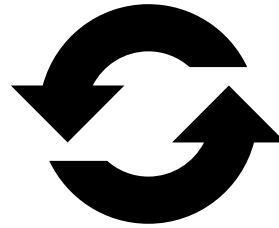
# Immunization Schedule Best Practices



Follow the  
current  
schedule



Use the  
schedule  
for the  
patient's  
age



Check for  
updates



Know your  
patient's  
complete  
immunization  
history



# Immunization Schedule Best Practices



Follow the  
current  
schedule



Use the  
schedule  
for the  
patient's  
age



Check for  
updates



Know your  
patient's  
complete  
immunization  
history

# Continuing Education Information

- To claim continuing education (CE) for this course, please follow the steps below by July 2, 2026.
- Search and register for course WD4810-070224 in CDC TRAIN.
- Pass the post-assessment at 80%.
- Complete the evaluation.
- Visit “Your Learning” to access your certificates and transcript.
- If you have any questions, contact CDC TRAIN at [train@cdc.gov](mailto:train@cdc.gov) or NCIRD’s CE Coordinator, Melissa Barnett, at [MBarnett2@cdc.gov](mailto:MBarnett2@cdc.gov)



# E-mail Your Immunization Questions to Us



**NIPINFO@cdc.gov**

# Thank You from Atlanta!

For more information, contact CDC  
1-800-CDC-INFO (232-4636)  
TTY: 1-888-232-6348 [www.cdc.gov](http://www.cdc.gov)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

