

# 2019: Update on Adult Immunizations

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# Disclosures

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- There are no relevant financial relationships with commercial interests to disclose

# Outline

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- Influenza Vaccines
- Hepatitis A Vaccine
- Hepatitis B Vaccine
- MMR Vaccine
- Zoster Vaccines
- HPV Vaccine

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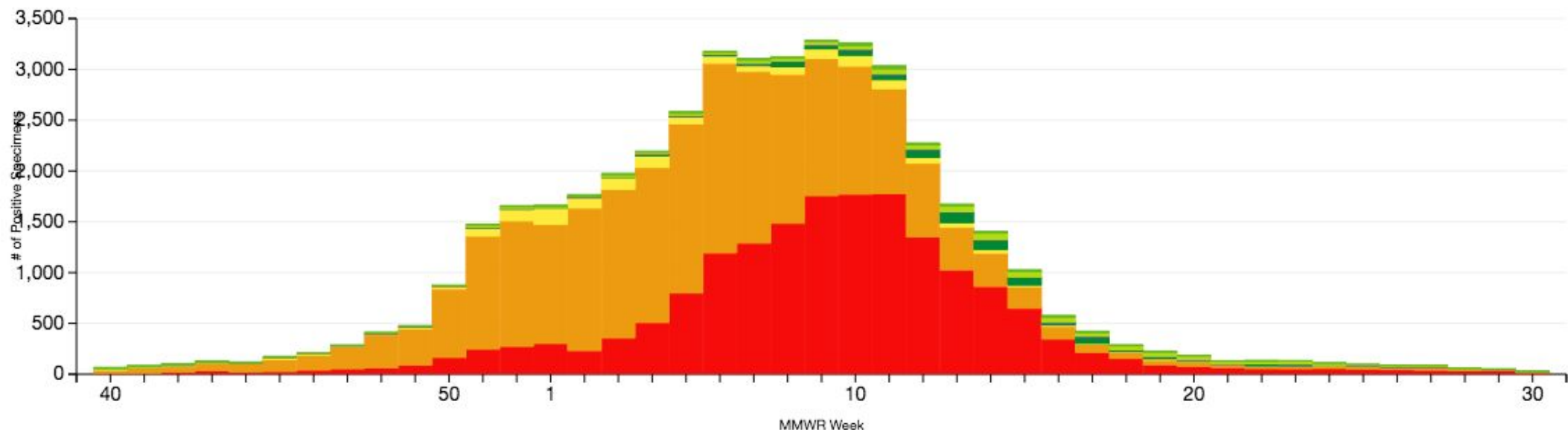
# Influenza Vaccines

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# Influenza Positive Test Reported to CDC by U.S. Clinical Laboratories, 2018-2019

2018

2019



A (H3)

A (H1N1)

A (subtyping not performed)

B (Victoria Lineage)

B (Yamaguta Lineage)

Source: CDC and Prevention.

# Viruses in US 2019-2020 Influenza Vaccines

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- A/Brisbane (H1N1-like)
  - A/Kansas (H3N2-like)
  - B/Colorado
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- \*B/Phuket

\*In the quadrivalent influenza vaccines

# Influenza Vaccine: Questions

- For the 2019-2020 influenza vaccines produced in United States, approximately what percentage will be Quadrivalent versus Trivalent vaccines?
  - A. 30% Quadrivalent and 70% Trivalent
  - B. 50% Quadrivalent and 50% Trivalent
  - C. 70% Quadrivalent and 30% Trivalent
  - D. 90% Quadrivalent and 10% Trivalent

# Influenza Vaccine: Questions

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- How much of the flu vaccines for the United States during 2018-2019 will be quadrivalent?

“Of the 163 to 168 million doses of influenza vaccine projected to be available for the 2018-2019 season, manufacturers estimate that 114 million to 124 million doses will be quadrivalent flu vaccine.”





# Influenza Vaccine: Questions

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- Should persons younger than 65 years of age receive the high-dose influenza vaccine (*Fluzone* high-dose) or the influenza adjuvant vaccine (*Fluad*)?
  1. Yes
  2. No

# Influenza Vaccine: Questions

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- Should persons younger than 65 years of age receive high-dose influenza vaccine (*Fluzone* high-dose) or influenza adjuvant vaccine (*Fluad*)?
- “No. *Fluzone* High-Dose and *Fluad* are licensed only for people age 65 years and older and are not recommended for younger people. ”

Source: Immunization Action Coalition

Ask the Experts: Experts from CDC Answer Questions about Vaccines

# Types of Influenza Vaccines

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- Standard Trivalent
- Standard Quadrivalent (Multiple brands)
- Live Attenuated Flu Vaccine/Nasal Spray (*Flumist*)
- High-dose Flu Vaccine (*Fluzone High Dose*)
- Adjuvanted Flu Vaccine (*Fluad*)
- Cell-Based Flu Vaccines (*Flucelvax*)
- Recombinant Flu Vaccines (*Flublok*)

Source: CDC and Prevention.

- Intradermal Flu Vaccine (*Fluzone Intradermal*)

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# Hepatitis A Vaccine

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# Hepatitis A Vaccine Serologic Testing

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- Which one of the following groups is newly considered an indication for hepatitis A vaccine?
  1. College students
  2. Persons with diabetes mellitus
  3. Persons with chronic obstructive lung disease
  4. Homeless persons

# New 2019 Hepatitis A Vaccine Recommendation

IN THE JOURNALS

## CDC includes 'homelessness' as indication for hepatitis A vaccine

Doshani M, et al. *MMWR Morb Mortal Wkly Rep.* 2019;doi:10.15585/mmwr.mm6806a6.

February 15, 2019



ADD TOPIC TO EMAIL ALERTS

The CDC recently announced that all persons aged 1 year or older experiencing homelessness should be routinely immunized for hepatitis A, based on a review of recent data.

# Hepatitis A Outbreaks Since 2016

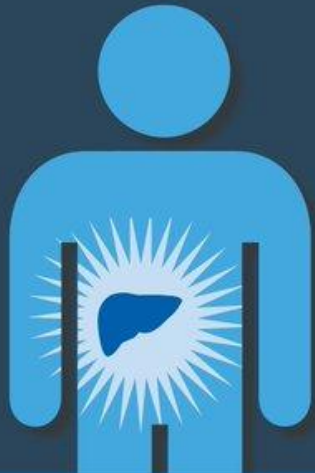
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- Reported in 25 states
- Cases = 22,566 cases
- Hospitalizations = 13,352 (59%)
- Deaths = 221

# STOP ONGOING OUTBREAKS OF HEPATITIS A

## HEPATITIS A VIRUS INFECTION

- **CAUSES LIVER DISEASE**
- **EASILY SPREADS**
- **PREVENTABLE WITH A VACCINE**



## SPREADING PERSON-TO-PERSON

**AMONG PERSONS REPORTING DRUG USE OR HOMELESSNESS**



**71%  
HOSPITALIZED**

**3%  
DIED**

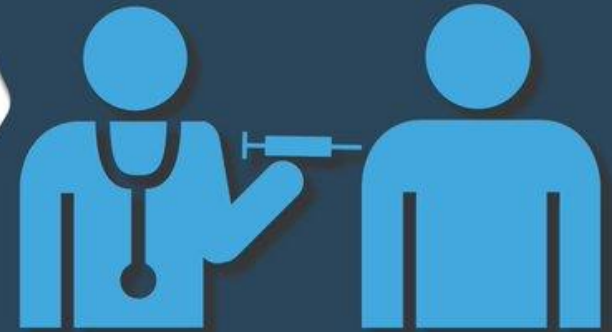
**1,521  
CASES  
4  
STATES  
2017**



**>7,000  
CASES  
12  
STATES  
2016 - 2018**

## INCREASE VACCINATION

- **PEOPLE WHO USE DRUGS**
- **PEOPLE EXPERIENCING HOMELESSNESS**
- **OTHER AT-RISK GROUPS\***



\*CDC hepatitis A vaccine recommendations: [bit.ly/CDChepA](http://bit.ly/CDChepA)



# Hepatitis A Vaccine Indications

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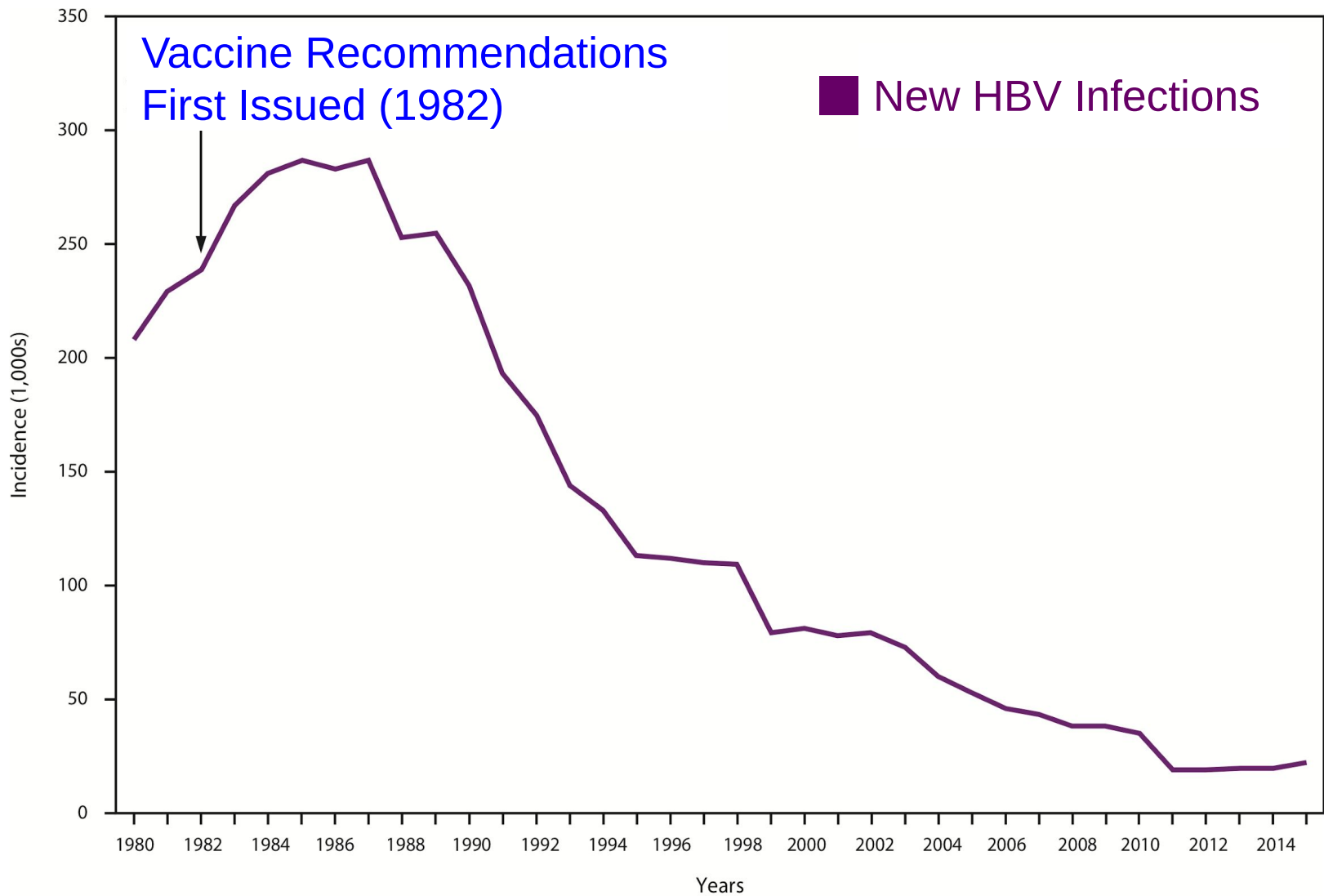
- All children at age 12–23 months
- Men who have sex with men
- Persons experiencing homelessness
- Users of injection and noninjection drugs
- Persons traveling to countries with high/intermediate HAV endemicity
- Persons anticipating close contact (<60 days following arrival) with international adoptee from country of high/intermediate endemicity
- Persons with chronic liver disease
- Persons with clotting factor disorders

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# Hepatitis B Vaccines

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# New HBV Infections in United States



Source: CDC and Prevention

# Hepatitis B Vaccine

- What is the dosing schedule for *Heplisav-B* vaccine?
  - A. Two doses give at least 4 weeks apart
  - B. Two doses given at least 6 months apart
  - C. Three doses given at 0, 1, and 2 months
  - D. Three doses given at 0, 1, and 6 months

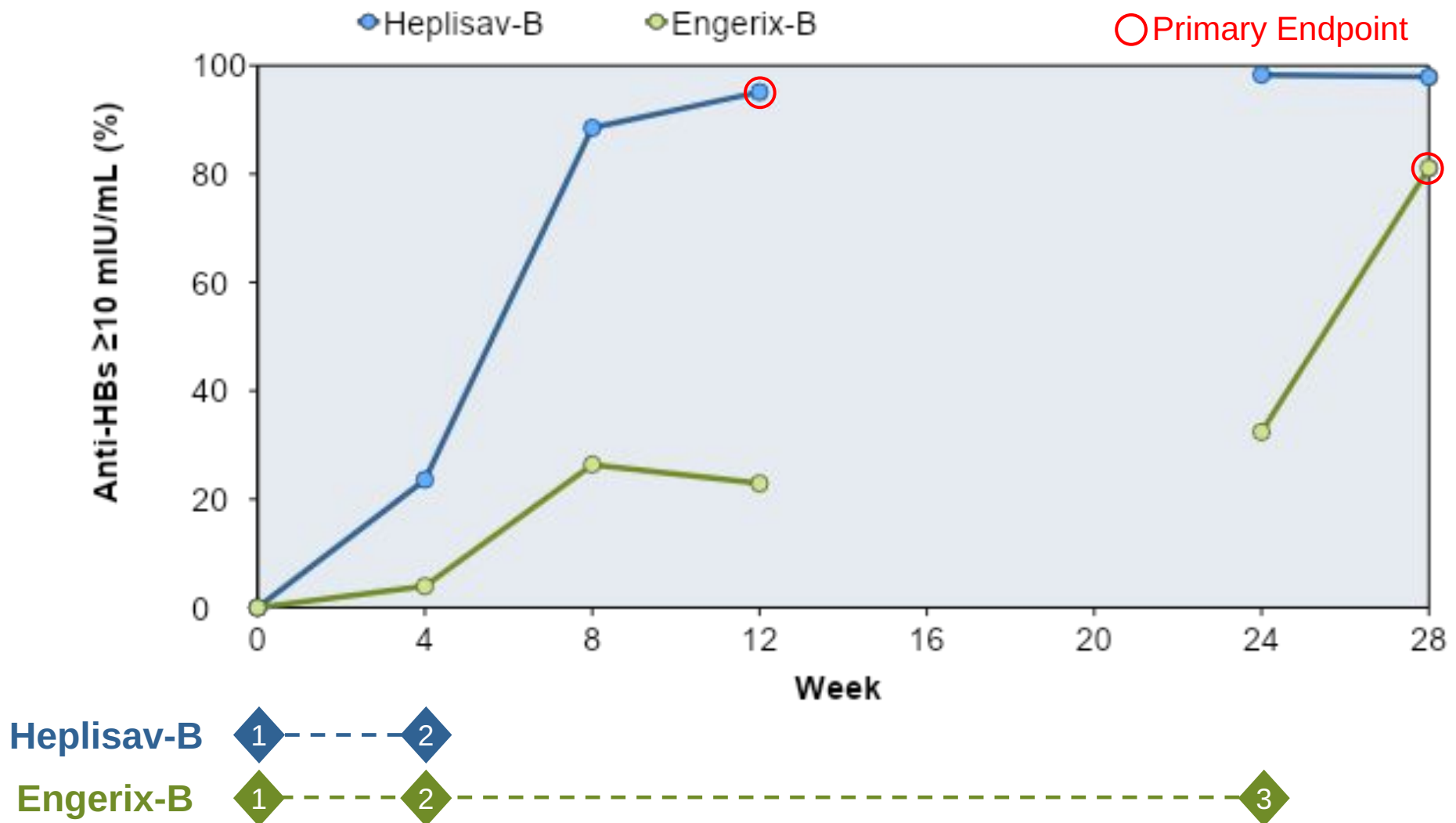
# ACIP Recommended Hepatitis B Vaccines

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- Heplisav-B-Cpg (1018 Adjuvant)
  - 2 doses IM at least 4 weeks apart
- Energix-B
  - 3 doses at 0, 1, and 6 months
- Recombivax-HB
  - 3 doses at 0, 1, and 6 months
- Twinrix (hepatitis A and B)
  - 3 doses at 0, 1, and 6 months

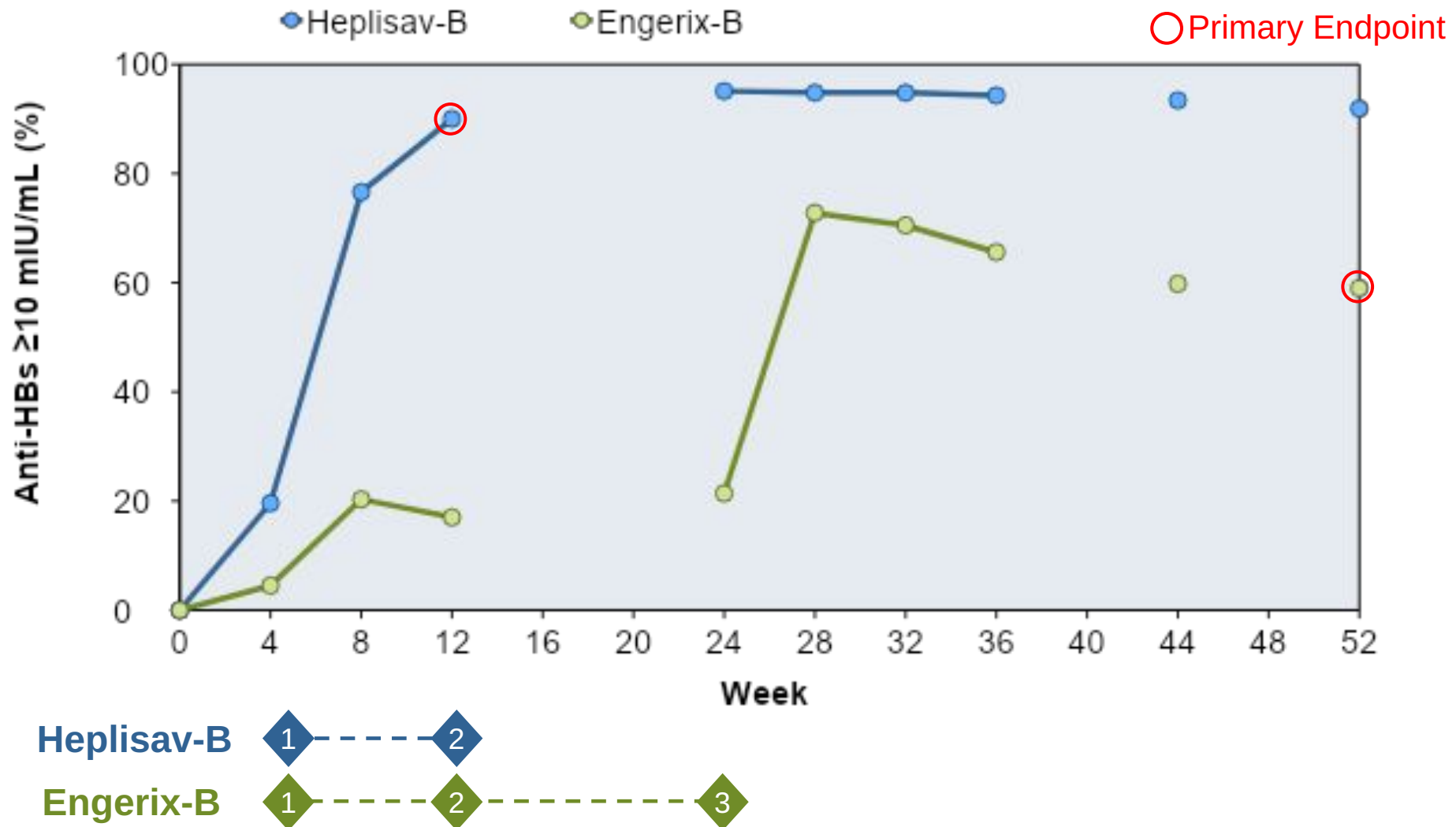
# Heplisav-B versus Engerix-B (Study 1)

## Healthy Adults 18-55 Years of Age



# Heplisav-B versus Engerix-B (Study 2)

## Healthy Adults 40-70 Years of Age



# Heplisav-B versus Engerix-B (Study 3) Adults 18-70 Years of Age



Source: Jackson S, et al. Vaccine. 2018;36:668-74.





# Hepatitis B Vaccine Serologic Testing

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- List all the groups that should have HBV serology testing (HBsAg, anti-HBs, anti-HBc) prior to receiving the HBV vaccine?
  - 1.
  - 2.
  - 3.....

# HBV Prevaccination Testing (HBsAg, Anti-HBs, Anti-HBc)

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- Household, sexual, or needle contacts of HBsAg+ persons
- Persons with HIV
- Persons with elevated ALT or AST of unknown etiology
- Hemodialysis patients
- Men who have sex with men
- Past or current persons who inject drugs
- Persons needing immunosuppressive therapy
- Donors of blood, plasma, organs, tissues, or semen

Source: CDC and Prevention

# HBV Prevaccination Testing (HBsAg, Anti-HBs, Anti-HBc)

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- Persons born in countries of high and intermediate (HBV) endemicity ( $\geq 8\%$ )
- U.S.-born persons not vaccinated as infants whose parents were born in countries with high HBV endemicity ( $\geq 8\%$ )

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# Measles Vaccine

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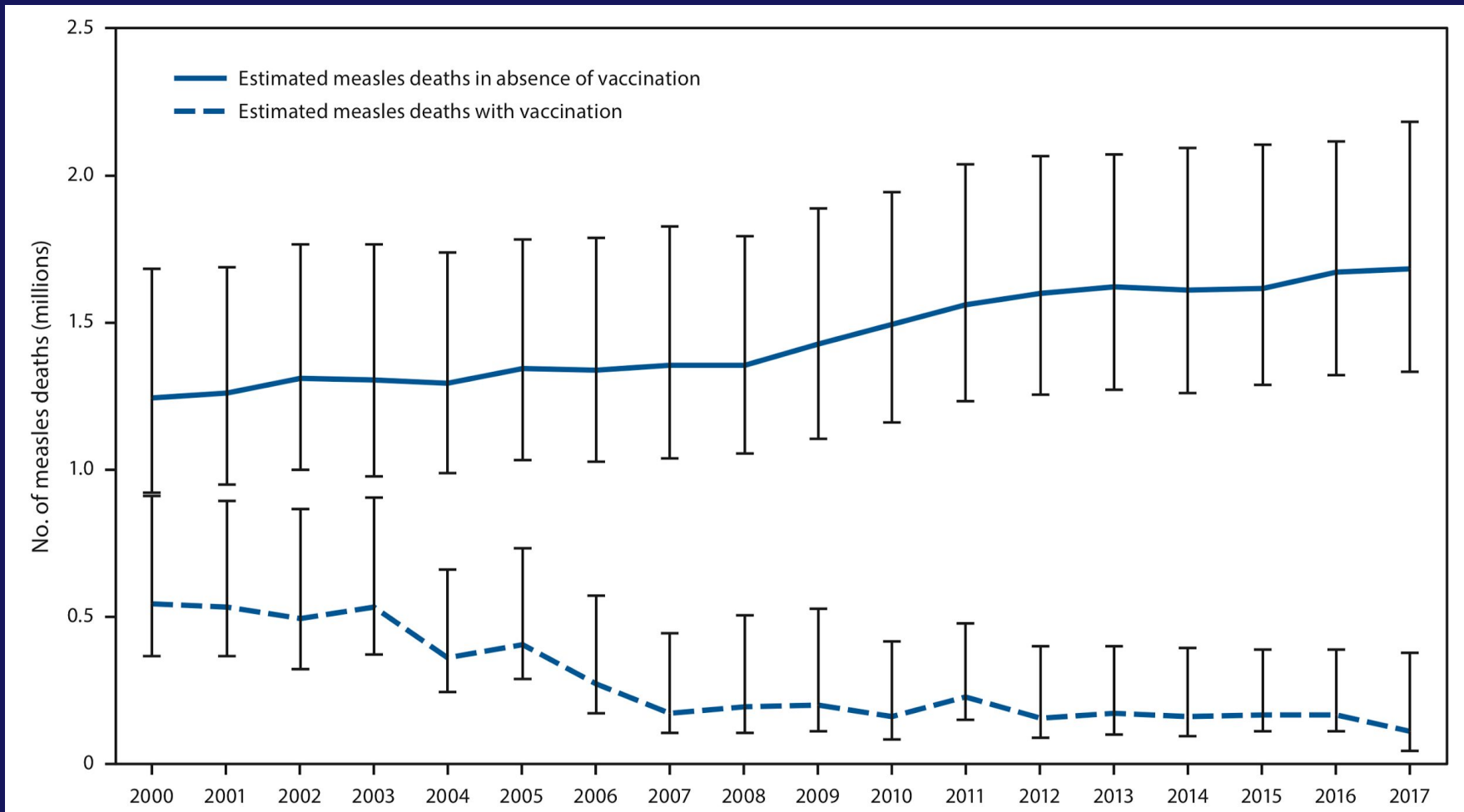
# Measles Vaccine Question

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- Globally from 2000-2017, what is estimated total number of deaths prevented by the measles vaccine?
  - A. 432,000
  - B. 961,000
  - C. 2,200,000
  - D. 21,000,000

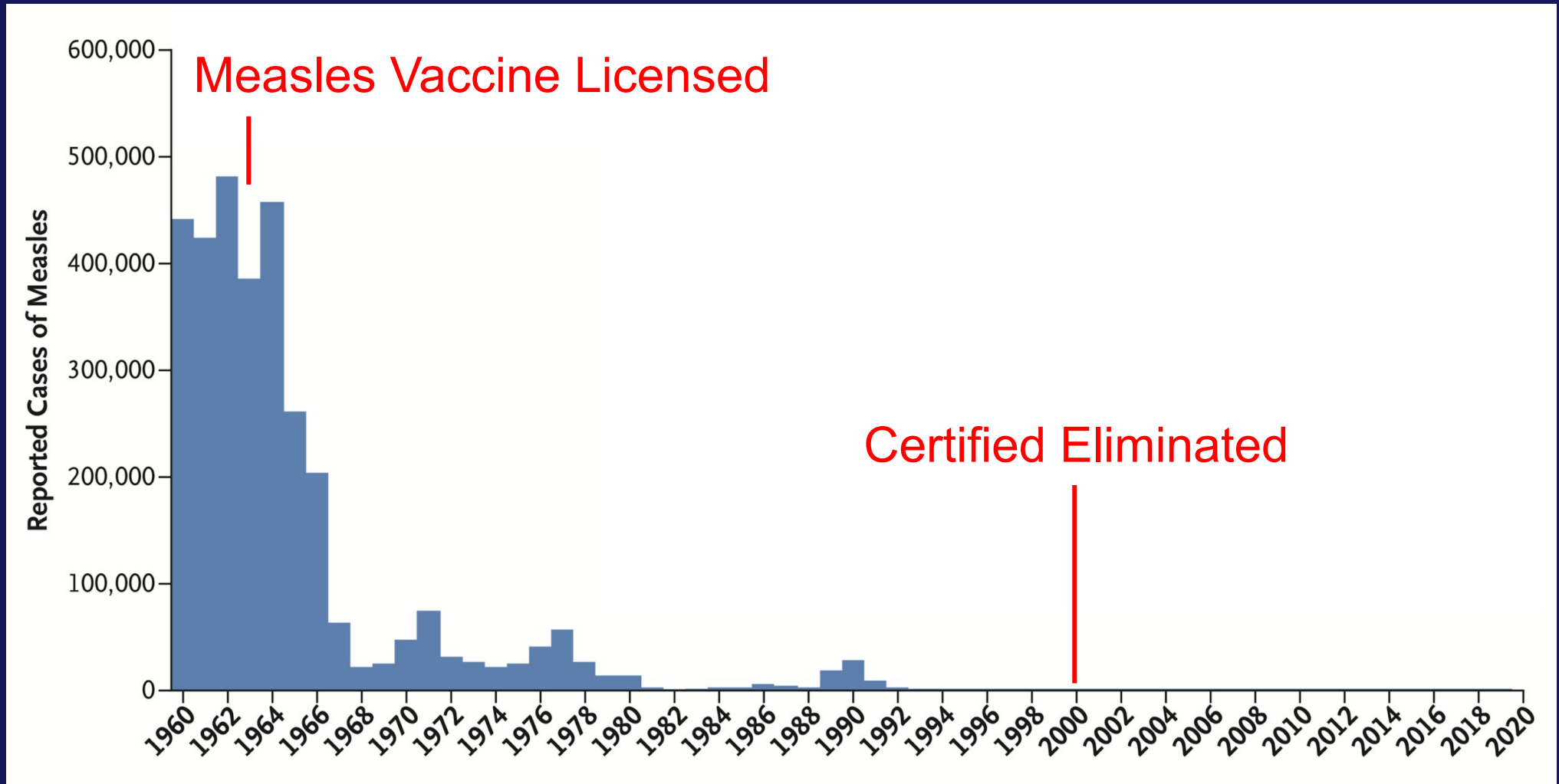
# Impact of Measles Vaccine: 2000-2017

- Global: estimated cumulative deaths prevented = 21,051,974



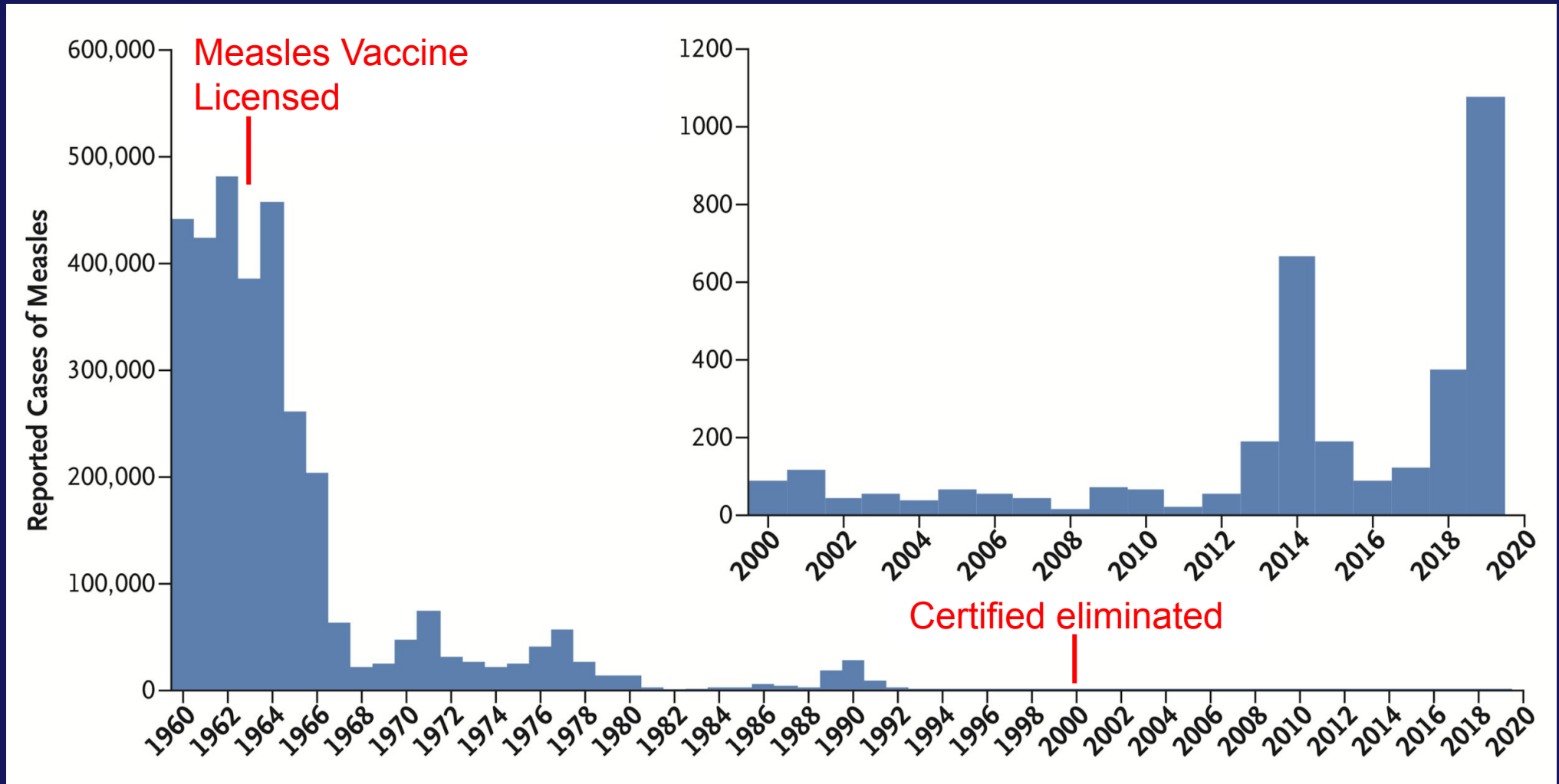
Source: Dabbagh A, et al. *Morb Mortal Wkly Rep.* 2018;67:1323-9.

# Measles Cases in United States, 1960-2019



Source: Centers for Disease Control and Prevention

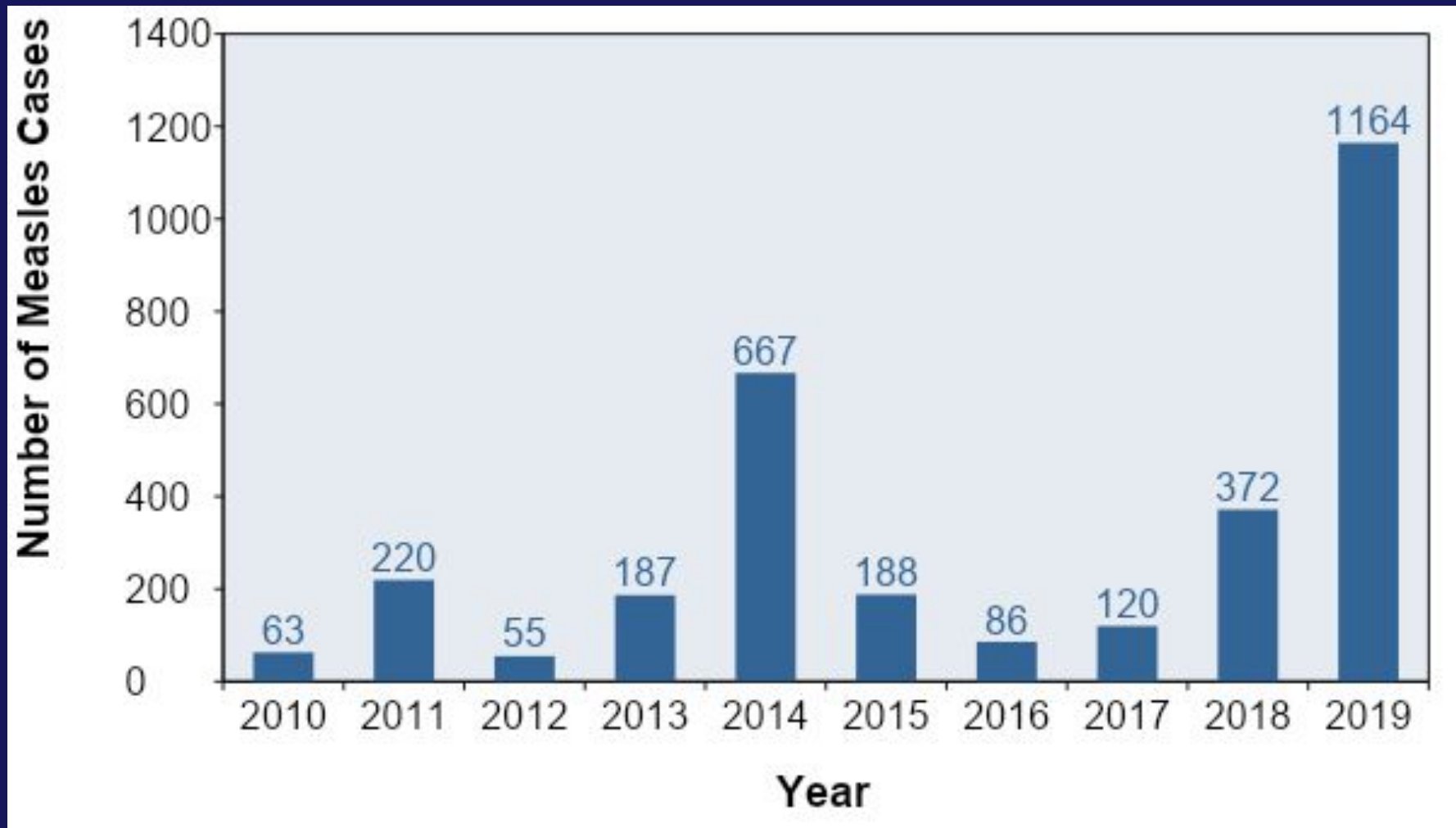
# Measles Cases in United States, 1960-2019



Source: Centers for Disease Control and Prevention

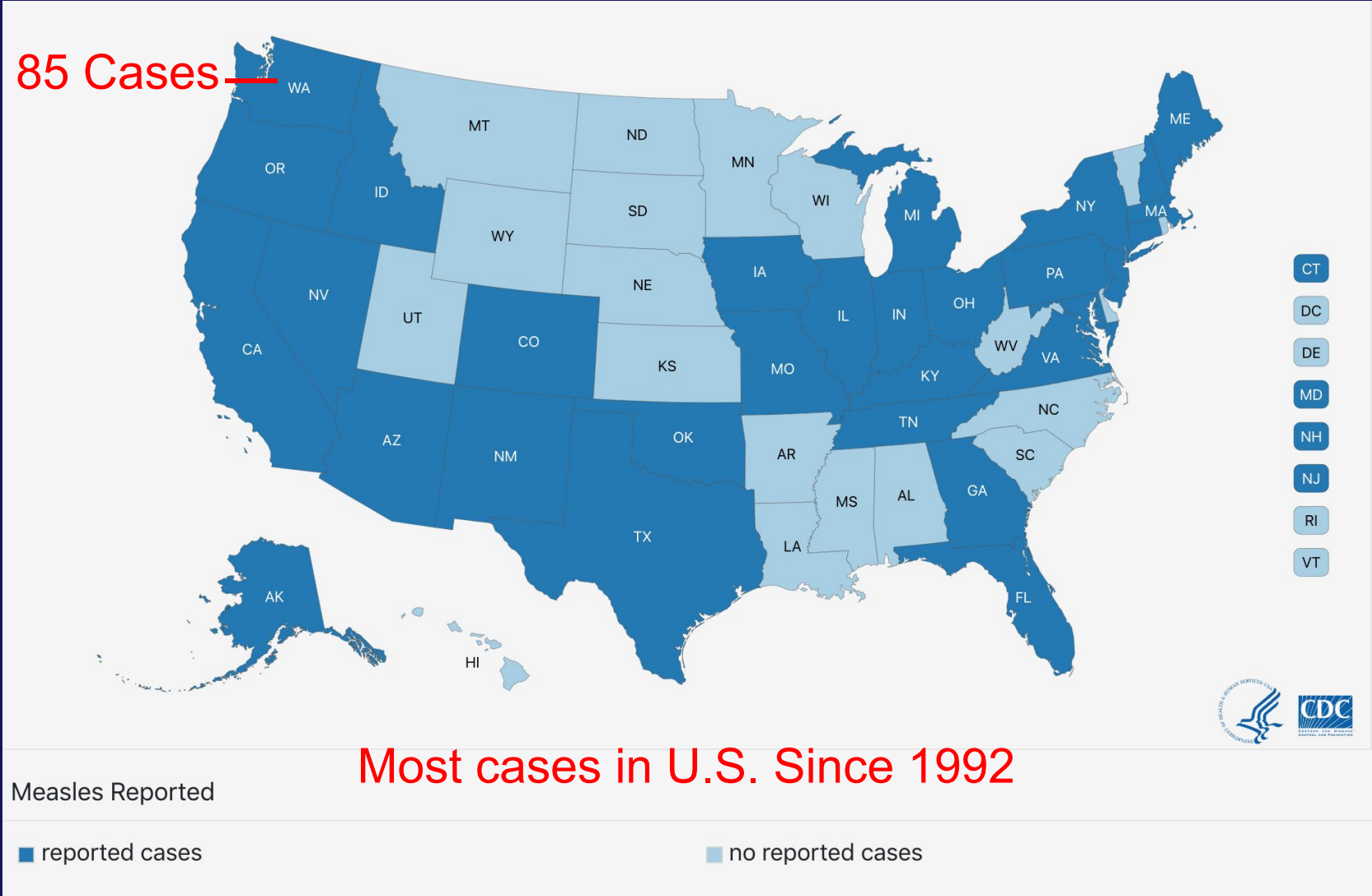


# Measles Cases in United States 2010-2019 (as of July 25, 2019)



Source: Centers for Disease Control and Prevention

# Measles Cases, 2019 (as of July 25, 2019)



Source: Centers for Disease Control and Prevention

# What is Considered Evidence of Immunity to Measles

- Born before 1957
- Laboratory confirmed measles (history of measles does not count)
- Written documentation of adequate vaccination
  - $\geq 1$  dose of measles vaccine at age  $\geq 1$  year and not high-risk group
  - $\geq 2$  doses of measles vaccine (for any group)

## \*High-Risk Groups

- Health care workers
- International travelers born  $>1957$
- Persons attending college or other post high-school educational activities

# Measles Vaccine ACIP/CDC Recommendations

- Routine (All Children)
  - Dose 1: All children age 12-15 months
  - Dose 2: Ages 4-6 years (ok if  $\geq 1$  month after first dose)
- Adults with no Evidence of Immunity
  - Standard: 1 dose
  - \*High Risk Groups: 2 doses (at least 4 weeks apart)

## \*High-Risk Groups

- Health care workers
- International travelers born >1957
- Persons attending college or other post high-school educational activities

# IF Measles Vaccine Was Given in U.S. 1963-1967

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- Live attenuated measles vaccine available in 1963
- Inactivated measles vaccine (ineffective) available 1963-1967

Note: MMR vaccine (MMRII) available in 1971

# IF Measles Vaccine Was Given in U.S. 1963-1967

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- Receipt of inactive measles vaccine dose not count as dose
- If type of vaccine unknown, does not count as a dose
- Standard group
  - $\geq 1$  dose of live attenuated measles vaccine required
- High-Risk Groups
  - $\geq 2$  dose of live attenuated measles vaccine required

# Measles Cases, 2019 (as of July 25, 2019)



Source: Centers for Disease Control and Prevention





# Fraudulent Research Linking Autism to MMR Vaccine

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- Case report in 1998 led by Andrew Wakefield based on 12 children
- Conclusions based on PARENT observation
- He paid children for blood samples at his child's 10<sup>th</sup> birthday party
- Many of parents later disputed claims in paper about their children
- Was on payroll of vaccine lawsuit firm 2 years before publication
- Wakefield received £435,000 from vaccine lawsuits
- Wakefield filed patent for MMR vaccine alternative
- Paper retracted in 2010, Wakefield lost UK license

**Source: British Medical Journal ([www.bmj.com/content/342/bmj.c5347](http://www.bmj.com/content/342/bmj.c5347))**

- Wakefield refused to ever do follow up studies to validate findings

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# Zoster Vaccine

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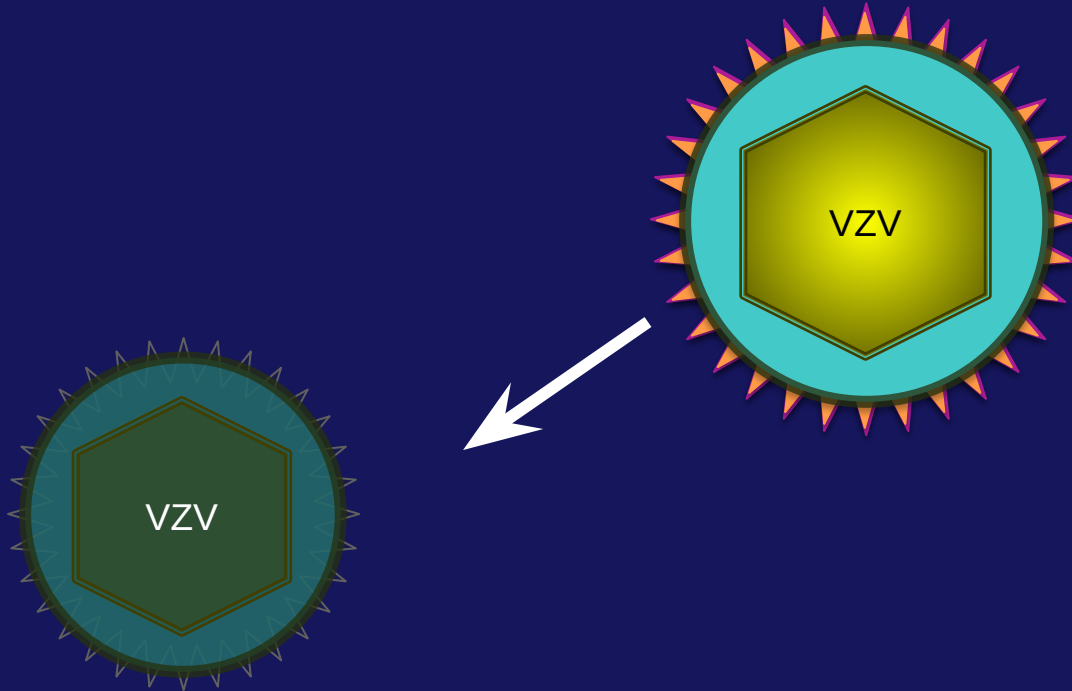
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- “Approximately 1 million new cases of zoster occur in the United States annually.”
  - “Approximately one in three persons in the general population will develop zoster during their lifetime.”

**From: ACIP & Centers for Disease Control. MMWR. 2008;57:1-32.**

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# Zoster Vaccines

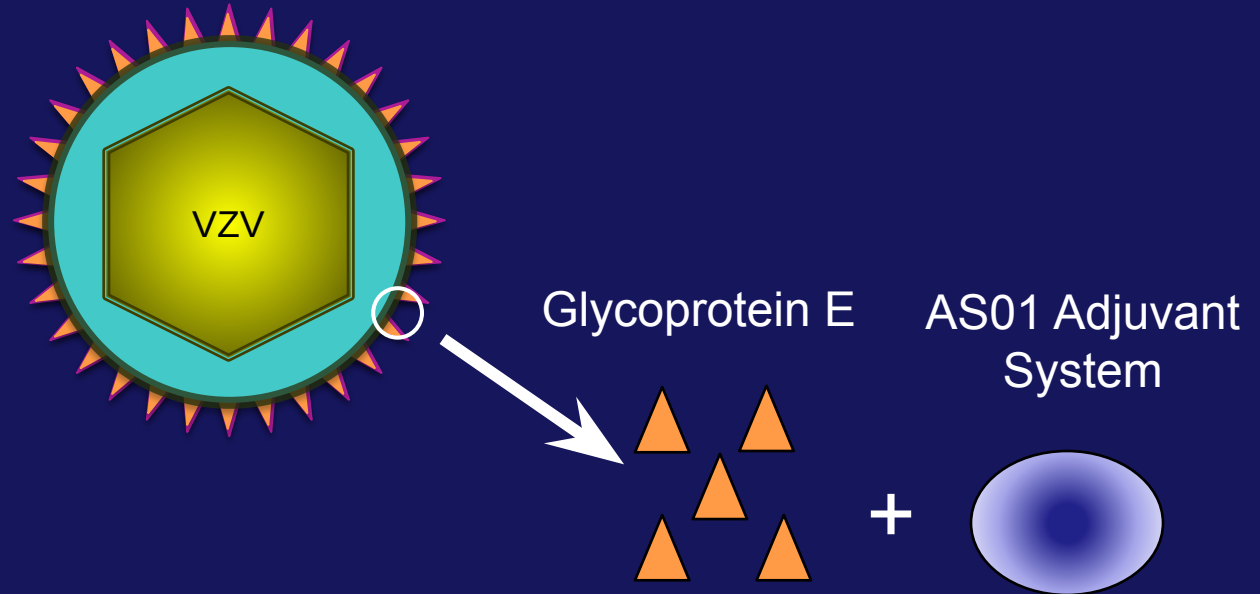
Varicella-Zoster Virus



Zoster Vaccine Live  
(ZVL)

# Zoster Vaccines

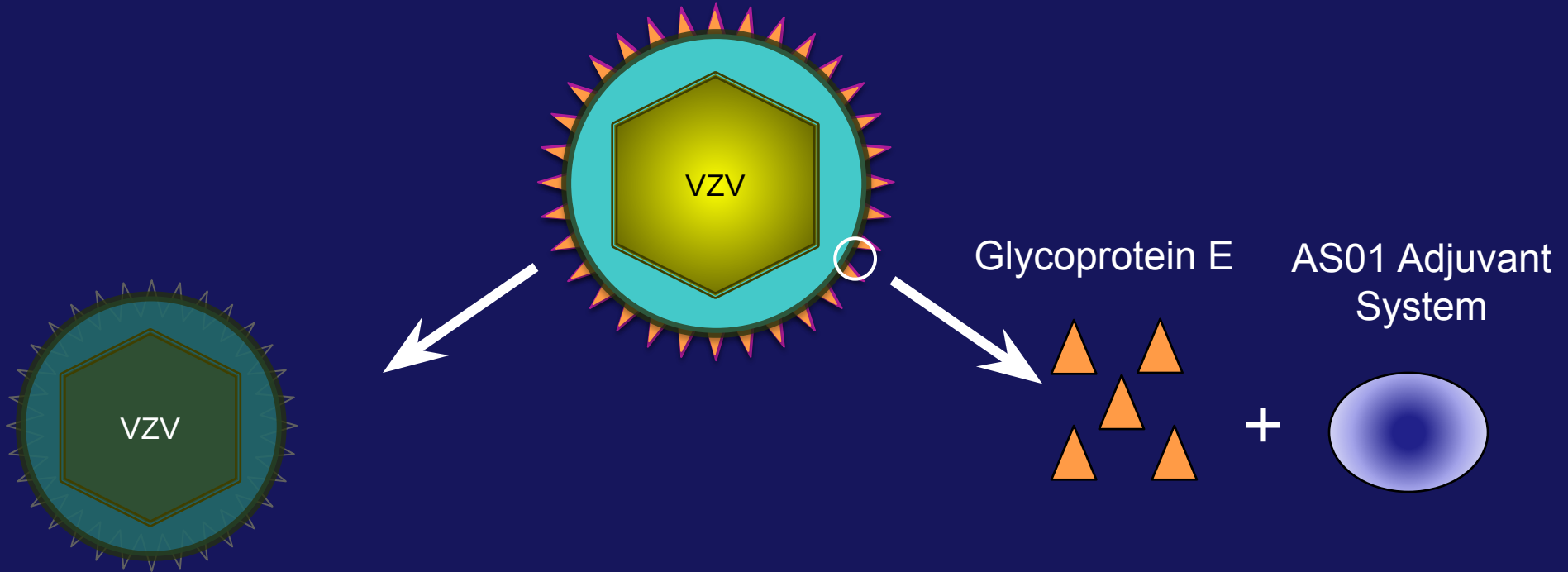
Varicella-Zoster Virus



Recombinant Zoster Vaccine  
(RZV)

# Zoster Vaccines

Varicella-Zoster Virus



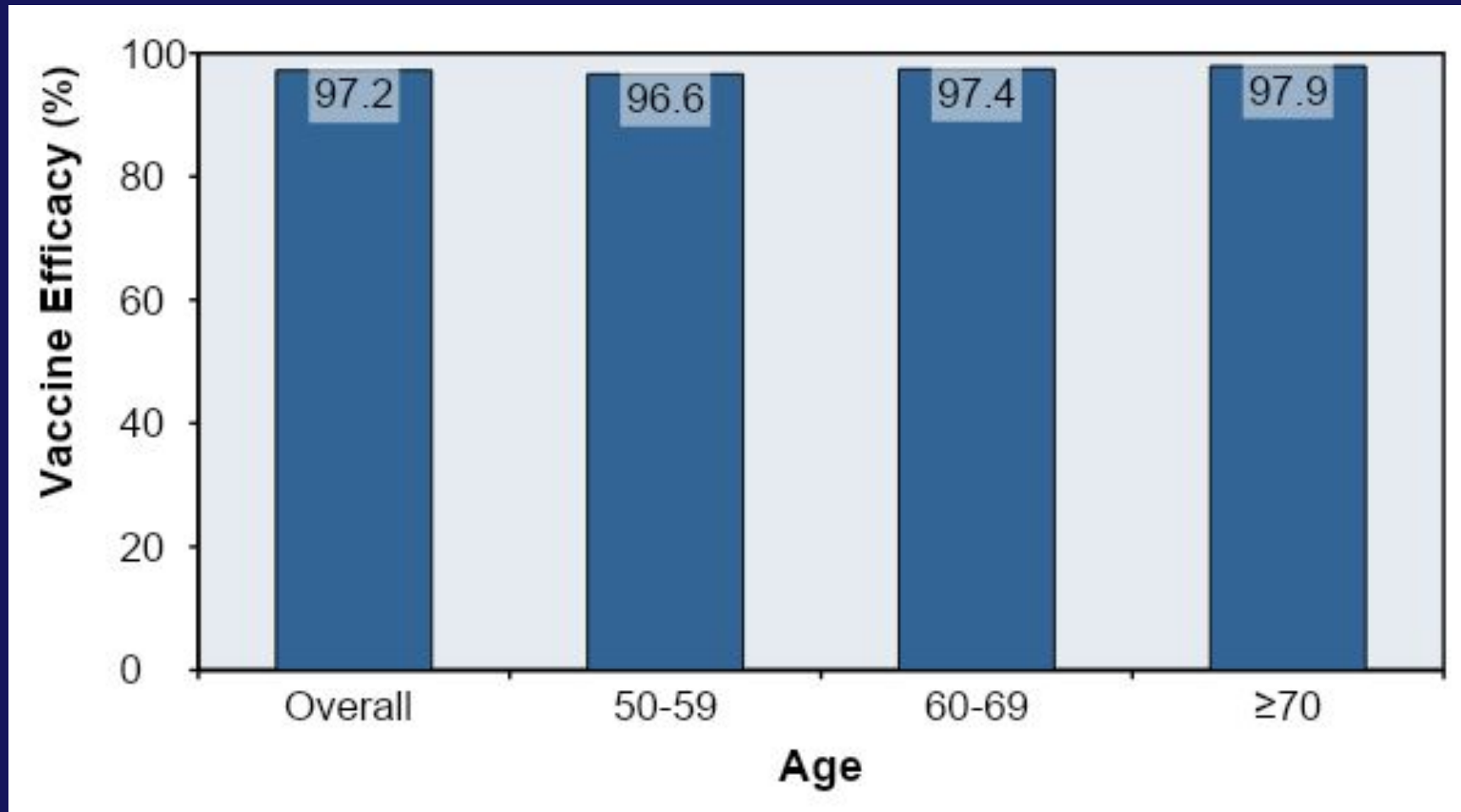
Zoster Vaccine Live  
(ZVL)

Recombinant Zoster Vaccine  
(RZV)

# Herpes Zoster Vaccines in Immunocompetent Adults

- FDA Approval
    - Recombinant Zoster Vaccine/RZV (*Shingrex*): Age  $\geq 50$
    - Zoster Vaccine Live/ ZVL (*Zostavax*): Age  $\geq 50$
  - Administration
    - RZV: 2 doses IM 2-6 months apart (store in refrigerator)
    - ZVL: 1 dose SQ (store in freezer)
  - ACIP Recommendations
    - RZV preferred and recommended for adults age  $\geq 50$  years
    - ZVL for age  $\geq 60$  ok, but RZV preferred
- Source: Dooling KL, et al. *MMWR Morb Mortal Wkly Rep*. 2018;67:103-8
- RZV can be given if previously received ZVL ( $\geq 2$  months after ZVL)

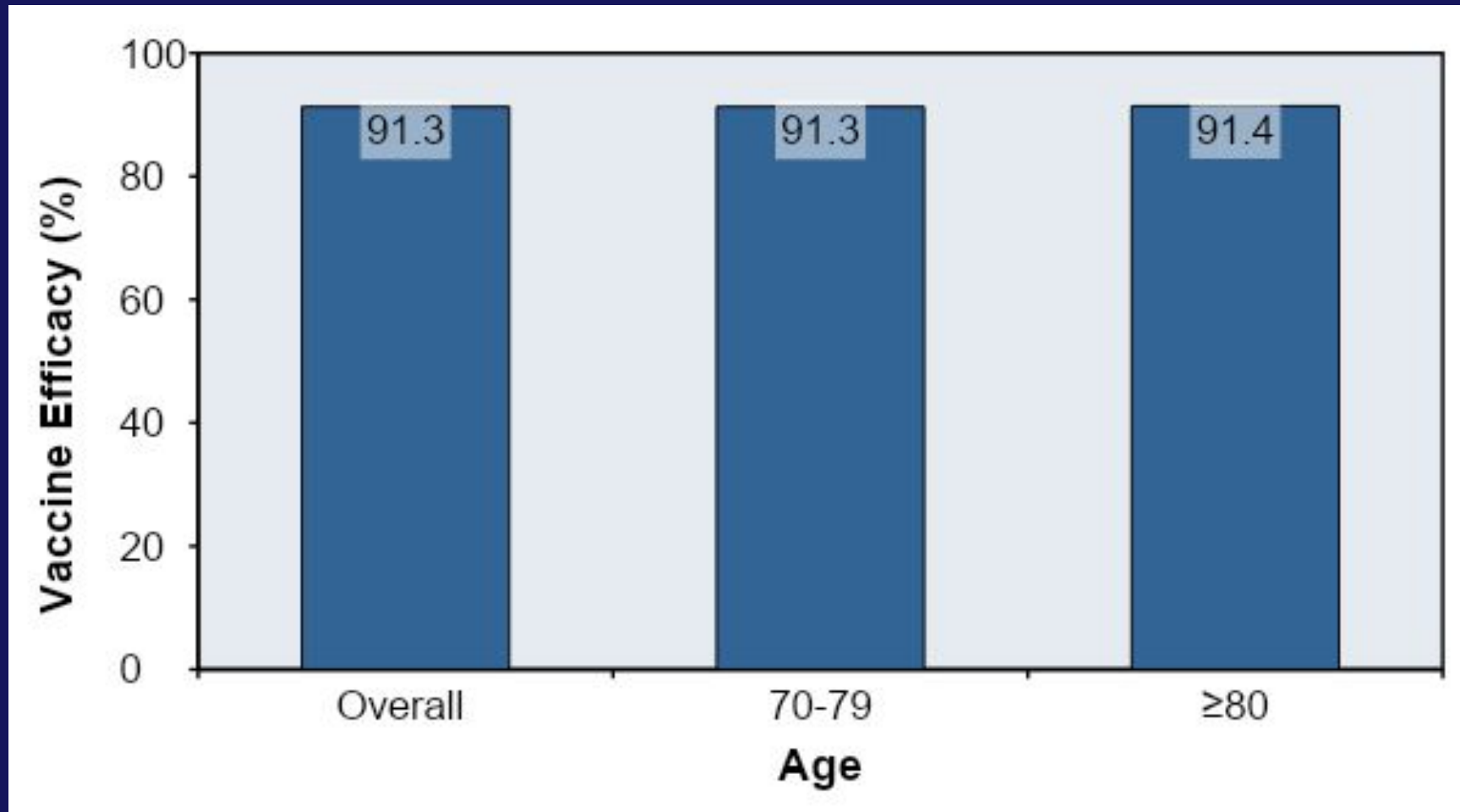
# HZ/su Vaccine Efficacy Against First Episode of Zoster in Immunocompetent Patients $\geq 50$ (ZOE-50)



Source: Lal H, et al. N Eng J Med. 2015;372:2087-96.



# HZ/su Vaccine Safety and Efficacy Against First Episode of Zoster in Immunocompetent Adults $\geq 70$ (ZOE-70)



Source: Cunningham AL, et al. N Eng J Med. 2016;375:1019-32.

# Zoster Vaccine: Question

- The RZV vaccine (*Shingrex*) is recommended as 2 doses given 2-6 months apart. A patient received dose 1, but has not been able to get dose 2 due the vaccine shortage. Nine months have elapsed now since dose 1.
- What do you recommended for this patient?
  - A. Start vaccine series over when shortage is resolved
  - B. Give second dose with ZVL (*Zostavax*)
  - C. Give second dose with RZV (*Shingrex*) when available

# Zoster Vaccine Shortage Question

- Make every effort to ensure that two doses of RZV are administered within the recommended interval of 2 to 6 months.
- If more than 6 months have elapsed since the first dose of RZV (*Shingrex*), administer the second dose when possible.
- Do not restart the vaccine series, and do not substitute ZVL (*Zostavax*) for the second dose of RZV.

Source: Immunization Action Coalition

Ask the Experts: Experts from CDC Answer Questions about Vaccines



# Zoster Vaccine: Question

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- How soon after a case of shingles can a person receive zoster vaccine?

# Zoster Vaccine: Question

- How soon after a case of shingles can a person receive zoster vaccine?
- Administering zoster vaccine to a person whose immunity was recently boosted by a case of shingles might reduce the effectiveness of the vaccine. ACIP does not have a specific recommendation on this issue. But it may be prudent to defer zoster vaccination for 6 to 12 months after the shingles has resolved so that the vaccine can produce a more effective boost to immunity.

Source: Immunization Action Coalition

Ask the Experts: Experts from CDC Answer Questions about Vaccines

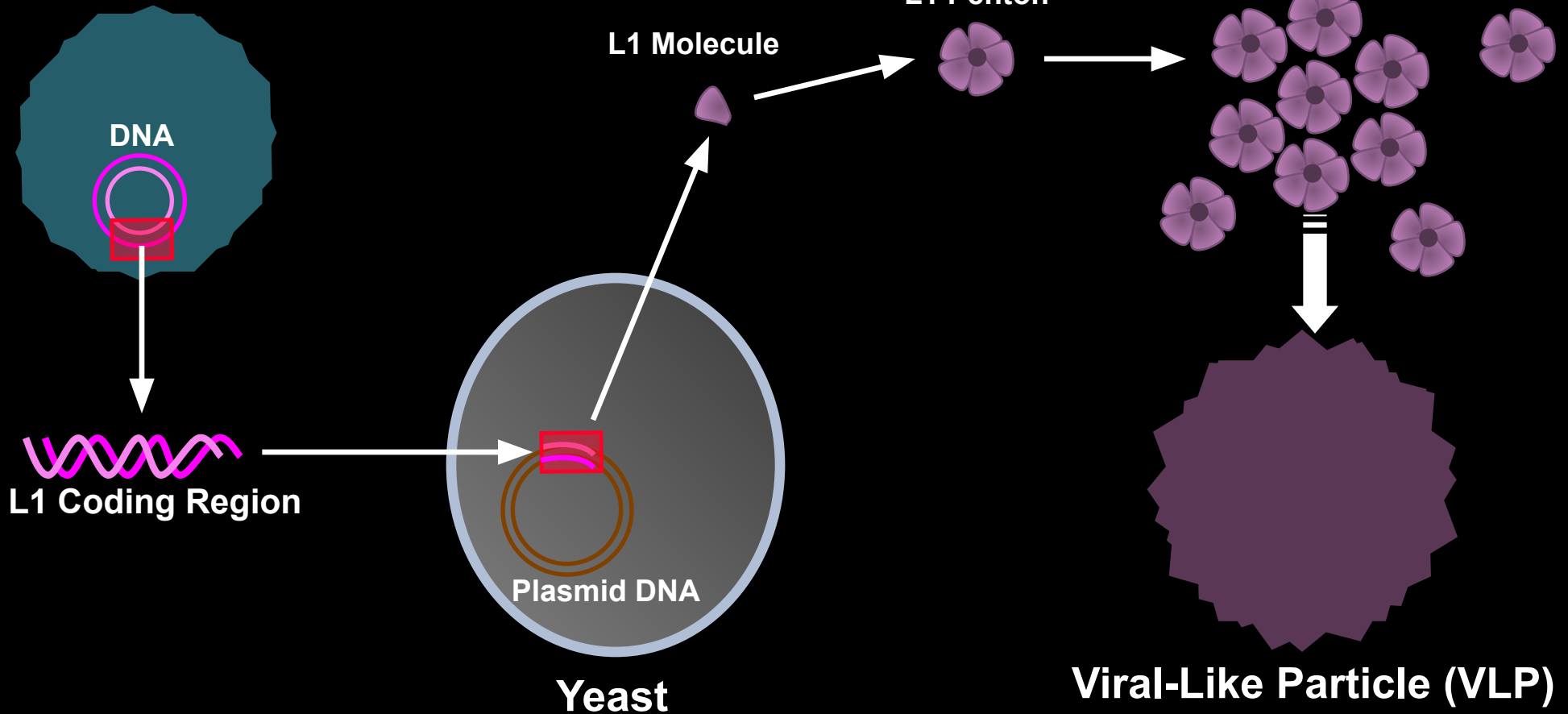
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# Human Papillomavirus Vaccine

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# HPV Subunit Vaccine: L1 Major Capsid Protein

## Human Papillomavirus



# Human Papillomavirus Vaccines

## Current Status

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- Nanovalent: 9vHPV (*Gardasil-9*)
- FDA-approved 2014
- Only HPV vaccine available in U.S.
- Contains HPV Types:
  - 6, 11, 16, 18, 31, 33, 45, 52, and 58



# 9vHPV Vaccine

## Expanded Approval and ACIP Recommendations

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- *October 28, 2018*

- FDA Approval Extended: Ages 9 through 45

- *June 26, 2019*

- ACIP voted to recommend “shared clinical decision making” for persons aged 27 through 45 years when considering the 9-valent HPV vaccine.

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Thank you!

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