# MMR & Shingles

## A Tale of Two Vaccines

Melissa Martinez MD
FAAFP

# A Tale of Two Vaccines

Chapter 1
Outbreaks of measles and mumps
Rationale for a 3rd MMR

Chapter 2
Comparing 2 Shingles Vaccines
Understanding Adjuvants

Chapter 3
A new Hepatitis B vaccine

Chapter 4
A tale of two influenza vaccines
LAIV4 and Adjuvanted IIV4

Chapter 5
Review of pneumococcal vaccines for adults

Melissa Martinez MD FAAFP
Vaccine Geek

Nothing to declare

- *SHOTS app content expert*
- *National Vaccine Advisory Committee*

*US Department of Health and Human Services*

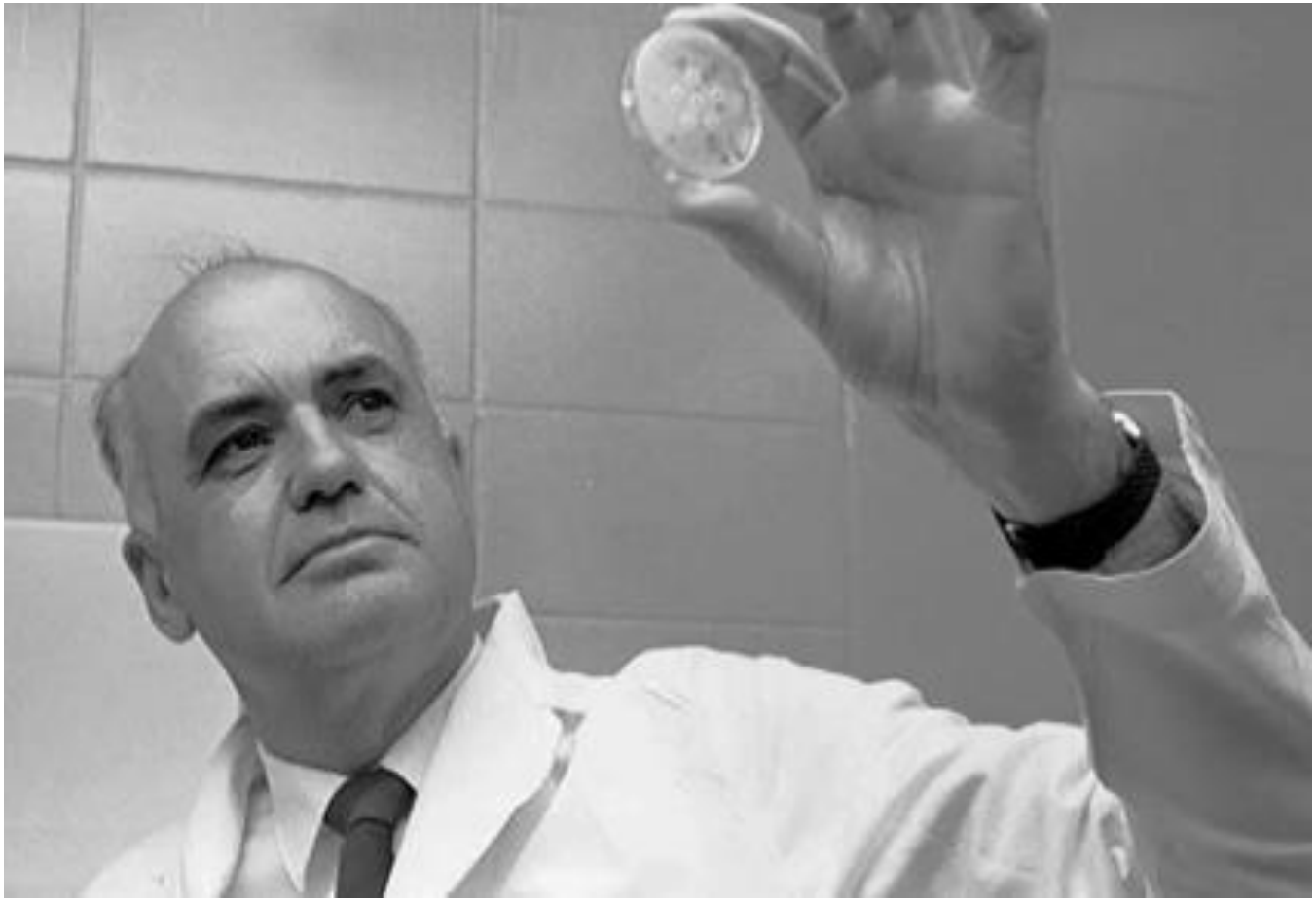
- *Liaison Mumps Work Group of the Advisory Council on Immunizations Practices (ACIP,CDC)*
- *Fellow AAFP Vaccine Science*
- *New Mexico Immunization Practice Advisory Committee*

- *UNMH  Adult Immunization Task Force*

# Jeryl Lynn Hilleman

The College of Physicians of Philadelphia
www.historyofvaccines.org/content/mumps-jeryl-lynn-story

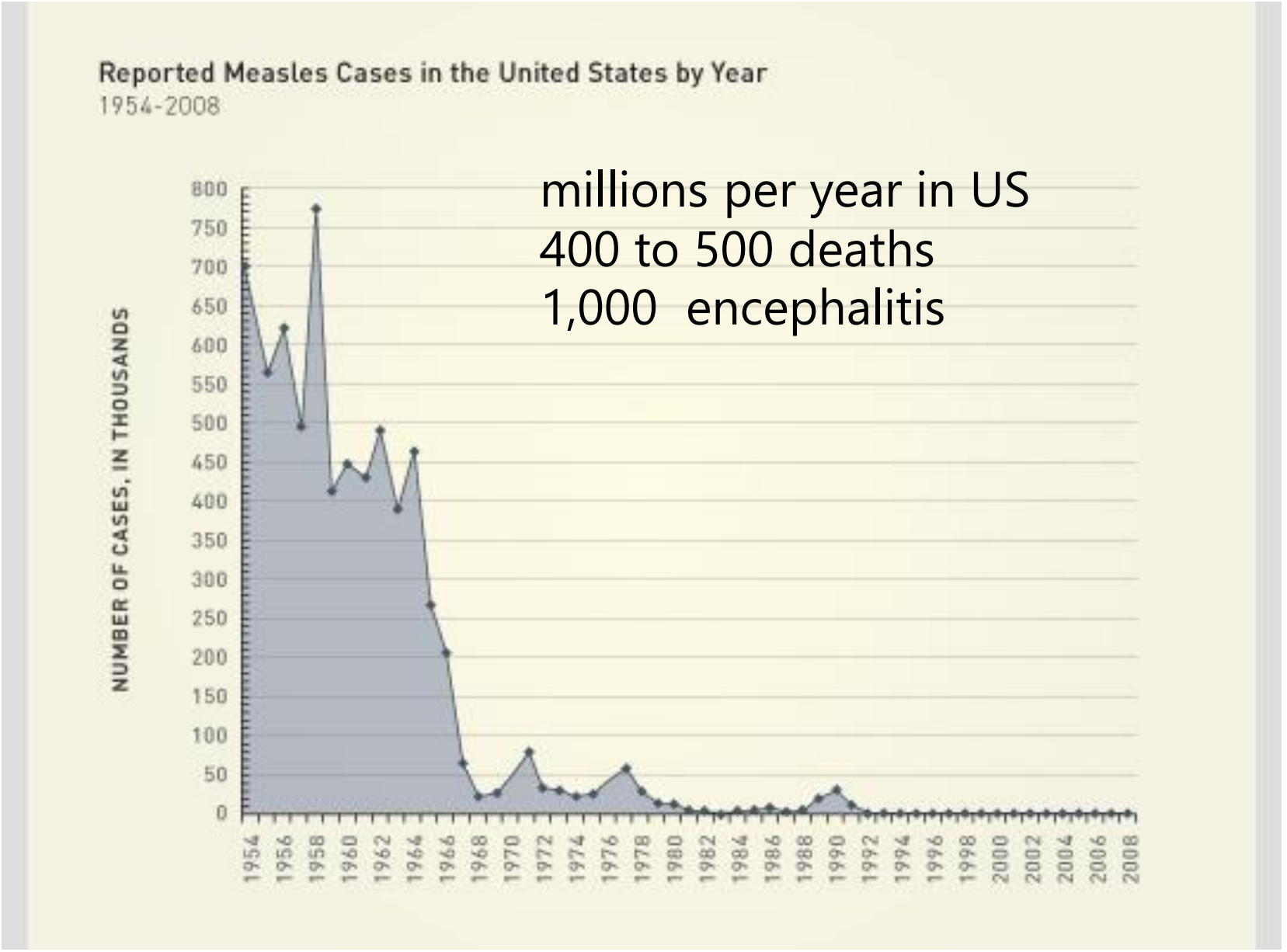
# 1965 Dr. Maurice Hilleman



Smithsonian: www.si.edu/spotlight/antibody-initiative/mmr

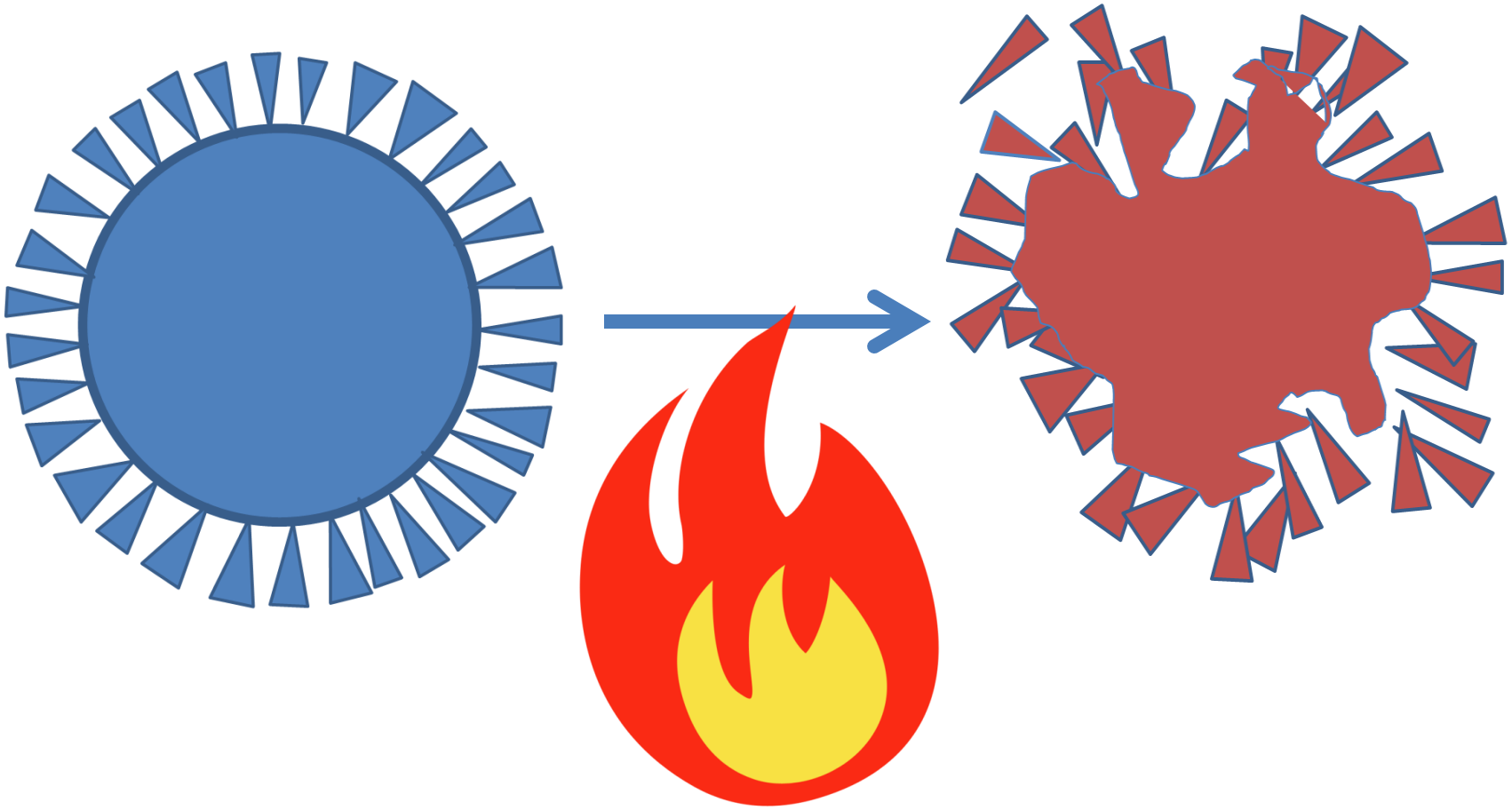
https://www.historyofvaccines.org/content/mumps-jeryl-lynn-story

, New York Times May 6 2013

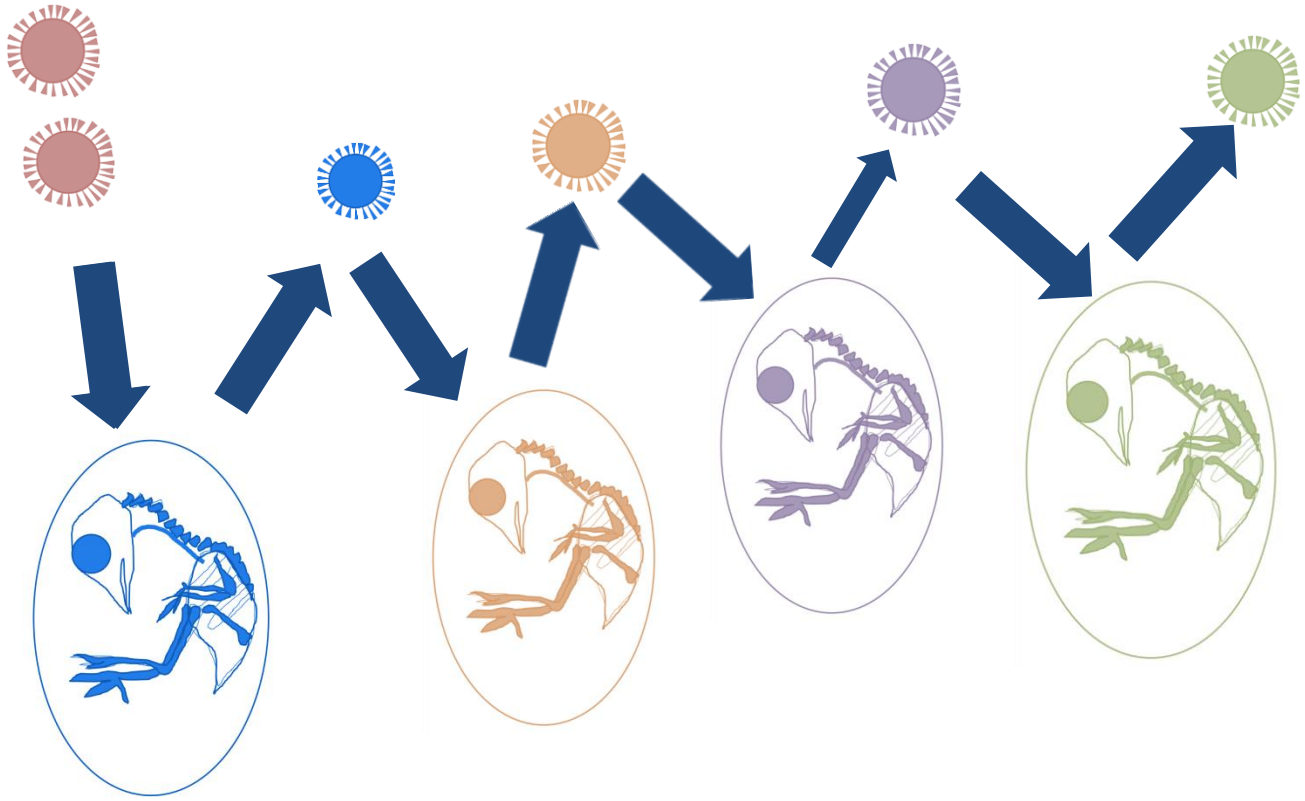



CDC/MMWR Summary of Notifiable Diseases, United States, 1993; CDC/MMWR Summary of Notifiable Diseases, United States, 2008.

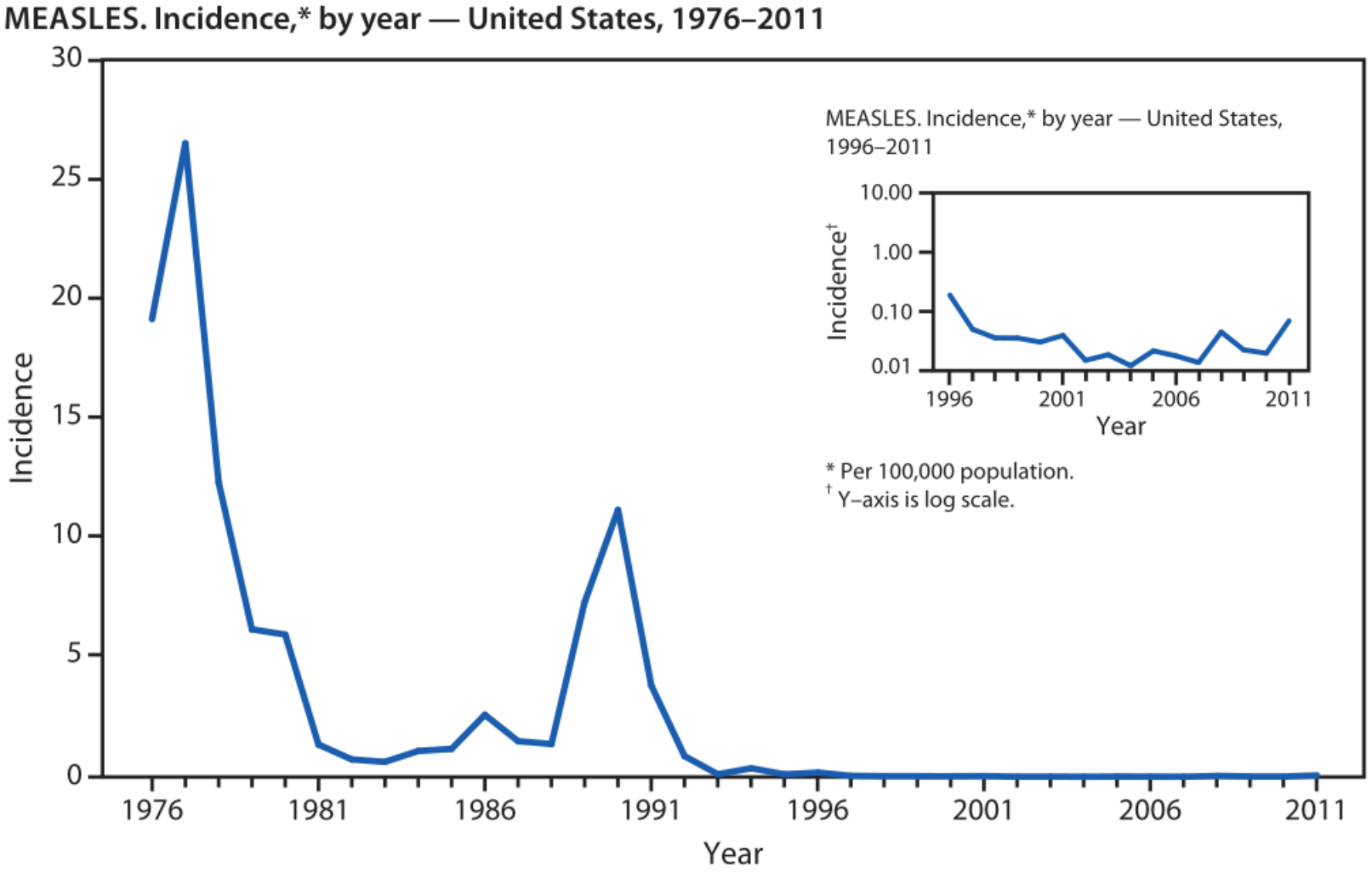
# Killed Virus



# Live Attenuated Vaccine



- Recognized by the human immune system
- Cannot replicate well in human host.




* Per 100,000 population.

MMWR 60:53 2013


Why do
1 in
100
children
have
AUTISM

# Wakefield Lancet

- 12 children with autism-no controls
  some clients
- Lots of tests including intestinal biopsy
  **Ileal lymphoid nodular hyperplasia and non-specific colitis**
- Conclusion
  MMR weakens intestines
  toxin leak through intestines into blood
  then to brain
- Others unable to replicate findings
- Data altered

Early report

# Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children

*A J Wakefield, S H Murch, A Anthony, J Linnell, D M Casson, M Malik, M Berelowitz, A P Dhillon, M A Thomson, P Harvey, A Valentine, S E Davies, J A Walker-Smith*

## Summary

**Background** We investigated a consecutive series of children with chronic enterocolitis and regressive developmental disorder.

**Methods** 12 children (mean age 6 years [range 3–10], 11 boys) were referred to a paediatric gastroenterology unit with a history of normal development followed by loss of acquired skills, including language, together with diarrhoea and abdominal pain. Children underwent gastroenterological, neurological, and developmental assessment and review of developmental records. Ileocolonoscopy and biopsy sampling, magnetic-resonance imaging (MRI), electroencephalography (EEG), and lumbar puncture were done under sedation. Barium follow-through radiography was done where possible. Biochemical, haematological, and immunological profiles were examined.

**Findings** Onset of behavioural symptoms was associ[ated] by the parents, with measles, mumps, and rub[ella] vaccination in eight of the 12 children, with measl[es] infection in one child, and otitis media in an[other]. All 12 children had intestinal abnormalities ranging from lymphoid nodular hyperplasia to ag[gregated] lymphoid ul[ceration]. Histology showed patchy chronic inflam[matory] in 11 children and reactive ileal lymph[oid] hyperplasia in seven, but no granulomas. Be[hav]ioural disorders included autism (nine), disintegrative psychosis (one), a[nd] possible postviral or vaccinal encephalitis (two). There were no focal neurological abnormalities and MRI and EEG tests were normal. Abnormal laboratory results were significantly raised urinary methylmalonic acid compared with age-matched controls ($p=0.003$), low haemoglobin in four children, and low serum IgA in four children.

**Interpretation** We identified associated gastrointestinal disease and developmental regression in a group of previously normal children, which was generally associated in time with possible environmental triggers.

*Lancet* 1998; **351**: 637–41
*See Commentary page*

**Inflammatory Bowel Disease Study Group, University Departments of Medicine and Histopathology** (A J Wakefield FRCS, A Anthony MB, J Linnell PhD, A P Dhillon MRCPath, S E Davies MRCPath) **and the University Departments of Paediatric Gastroenterology** (S H Murch MB, D M Casson MRCP, M Malik MRCP, M A Thomson FRCP, J A Walker-Smith FRCP,), **Child and Adolescent Psychiatry** (M Berelowitz FRCPsych), **Neurology** (P Harvey FRCP), **and Radiology** (A Valentine FRCR), **Royal Free Hospital and School of Medicine, London NW3 2QG, UK**

**Correspondence to:** Dr A J Wakefield

## Introduction

We saw several children who, after a period of apparent normality, lost acquired skills, including communication. They all had gastrointestinal symptoms, including abdominal pain, diarrhoea, and bloating and, in some cases, food intolerance. We describe the clinical findings, and gastrointestinal features of these children.

## Patients and methods

12 children, consecutively referred to the department of paediatric gastroenterology with a history of a pervasive developmental disorder with loss of acquired skills and intestinal symptoms (diarrhoea, abdominal pain, bloating and food intolerance), were investigated. All children were admitted to the ward for 1 week, accompanied by their parents.

### *Clinical investigations*

We took histories including details of immunisations and exposure to infectious diseases, and assessed the children. In 11 cases the history was obtained by the senior clinician (JW-S). Neurological and psychiatric assessments were done by consultant staff (PH, MB) with HMS-4 criteria.[1] Developmental assessment included a review of prospective developmental records from parents, health visitors, and general practitioners. Four children did not undergo psychiatric assessment in hospital; all had been assessed professionally elsewhere, so these assessments were used as the basis for their behavioural diagnosis.

After bowel preparation, ileocolonoscopy was performed by SHM or MAT under sedation with midazolam and pethidine. Paired frozen and formalin-fixed mucosal biopsy samples were taken from the terminal ileum; ascending, transverse, descending, and sigmoid colons, and from the rectum. The procedure was recorded by video or still images, and were compared with images of the previous seven consecutive paediatric colonoscopies (four normal colonoscopies and three on children with ulcerative colitis), in which the physician reported normal appearances in the terminal ileum. Barium follow-through radiography was possible in some cases.

Also under sedation, cerebral magnetic-resonance imaging (MRI), electroencephalography (EEG) including visual, brain stem auditory, and sensory evoked potentials (where compliance made these possible), and lumbar puncture were done.

### *Laboratory investigations*

Thyroid function, serum long-chain fatty acids, and cerebrospinal-fluid lactate were measured to exclude known causes of childhood neurodegenerative disease. Urinary methylmalonic acid was measured in random urine samples from eight of the 12 children and 14 age-matched and sex-matched normal controls, by a modification of a technique described previously.[2] Chromatograms were scanned digitally on computer, to analyse the methylmalonic-acid zones from cases and controls. Urinary methylmalonic-acid concentrations in patients and controls were compared by a two-sample $t$ test. Urinary creatinine was estimated by routine spectrophotometric assay.

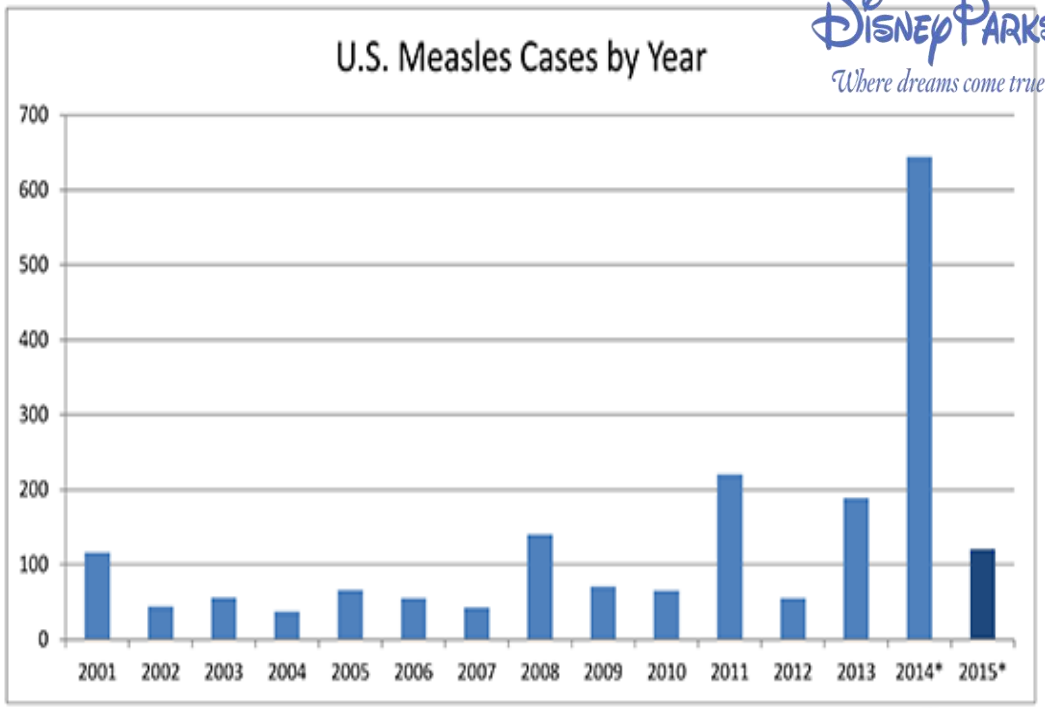
Children were screened for antiendomyseal antibodies and boys were screened for fragile-X if this had not been done

# Measles Cases and Outbreaks

January 1 to February 6, 2015*

**121** Cases reported in 17 states and Washington DC: Arizona, California, Colorado, Delaware, Illinois, Michigan, Minnesota, Nebraska, Nevada, New Jersey, New York, Oregon, Pennsylvania, South Dakota, Texas, Utah, Washington

**1** Outbreak representing 85% of reported cases this year




*Provisional data reported to CDC's National Center for Immunization and Respiratory Diseases

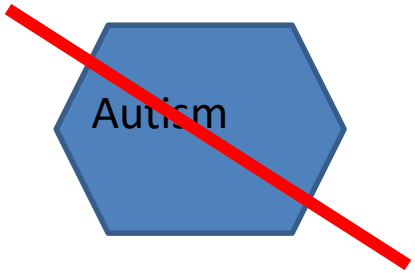
CDC

Disney Parks — Where dreams come true

2016 86
2017 118
2018* 63

# MMR Adverse Effects

- Hypersensitivity
- Fever
- Rash



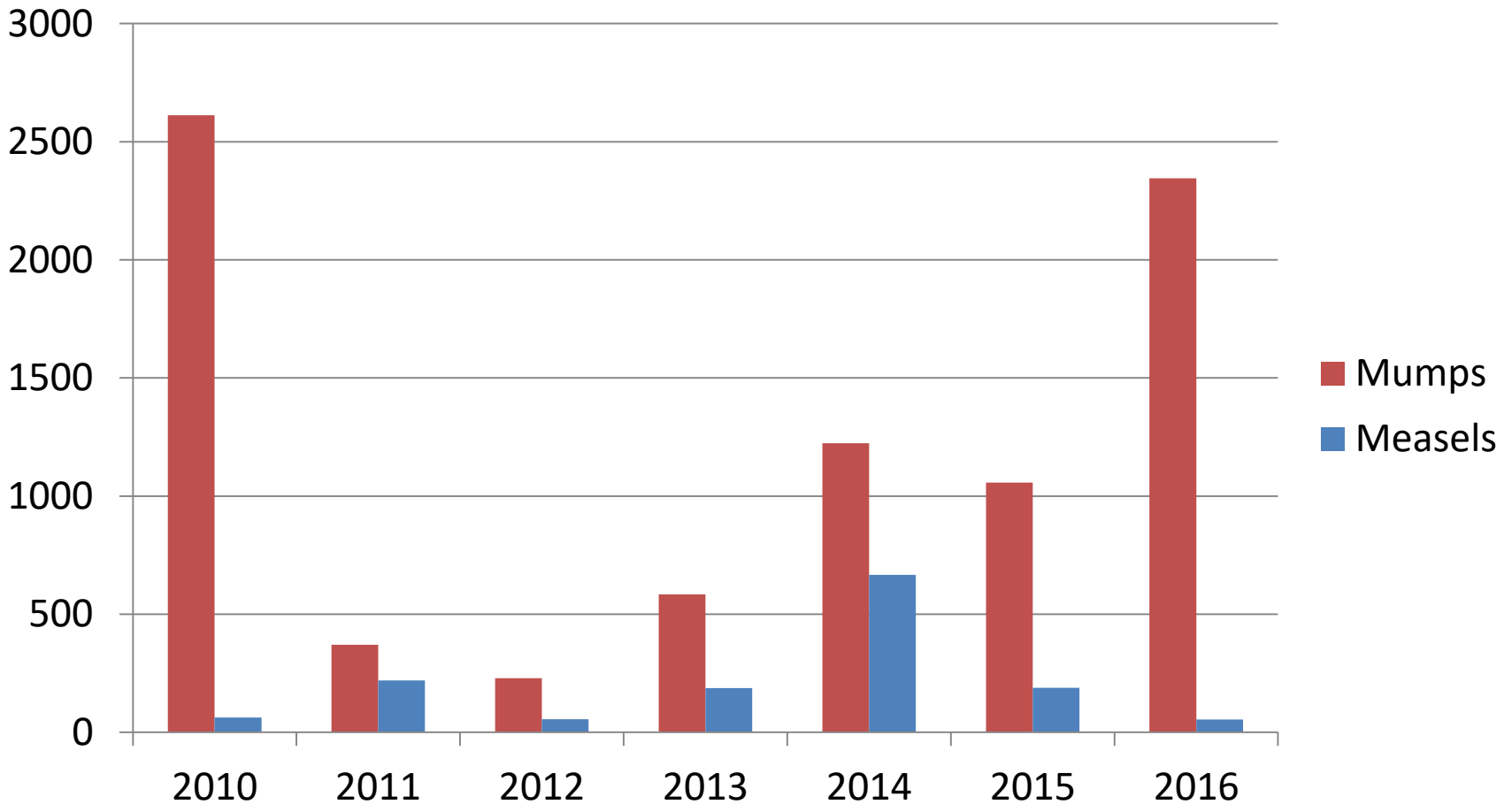

Anaphylaxis
3.5 in 1million doses

ITP 2.6 in 100,000 doses

Subacute sclerosing panecephalitis rare if at all

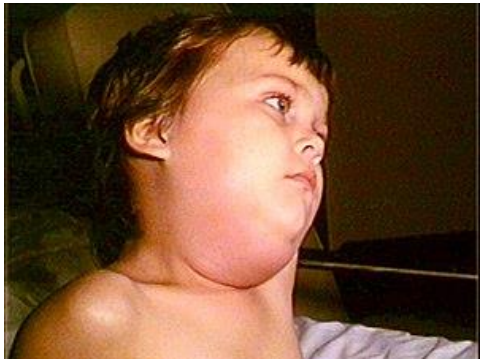
Encephalitis
0.4 in 1 million doses

# Mumps/Measles cases by Year




CDC

# MUMPS in persons with two doses of MMR



prolonged contact
(e.g., universities and close-knit communities)

time since 2nd dose

# ACIP Recommendation 2018

Third dose of mumps containing vaccine in persons at increased risk for acquiring mumps during an outbreak

Chapter 1 Summary

*MMR*

- *Live Attenuated Vaccine*

- *Does not cause autism*

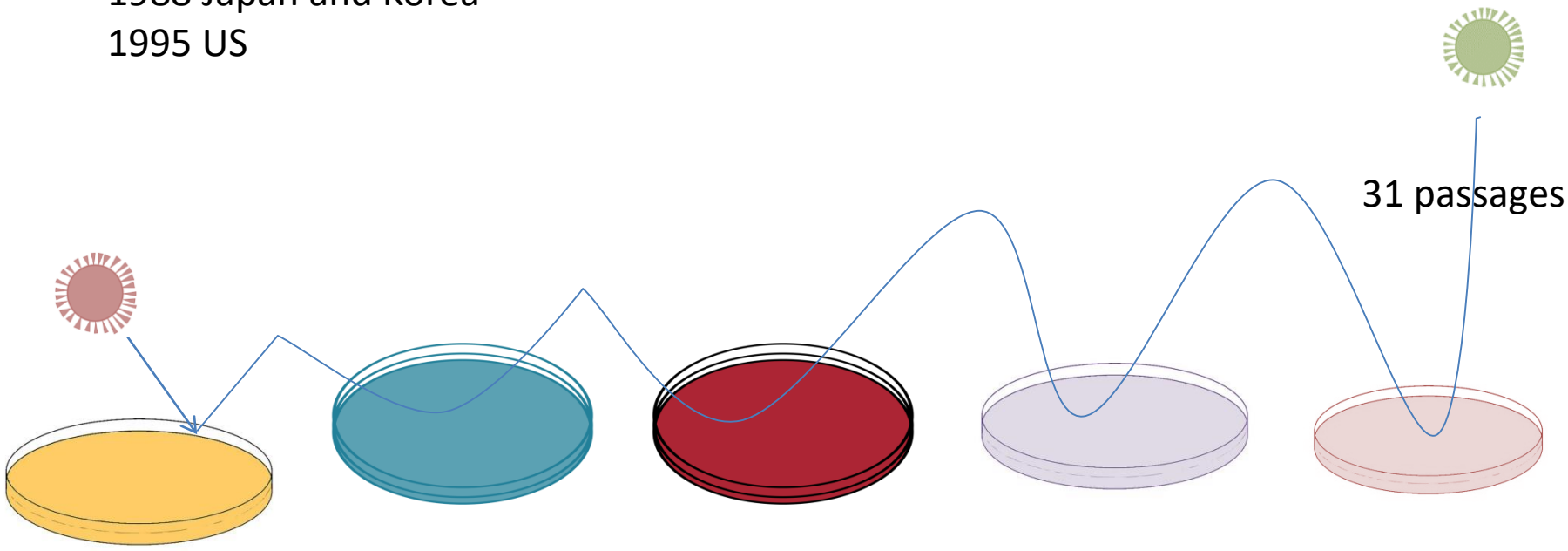
- *Effective in preventing measles when used*

- *3rd does for preventing mumps in some outbreak settings*

# Chapter 2 Shingles Vaccines

# Varicella

Takahashi
1988 Japan and Korea
1995 US

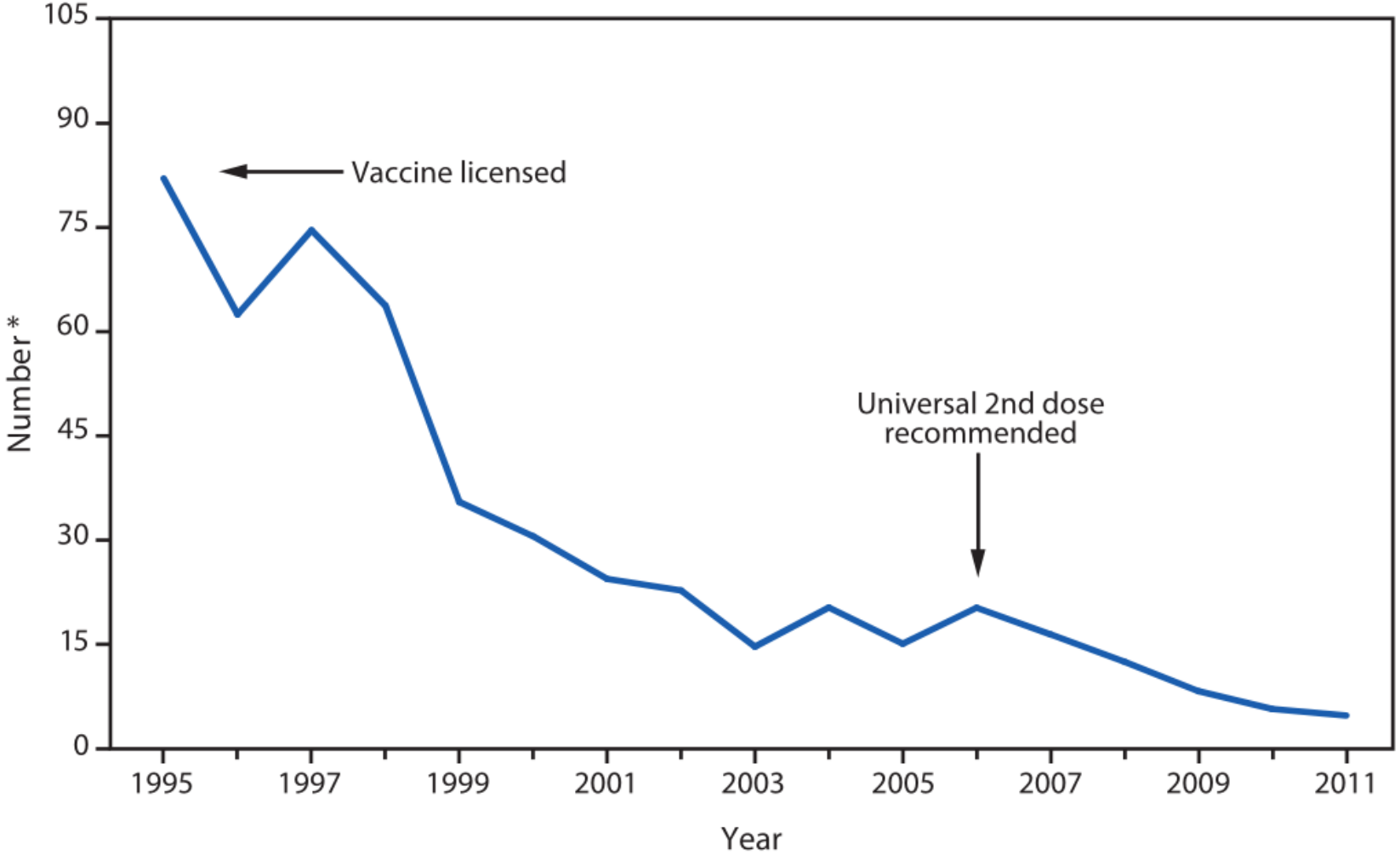



human embryonic
lung cell culture

embryonic guinea
pig fibroblasts

Other Cells types

**VARICELLA (CHICKENPOX). Number of reported cases — Illinois, Michigan, Texas, and West Virginia, 1995–2011**

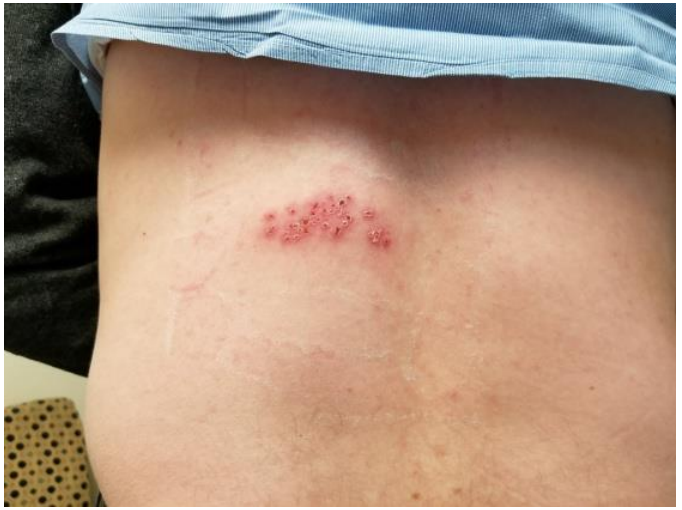



* In thousands.

MMWR 60:53 2013

# Zoster Vaccine (Zostavax®) #1

- 2006
- Age 50 and up
- Live Attenuated



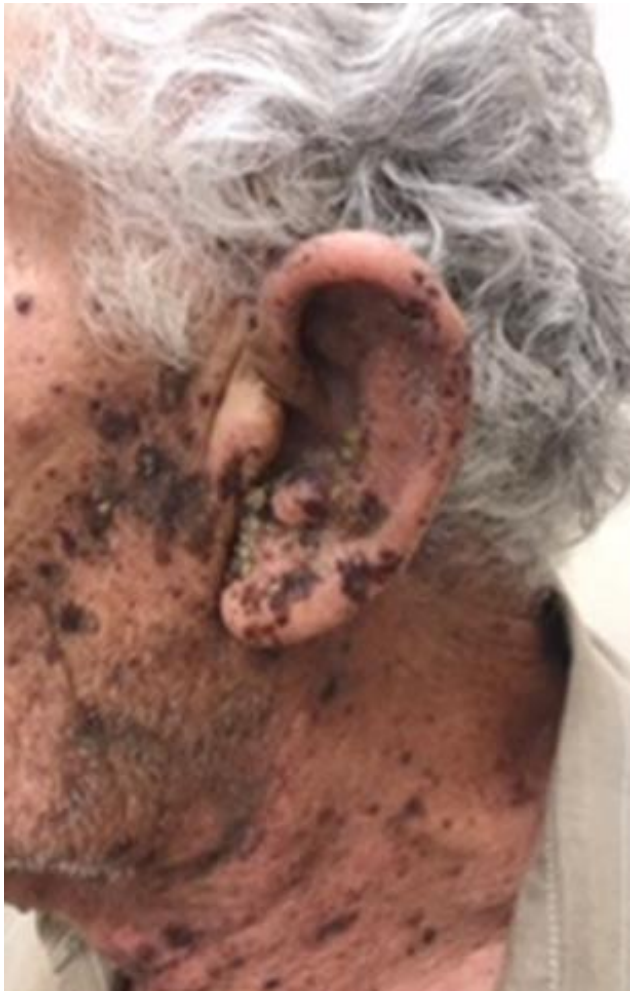
- 14X the dose of varicella

# Shingles Vaccine HZV (Zostavax®)

- Herpes Zoster Efficacy 51.3%

41% (age 70-79)

- 4 years duration
- Post Herpetic Neuralgia 66.5%

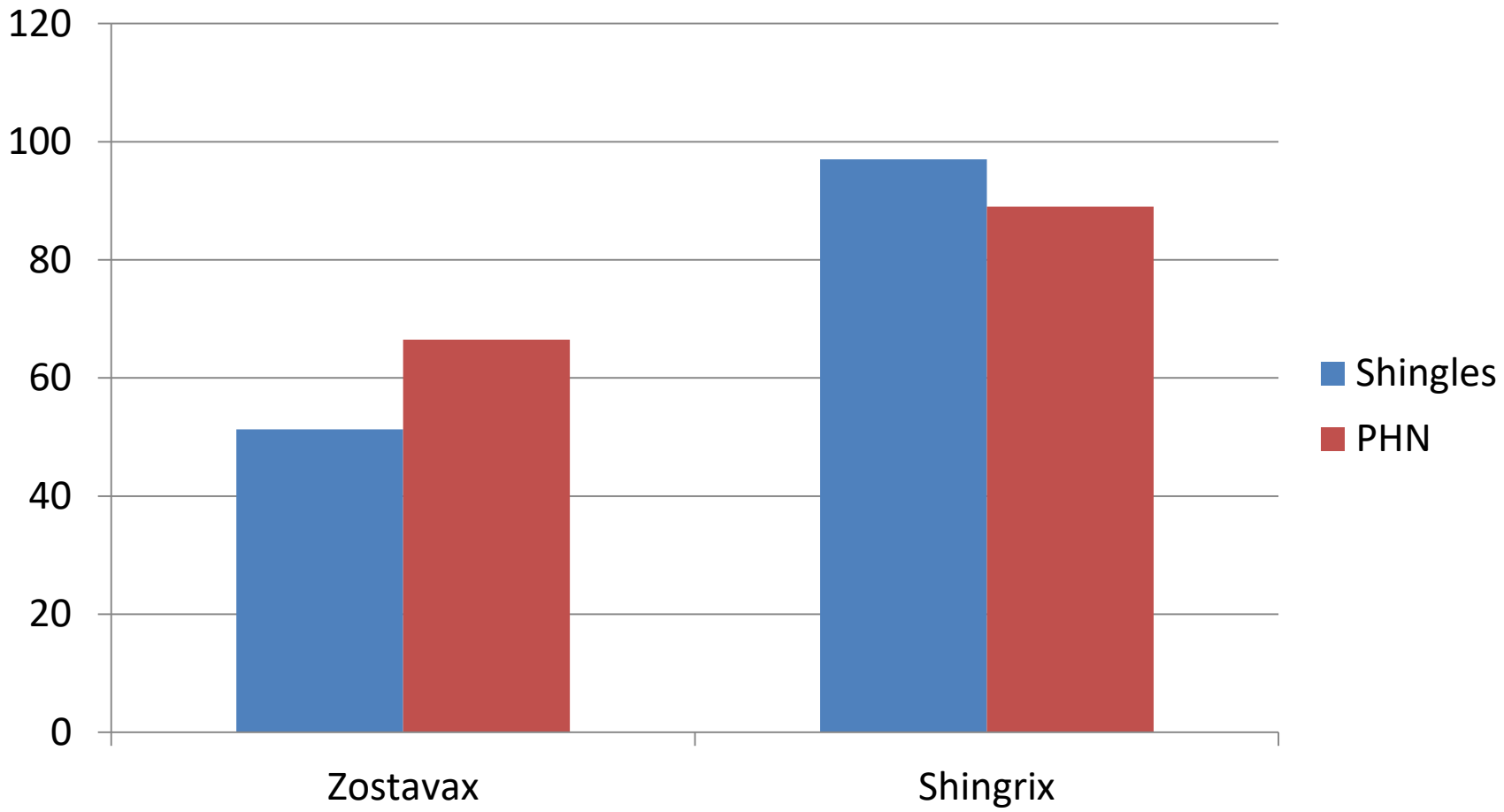


N Engl J Med. 2015;372:2087-96

N Engl J Med. 2016;375:1019-32.

N Engl J Med 2005; 352: 2271-84

# Efficacy %



# Shingles Vaccines

**HSV live attenuate (Zostavax®)**

- Herpes Zoster

Efficacy 51.3%

- 4 years duration

- Post Herpetic Neuralgia

Efficacy 66.5%

**HSV Sub unit( Shingrix®)**

- Herpes Zoster

  Efficacy 97%

- 3.7 years and going

- Post Herpetic Neuralgia

Efficacy 89%

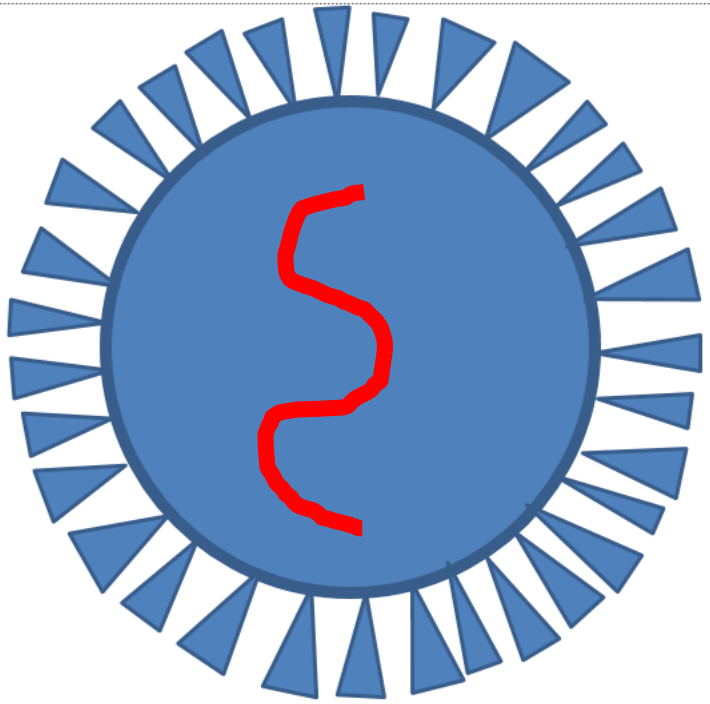
N Engl J Med. 2016;375:1019-32.

N Engl J Med 2005; 352: 2271-84.

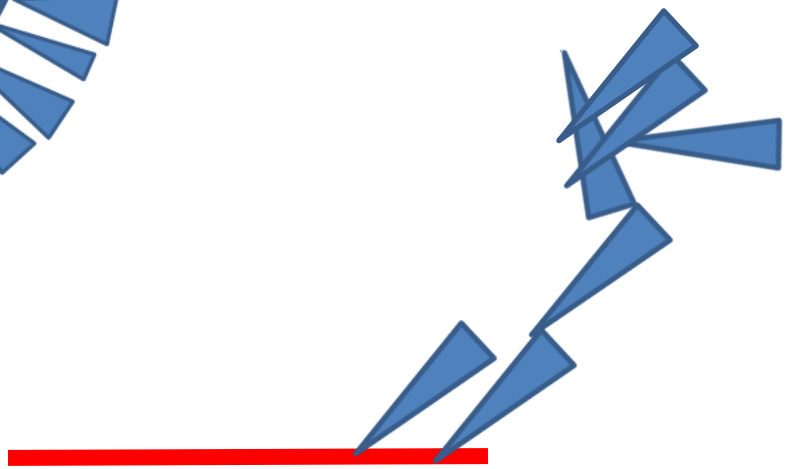
# Herpes Zoster subunit vaccine Shingrix®

- Recommended for the prevention of herpes zoster and complications in immunocompetent adults aged 50 up
- **Preferred over Zoster Vaccine Live (**Zostavax®**)**
- Recommended for immunocompetent even if they have Received Zostavax®

ACIP October 2017



Glycoprotein E (gE)
most abundant
glycoprotein on the
surface of infected cells



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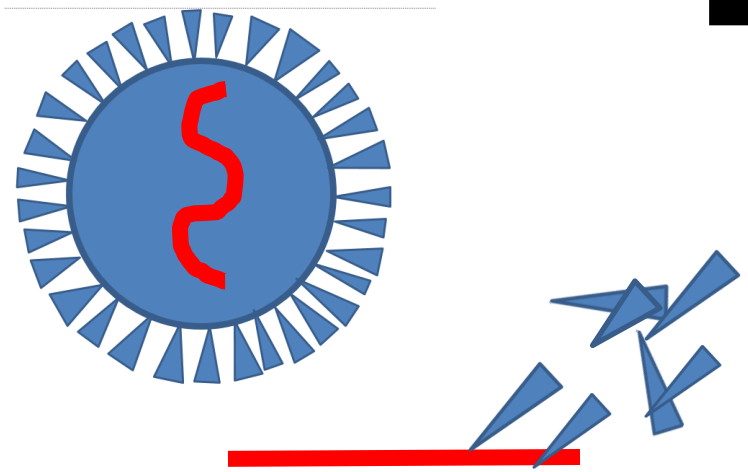
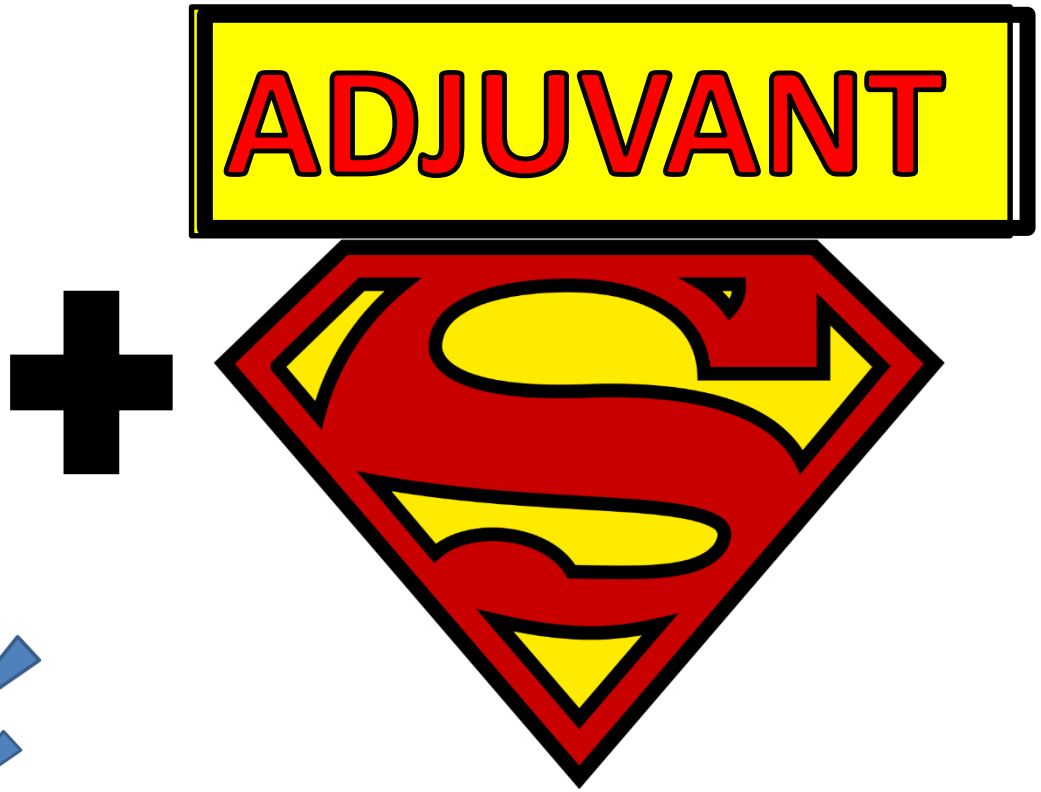




# ADJUVANT

Substances included in a vaccine formulation to enhance the quality and strength of the immune response induced by the vaccine antigen(s)

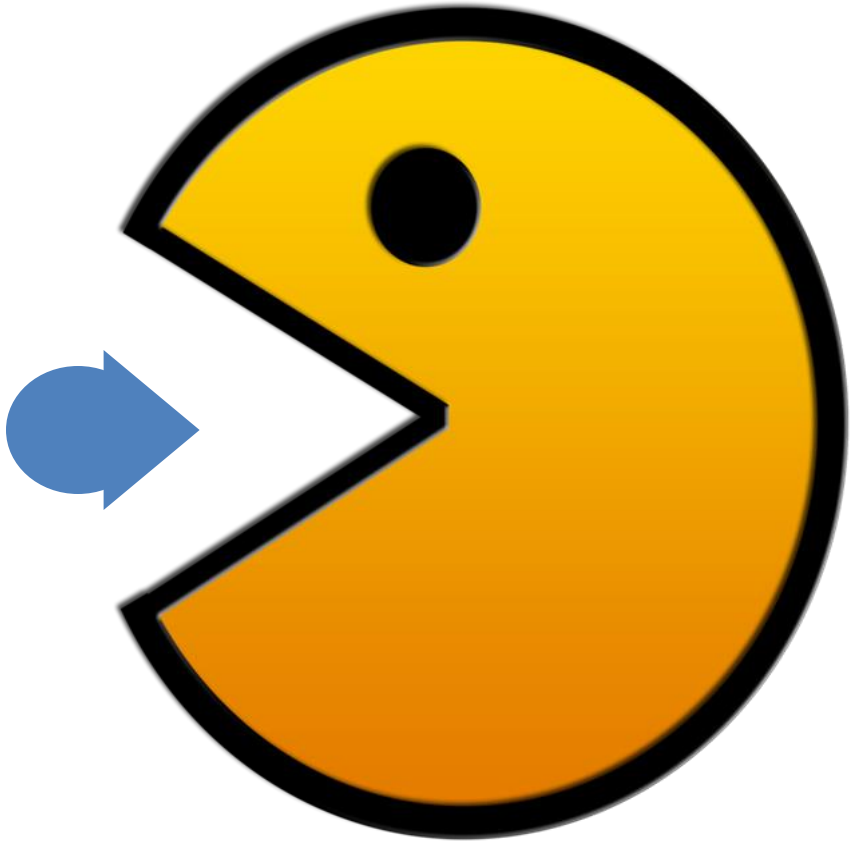
- less immunogenic antigens
- lower antigen doses needed
- enhancing immune response in

  elderly

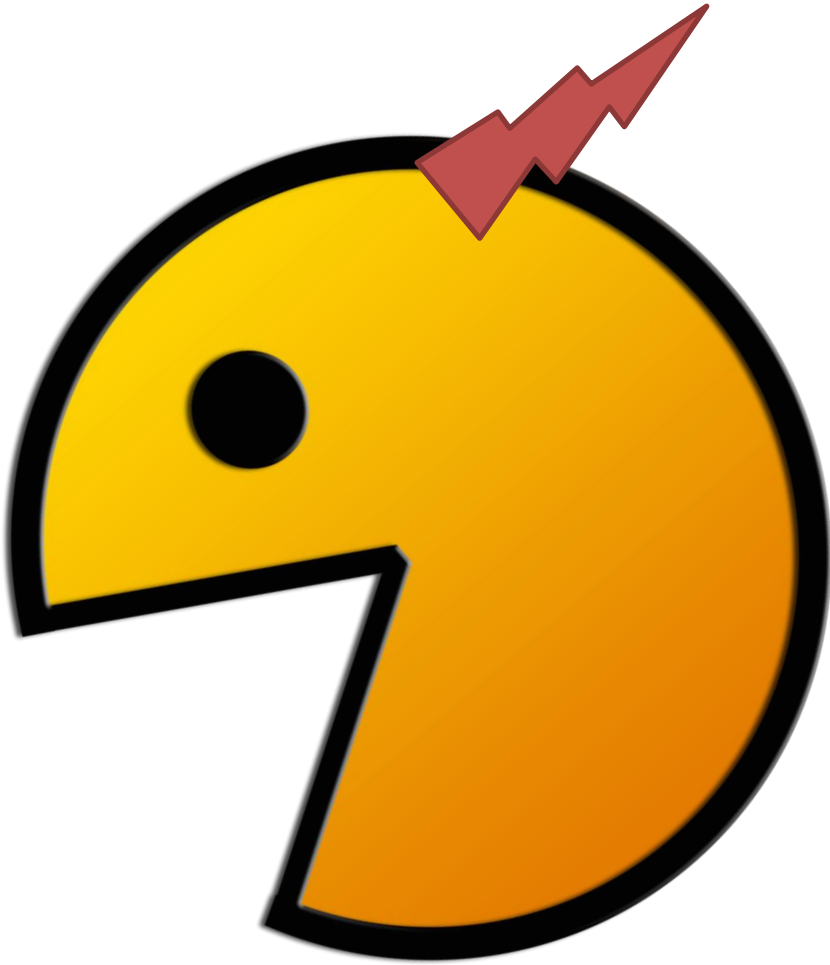
  young children

  chronic diseases

  immunocompromised



- T Cells
- release cytokines
- stimulate B cells
- create memory cells
-
- B Cells
- make antibodies



# Adjuvants

- Oil-in-water emulsions (MF59, AS03)
- Virosomes
- AS04
- AS01
- MPRC
- 529
- Liposomes (AS01)
- CpG ODN (1018 ISS)
- TLR7 ligand

# Shingrix

**Antigen**

- Glycoprotein E (gE)

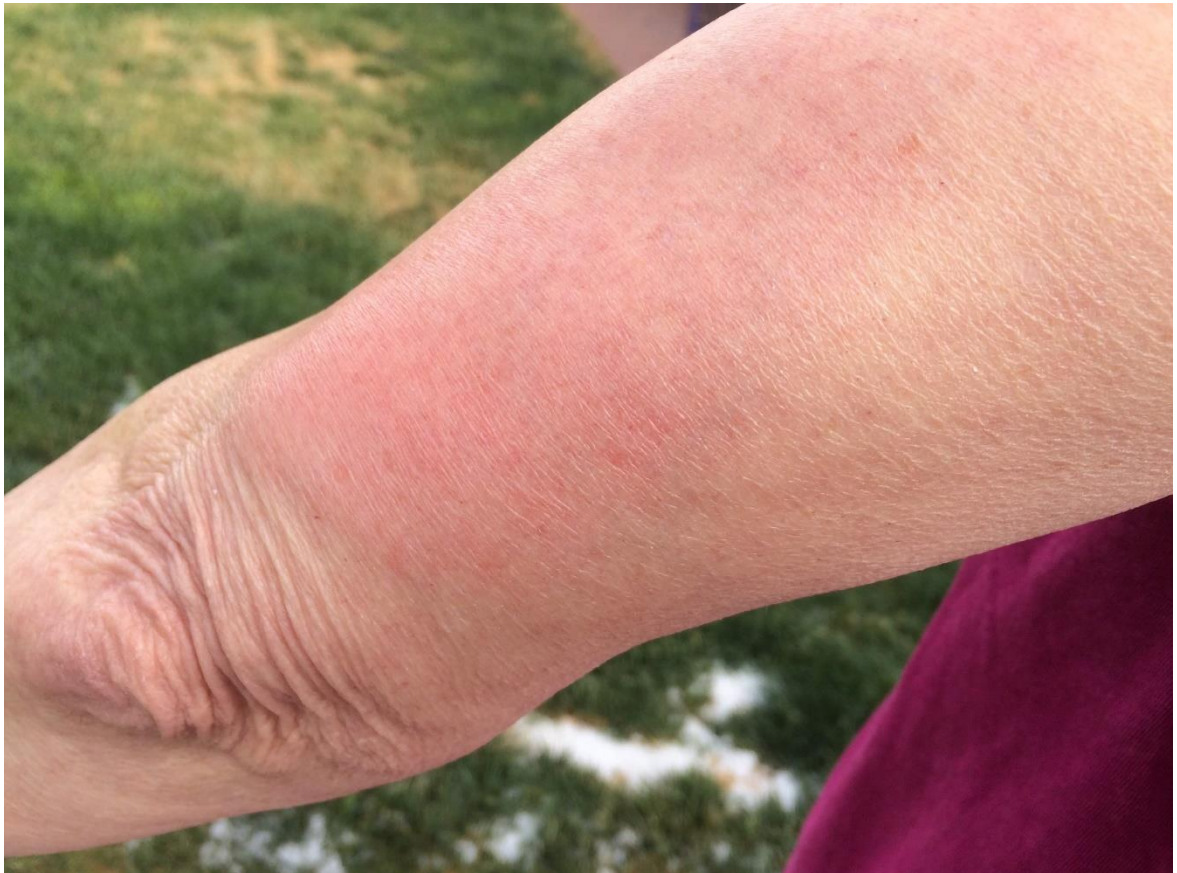

**Adjuvant: AS01**



# HZV sub unit

More reactions:

HZsu 79.0%  Placebo 29.5%



# HSV Sub unit (Shingrix®)

Price=$130 whole sale X 2 ±$300

Questions

- Coverage

  Medicare D?

- Availability

Long term duration and safety

Chapter 2 Summary

*New shingles vaccine*

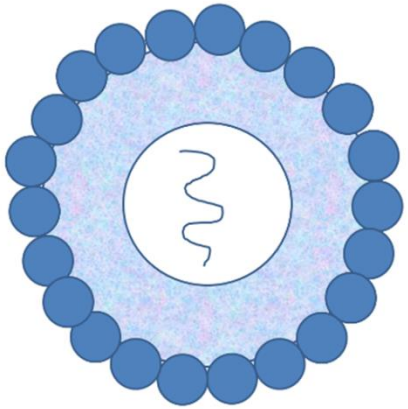
- *2 vials*
  *2 dose (1-6m apart)*
- *adjuvanted*
- *higher efficacy*
- *reactive side effects*
- *Coverage still not clear*
- *Current shortage*

# Chapter 3
# Hepatitis B Vaccine

# Hepatitis B Vaccines

EngenrixB®

Recombivax HB®



Combination:

Pediarix 6 weeks–6 years Tdap/IPV

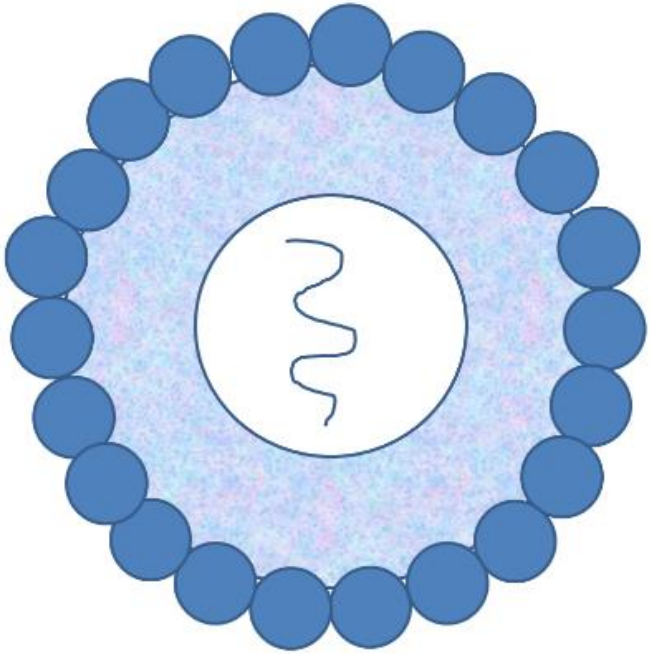
Twinrix ≥18 years -Hep A and Hep B

New

Heplisav®

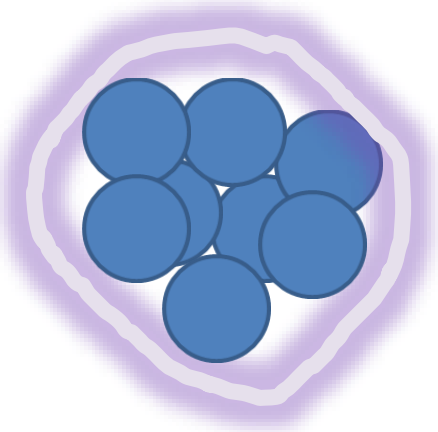
# Heplisav-B®

**HepB surface antigen (HBsAg)**



**1018 adjuvant**

- synthetic immunostimulatory cytidine-phosphate-guanosine oligodeoxynucleotide (CpG-ODN) motifs



MMWR 2018;67:455–458.

# Heplisav B® versus Engerix-B®

Outcome: Anti-HBS Ab >10mIU/Ml

Study 7,056 2 doses Heplisav®

Control 3,214 3 doses Engerix-B®

Results

90.0%–100.0% Heplisav®

70.5%–90.2% Engerix-B ®

MMWR April 20, 2018 / 67(15);455–458

# Safety

| 9,871 Heplisav ® | 4,385 Engerix-B ® |
| --- | --- |
| Mild 45.6% | Mild 45.7% |
| Serious 5.4% | Serious 6.3% |
| Cardiac 0.27% | Cardiac 0.14% |

Not statistically significant

MMWR April 20, 2018 / 67(15);455–458

# Heplisav B®

- May be used as a HepB vaccine in persons aged ≥18 years for vaccination against HBV
- When feasible, the same manufacturer's vaccines should be used to complete the series
- No data on pregnancy
- Use serologic testing as usual

MMWR April 20, 2018 / 67(15);455–458

# Non-responders

- Celiac: lower response rate compared to controls
  - Low HBSab titers
- Compliance with gluten free diet improved response

- No studies to date of Non-responders and test for celiac or trial of gluten free diet

BMJ 2015;351.h4347

*New Hepatitis B Vaccine*

- *2 doses*
- *adjuvanted*
- *higher efficacy (serologic studies)*
- *cardiovascular events not statistically significant*
- *Trial of gluten free diet in non-responders*

Chapter 4
Influenza Vaccines

LAIV

Adjuvanted Seasonal Flu

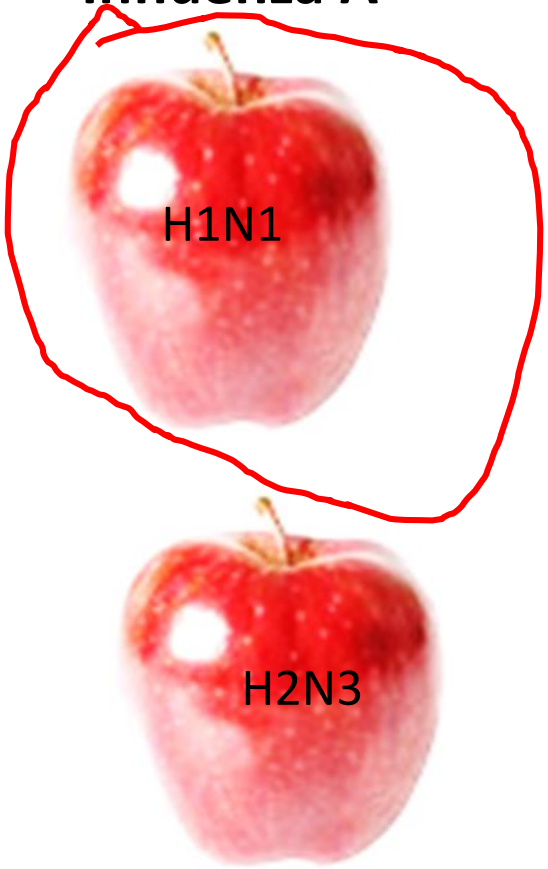
2009 H1N1 safety signal

# LAIV (FluMist)

- 2003: LAIV3 licensed
- 2012: LAIV4 replaced LAIV3 for 2013-14
- 2014: Preferential recommendation for healthy 4-49 year olds
- 2015: Preferential recommendation removed
- 2016-17 and 2017-18 not recommended

# Quadrivalent Influenza

**Influenza A**



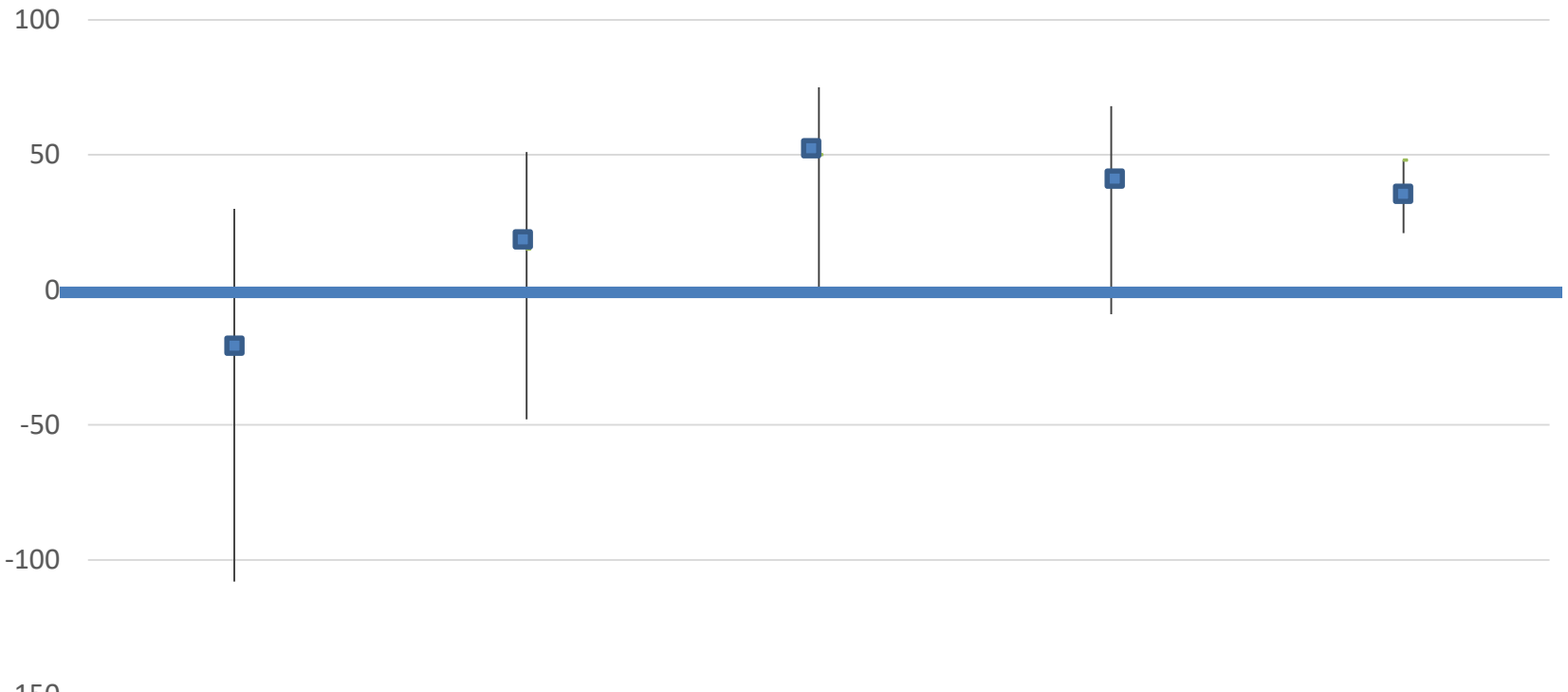

**Influenza B**

# 2013-14 and 2015-16 Seasons

- **A(H1N1)pdm09 predominates**

# VE:LAIV against H1N1 2015-16

## Ages 2-17




| | CDC | Dod | ICICLE | PHE | THL |
|---|---|---|---|---|---|
| High | 30 | 51 | 75 | 68 | 46 |
| Low | -108 | -48 | -2 | -9 | 21 |
| Close | -21 | 15 | 50 | 42 | 48 |

Euro Surveill. 2016;21(38):pii=30350

A(H1N1)pdm09

Children 2-17 years
2015-16 season

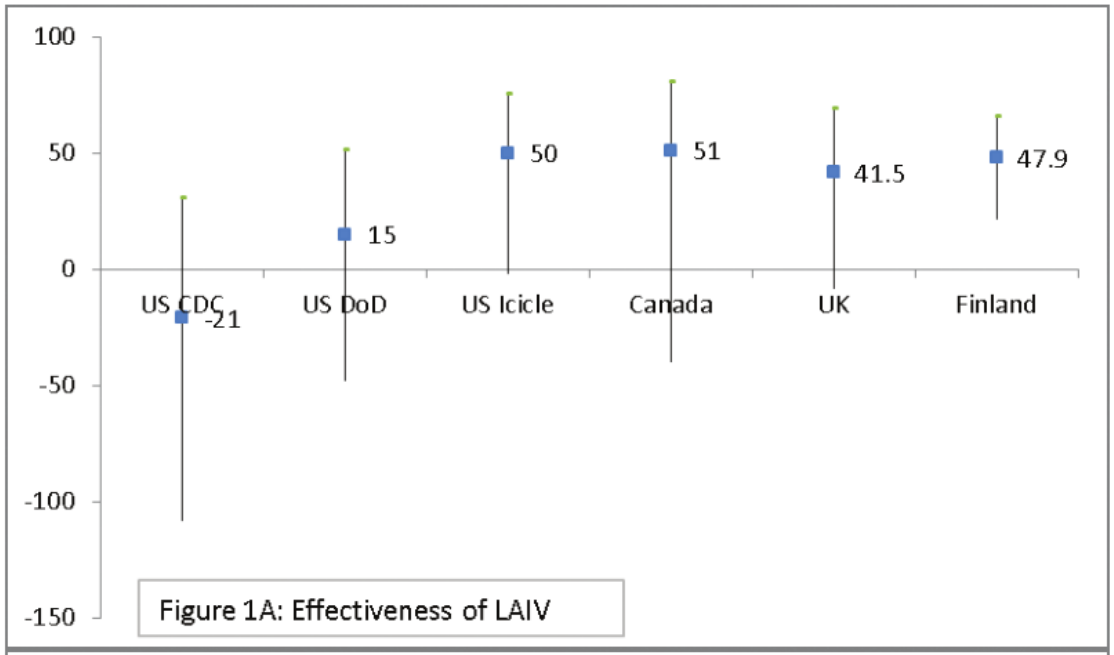



Figure 1A: Effectiveness of LAIV

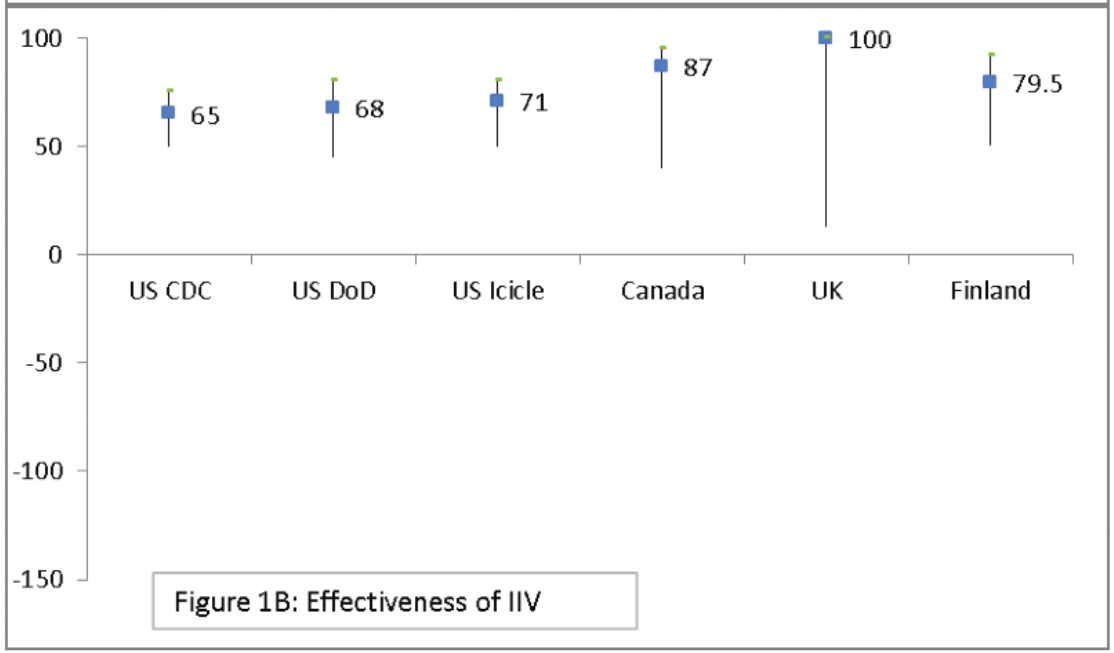


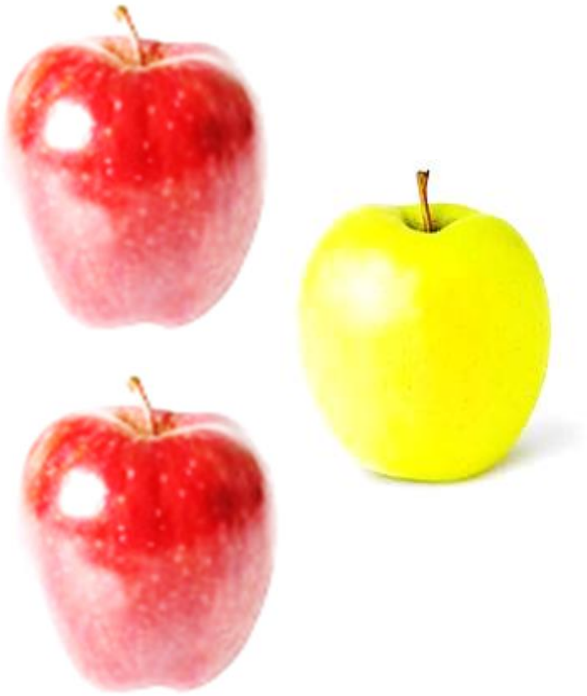

Figure 1B: Effectiveness of IIV

Pebody Arch Dis Child 2018;103:101–105

# 2017-18 Season

- New HINI in LAIV4
- A(H2N3) predominates
- LAIV not tested clinically but did well in serologic and shedding studies
- ACIP: LAIV4 is an option for those for whom it is otherwise appropriate. No preference is expressed for any influenza vaccine product.

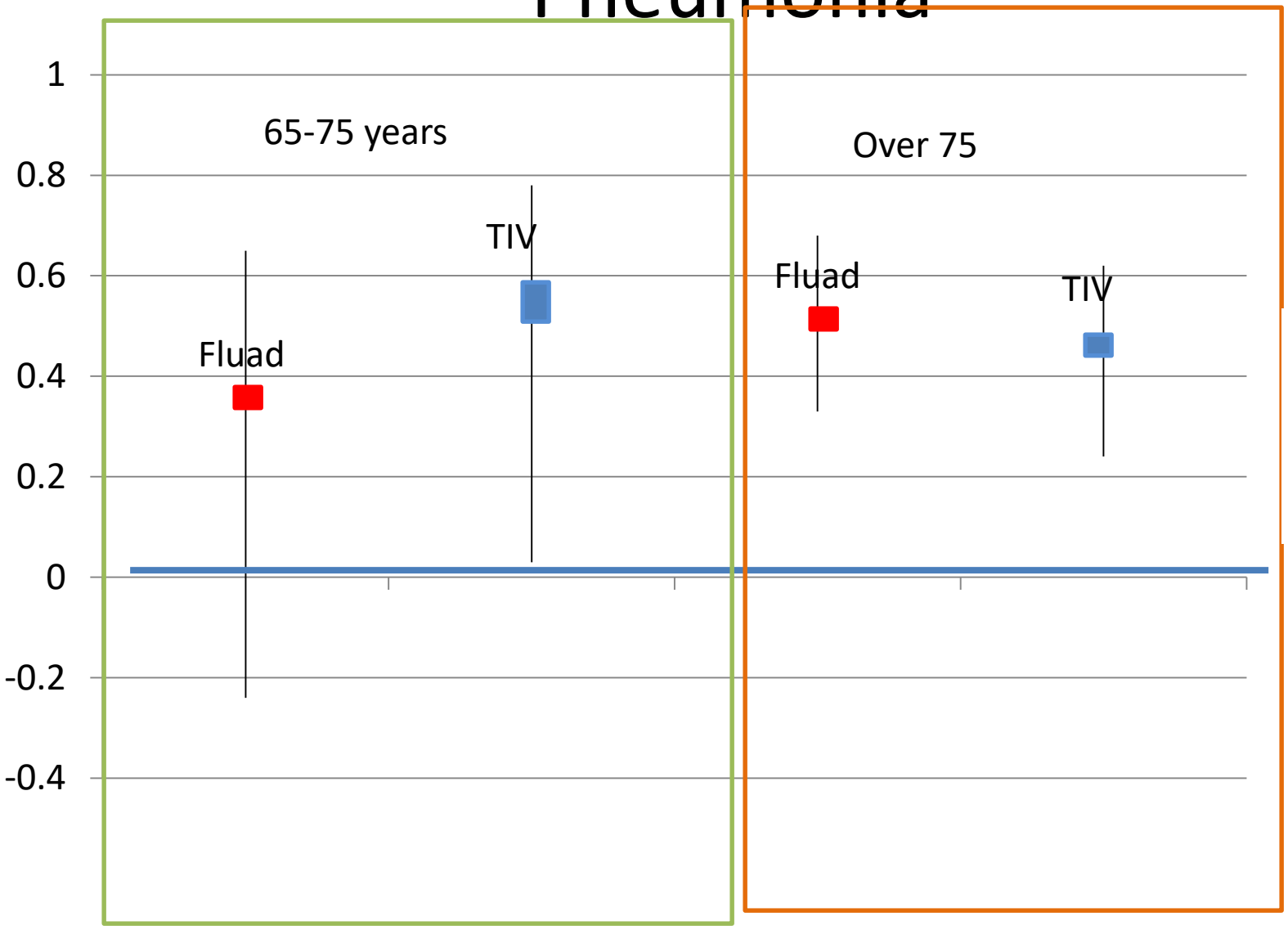
# Fluad®: Adjuvanted Flu Vaccine



MF596.1

Age 65+

# VE for Hospitalization, Flu or Pneumonia



# Adjuvanted Influenza Vaccine

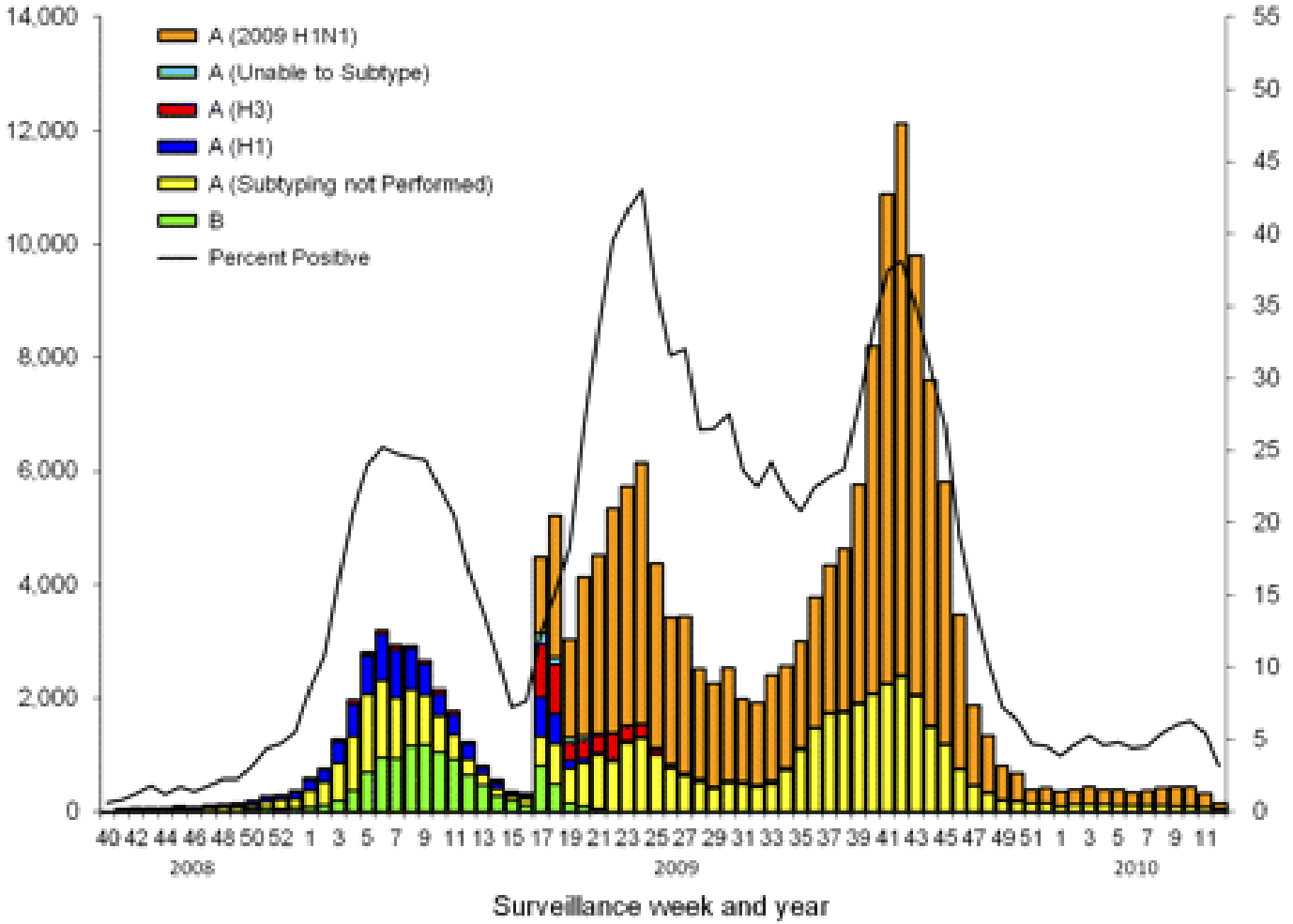
- Option for over 65
- Trivalent
- Better in serologic studies
- Clinical studies

    Slightly better in those over 75

More side effects

Vaccine 35 (2017) 513–520

# 2009-2010


A (2009 H1N1)
A (Unable to Subtype)
A (H3)
A (H1)
A (Subtyping not Performed)
B
Percent Positive
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
55
50
45
40
35
30
25
20
15
10
5
0
40 42 44 46 48 50 52 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 1 3 5 7 9 11
2008
2009
2010
Surveillance week and year


ASO3 Adjuvanted N1H1
Non Adjuvanted N1H1
ASO3 Adjuvanted N1H1

# H1N1 Vaccines for 2009-10

Non Adjuvant

ASO3 Adjuvanted (not used in US)

European-Narcolepsy

Canadian-no narcolepsy

<1 in 10,000 vaccine recipients

Ahmed *et al* Journal of Autoimmunity 50 (2014)

# H1N1 AS03

- Genetics
- H1N1 disease
- None in Canada
- Rare disease
- Up to 10 years to diagnosis

Harris 2014 Eurosurvallance .org
Ahmed et al Journal of Autoimmunity 50 (2014)

# Adjuvant and Safety?

MF59 AS03

Virosomes TLR7 ligand

AS04

AS01 MPRC 529 Liposomes

CpG ODN 1018 ISS TLR7 ligand

Determined with each vaccine

Combined in vaccines

Cumulative and net effect?

Flu + HepB + Shingles

# Chapter 4 Summary Influenza Vaccines

*LAIV okay to use*

*Adjuvanted Seasonal Flu okay to use*

*2009 H1N1 Safety signal*

*Watching adjuvant vaccines*

# Chapter 5

# Review of pneumococcal vaccines for adults

# Pneumococcal Vaccine

Between  October 1 and March 1

- Offer Influenza and Pneumococcal Vaccine
- All hospitalized patients 65 and up

# NMSIIS

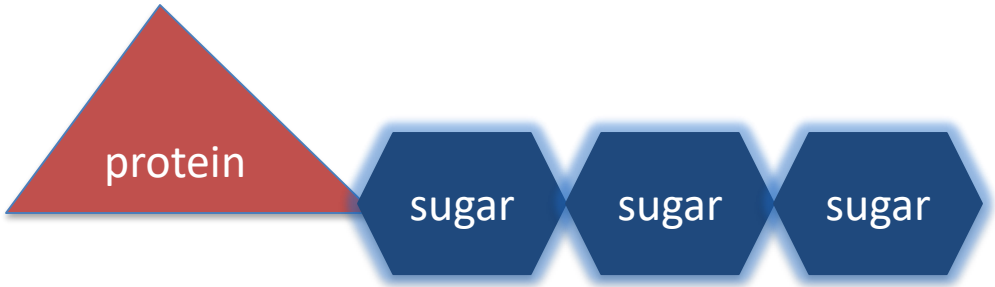
One Clinic –check NMSIIS

Study uncovered many vaccines previously given

# Two Pneumococcal Vaccines

## Pneumovax® PPSV23


## Prevnar® PCV13




CDC Pink Book 2015

# Pneumococcal Vaccine Timing For Adults

**DO NOT administer PCV13 and PPSV23 at the same visit.**

## Age 65 Years or Older

- If PCV13 was given before age 65 years, no additional PCV13 is needed.

**No history of pneumococcal vaccine** → PCV 13 (Prevnar 13®) → 1 year (8 weeks for groups B & C as defined below) → PPSV 23 (Pneumovax® 23)

**Received PPSV23 before age 65** → 1 year → PCV 13 → 1 year (8 weeks for groups B & C as defined below) **and 5 years** after prior dose of PPSV23 → PPSV 23

**Received PPSV23 at age 65 or older** → 1 year → PCV 13

## Age 19-64 Years With Underlying Condition(s)

- Prior doses count toward doses recommended below and do not need to be repeated.
- If PPSV23 given previously – wait one year before giving PCV13
  – for group B, wait at least five years before giving a second dose of PPSV23
- No more than two doses of PPSV23 recommended before 65th birthday and one dose thereafter.

**A. Smoker, Long-term facility resident, or Chronic conditions:**
- heart disease (excluding hypertension)
- lung disease (including asthma)
- liver disease (including cirrhosis)
- diabetes
- alcoholism

→ PPSV 23

**B. Immunocompromised** (including HIV infection), **Chronic renal failure, Nephrotic syndrome, or Asplenia** → PCV 13 → 8 weeks → PPSV 23 → 5 years → PPSV 23

**C. CSF leaks or Cochlear implants** → PCV 13 → 8 weeks → PPSV 23

**For further details, see: www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/pneumo.html**

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66 year old female with type II diabetes, hypertension, low back pain, and elevated cholesterol.  Smokes 1 pack per day for 30 years. She has never received a pneumococcal vaccine.

# Pneumococcal Vaccine Timing For Adults

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**Received PPSV23 before age 65** → **1 year** → **PCV 13** → **1 year** (8 weeks for groups B & C as defined below) **and 5 years** after prior dose of PPSV23 → **PPSV 23**

**Received PPSV23 at age 65 or older** → **1 year** → **PCV 13**

## Age 19-64 Years With Underlying Condition(s)

- Prior doses count toward doses recommended below and do not need to be repeated.
- If PPSV23 given previously – wait one year before giving PCV13
  – for group B, wait at least five years before giving a second dose of PPSV23
- No more than two doses of PPSV23 recommended before 65th birthday and one dose thereafter.

**A. Smoker, Long-term facility resident, or Chronic conditions:** → **PPSV 23**

- heart disease (excluding hypertension)
- lung disease (including asthma)
- liver disease (including cirrhosis)
- diabetes
- alcoholism

**B. Immunocompromised** (including HIV infection), **Chronic renal failure, Nephrotic syndrome, or Asplenia** → **PCV 13** → **8 weeks** → **PPSV 23** → **5 years** → **PPSV 23**

**C. CSF leaks or** → **PCV** → **PPSV**

66 year old female treated with mastectomy, chemotherapy and radiation for breast cancer at age 50.  Given PPSV23 at age 55

# Pneumococcal Vaccine Timing For Adults

**DO NOT administer PCV13 and PPSV23 at the same visit.**

## Age 65 Years or Older

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**Received PPSV23 before age 65** → **1 year** → **PCV 13** → **1 year** (8 weeks for groups B & C as defined below) **and 5 years** after prior dose of PPSV23 → **PPSV 23**

**Received PPSV23 at age 65 or older** → **1 year** → **PCV 13**

## Age 19-64 Years With Underlying Condition(s)

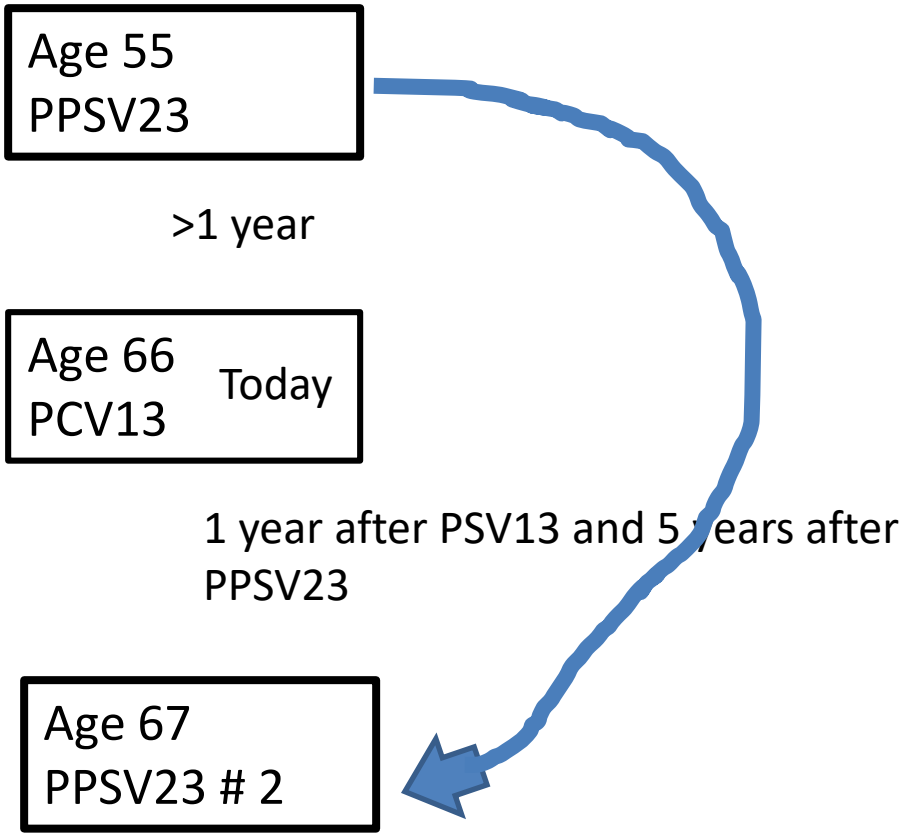
• Prior doses count toward doses recommended below and do not need to be repeated.
• If PPSV23 given previously – wait one year before giving PCV13
– for group B, wait at least five years before giving a second dose of PPSV23
• No more than two doses of PPSV23 recommended before 65th birthday and one dose thereafter.

**A. Smoker, Long-term facility resident, or Chronic conditions:** → **PPSV 23**
- heart disease (excluding hypertension)
- lung disease (including asthma)
- liver disease (including cirrhosis)
- diabetes
- alcoholism

**B. Immunocompromised** (including HIV infection), **Chronic renal failure, Nephrotic syndrome, or Asplenia** → **PCV 13** → **8 weeks** → **PPSV 23** → **5 years** → **PPSV 23**

**C. CSF leaks or** → **PCV** → **PPSV**

# Timeline


Age 55
PPSV23
>1 year
Age 66
PCV13
Today
1 year after PSV13 and 5 years after
PPSV23
Age 67
PPSV23 # 2

# CASE 3

~~66~~ 56 year old female with type II diabetes, hypertension, low back pain, and elevated cholesterol. Smokes 1 pack per day for 30 years. She has never received a pneumococcal vaccine.

~~66~~ 56 year old female with type II diabetes, hypertension, low back pain, and elevated cholesterol. Smokes 1 pack per day for 30 years. She has never received a pneumococcal vaccine.

# Pneumococcal Vaccine Timing For Adults

**DO NOT administer PCV13 and PPSV23 at the same visit.**

## Age 65 Years or Older

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**Received PPSV23 before age 65** → **1 year** → PCV 13 → **1 year** (8 weeks for groups B & C as defined below) **and 5 years** after prior dose of PPSV23 → PPSV 23

**Received PPSV23 at age 65 or older** → **1 year** → PCV 13

## Age 19-64 Years With Underlying Condition(s)

- Prior doses count [illegible] doses recommended below and do not need to be repeated.
- If PPSV23 given previously – wait one year before giving PCV13
  – for group B, wait at least five years before giving a second dose of PPSV23
- No more than two doses of PPSV23 recommended before 65th birthday and one dose thereafter.

**A. Smoker, Long-term facility resident, or Chronic conditions:**
- heart disease (excluding hypertension)
- lung disease (including asthma)
- liver disease (including cirrhosis)
- diabetes
- alcoholism

→ PPSV 23

**B. Immunocompromised** (including HIV infection), **Chronic renal failure, Nephrotic syndrome, or Asplenia** → PCV 13 → **8 weeks** → PPSV 23 → **5 years** → PPSV 23

**C. CSF leaks or Cochlear implants** → PCV 13 → **8 weeks** → PPSV 23

IPAC | New Mexico Immunization | Quality Improvement Organizations | HealthInsight

~~66~~ 56 year old female with type II diabetes, hypertension, low back pain, and elevated cholesterol. Smokes 1 pack per day for 30 years. She has never received a pneumococcal vaccine.

PPSV23 only until she turns 65

Then PCV13 followed by PPSV23 at least 5 years

After 1st PPSV23

# 46 year old with lung cancer. In remission after chemotherapy

pneumococcal vaccine

PCV 13 (Prevnar 13®) → 1 year (8 weeks for groups B & C as defined below) → PPSV 23 (Pneumovax® 23)

**Received PPSV23 before age 65** → 1 year → PCV 13 → **1 year** (8 weeks for groups B & C as defined below) **and 5 years** after prior dose of PPSV23 → PPSV 23

**Received PPSV23 at age 65 or older** → 1 year → PCV 13

## Age 19-64 Years With Underlying Condition(s)

- Prior doses count toward doses recommended below and do not need to be repeated.
- If PPSV23 given previously – wait one year before giving PCV13
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- No more than two doses of PPSV23 recommended before 65th birthday and one dose thereafter.

**A. Smoker, Long-term facility resident, or Chronic conditions:** → PPSV 23

- heart disease (excluding hypertension)
- diabetes
- lung disease (including asthma)
- liver disease (including cirrhosis)

**B. Immunocompromised** (including HIV infection), **Chronic renal failure, Nephrotic syndrome, or Asplenia** → PCV 13 → 8 weeks → PPSV 23 → 5 years → PPSV 23

**C. CSF leaks or Cochlear implants** → PCV 13 → 8 weeks → PPSV 23

IPAC Immunization Practices Advisory Council | New Mexico Immunization Coalition | Quality Improvement Organizations — Sharing Knowledge. Improving Health Care. Centers for Medicare & Medicaid Services | HealthInsight

**For further details, see: www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/pneumo.html**

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# Chapter 5 Summary

Pneumococcal and Influenza to Hospitalized patients over 65

Check NMSIIS

Use flow sheet for pneumococcal vaccine guidance

# The End

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