

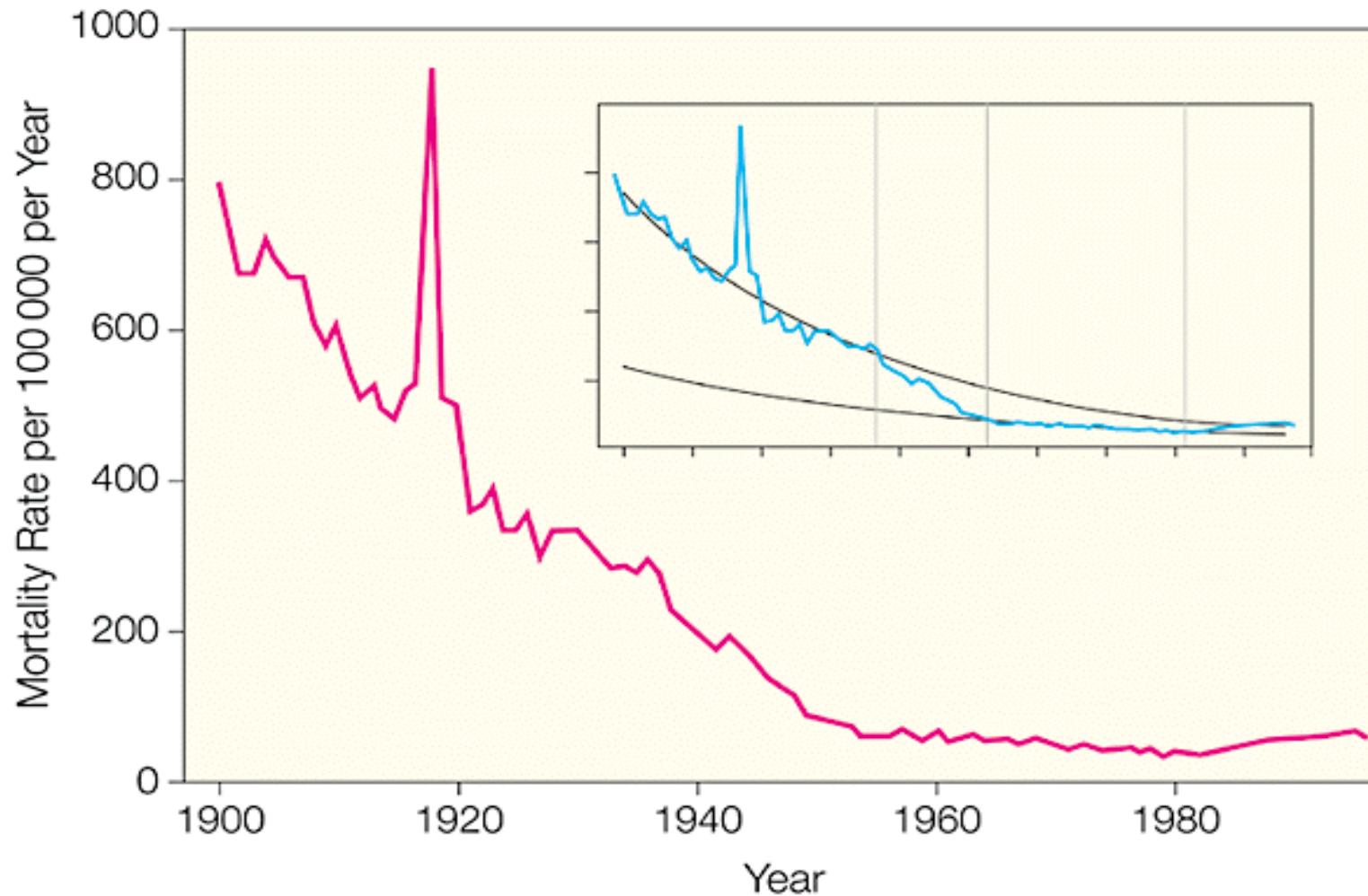
Vaccine-preventable diseases

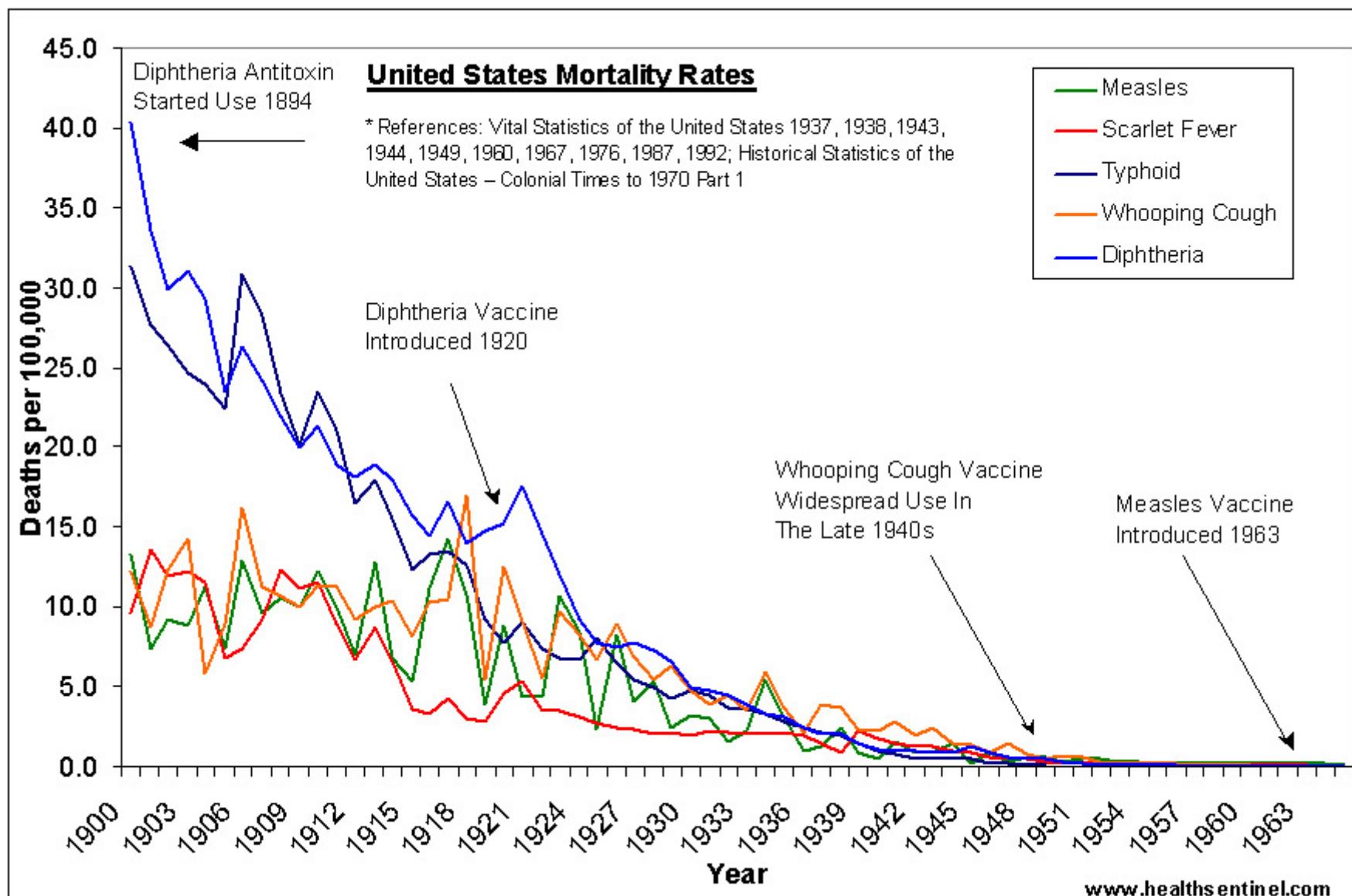
National Immunisation Study Day

Jan.17, 2012

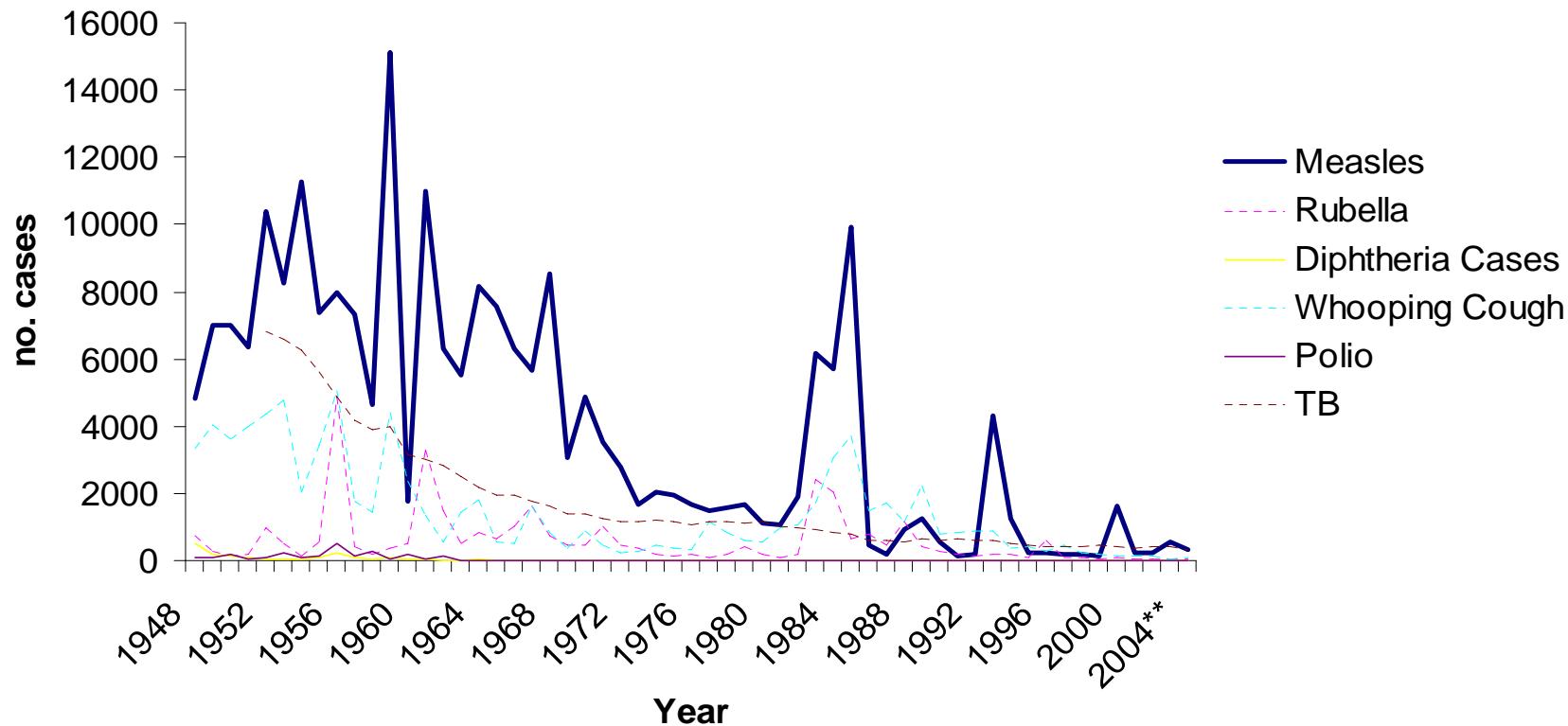
Dr Kevin Connolly

Infectious Disease Mortality, United States--20th Century

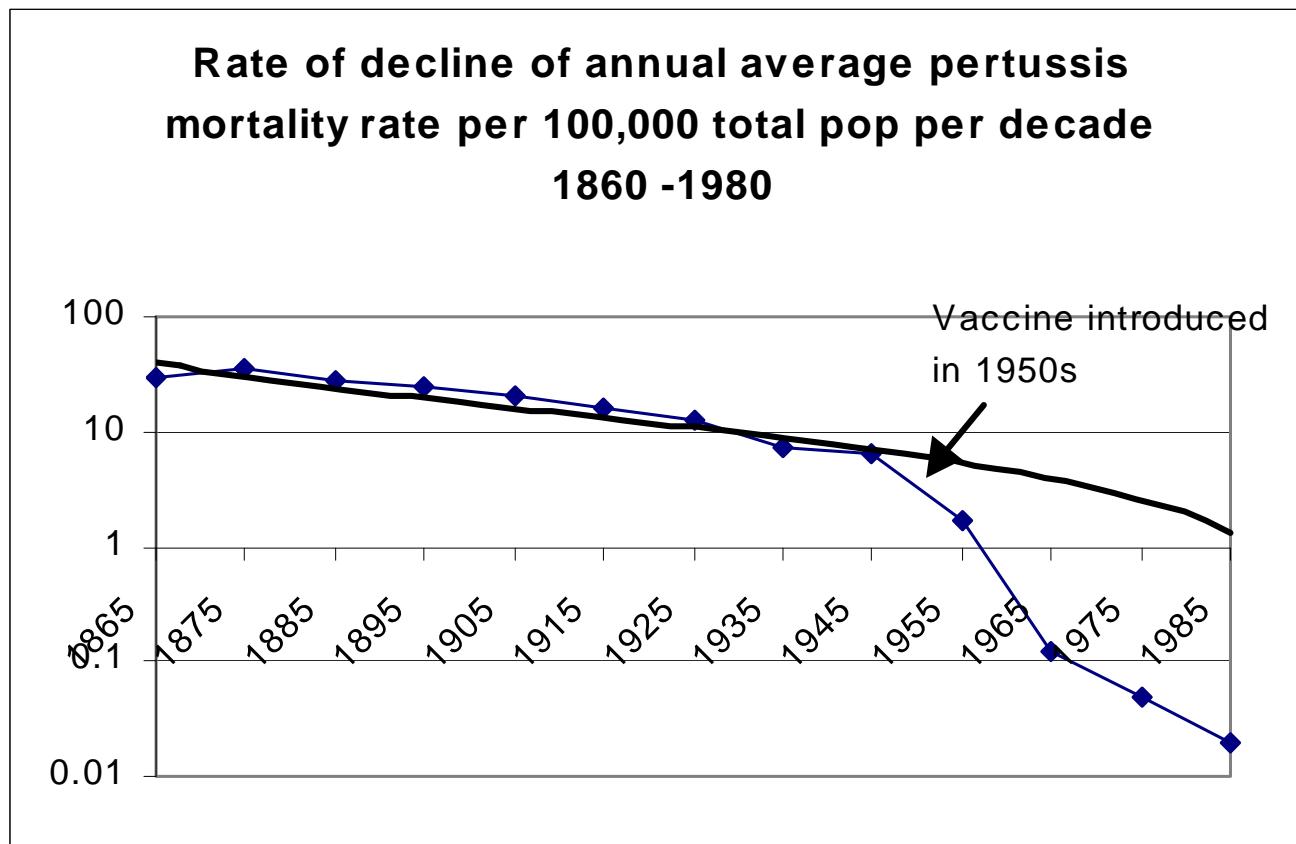




Cases of Vaccine Preventable Disease- Ireland 1948-2004*



The effect of Pertussis Vaccine

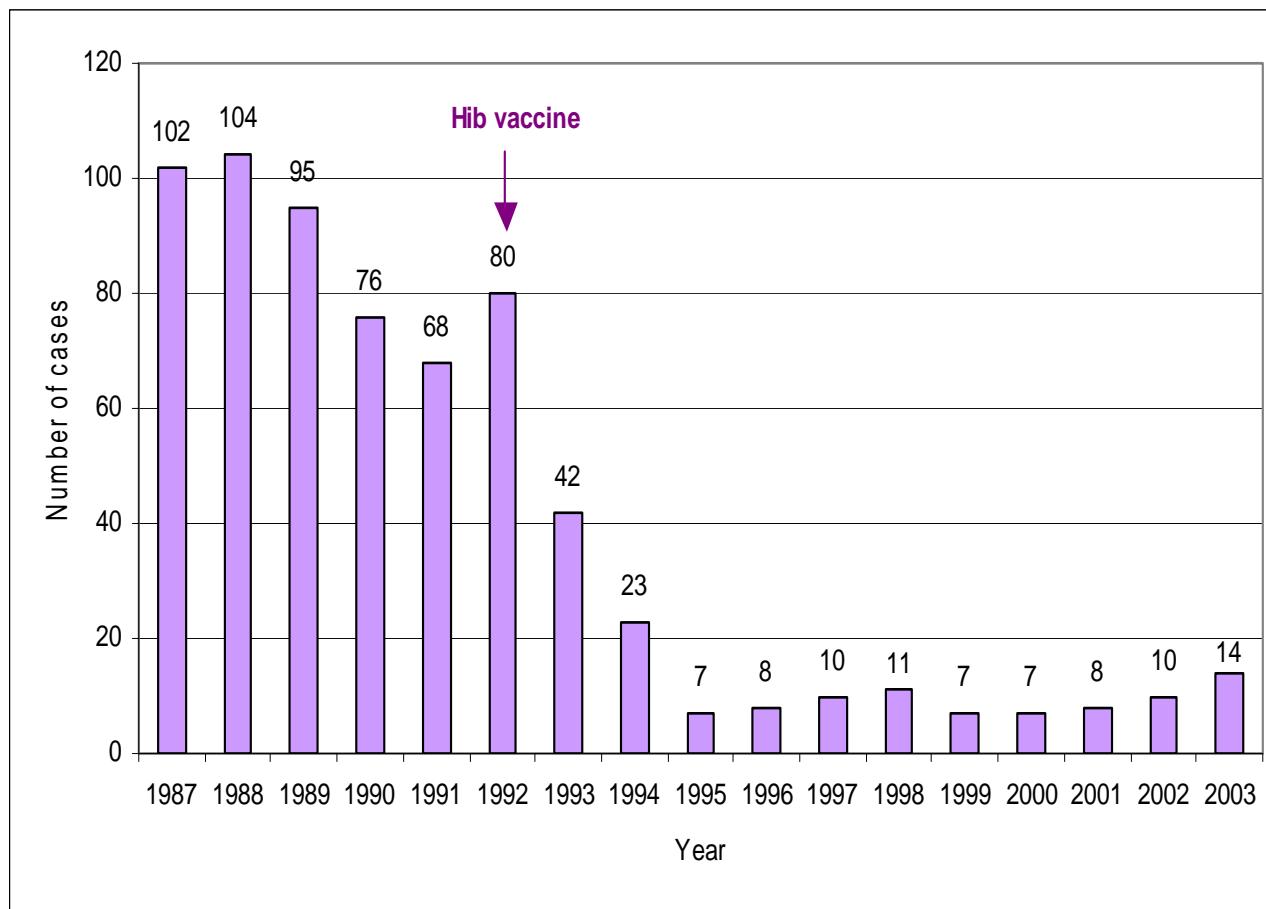


Approximately 30 new or improved vaccines anticipated by 2015

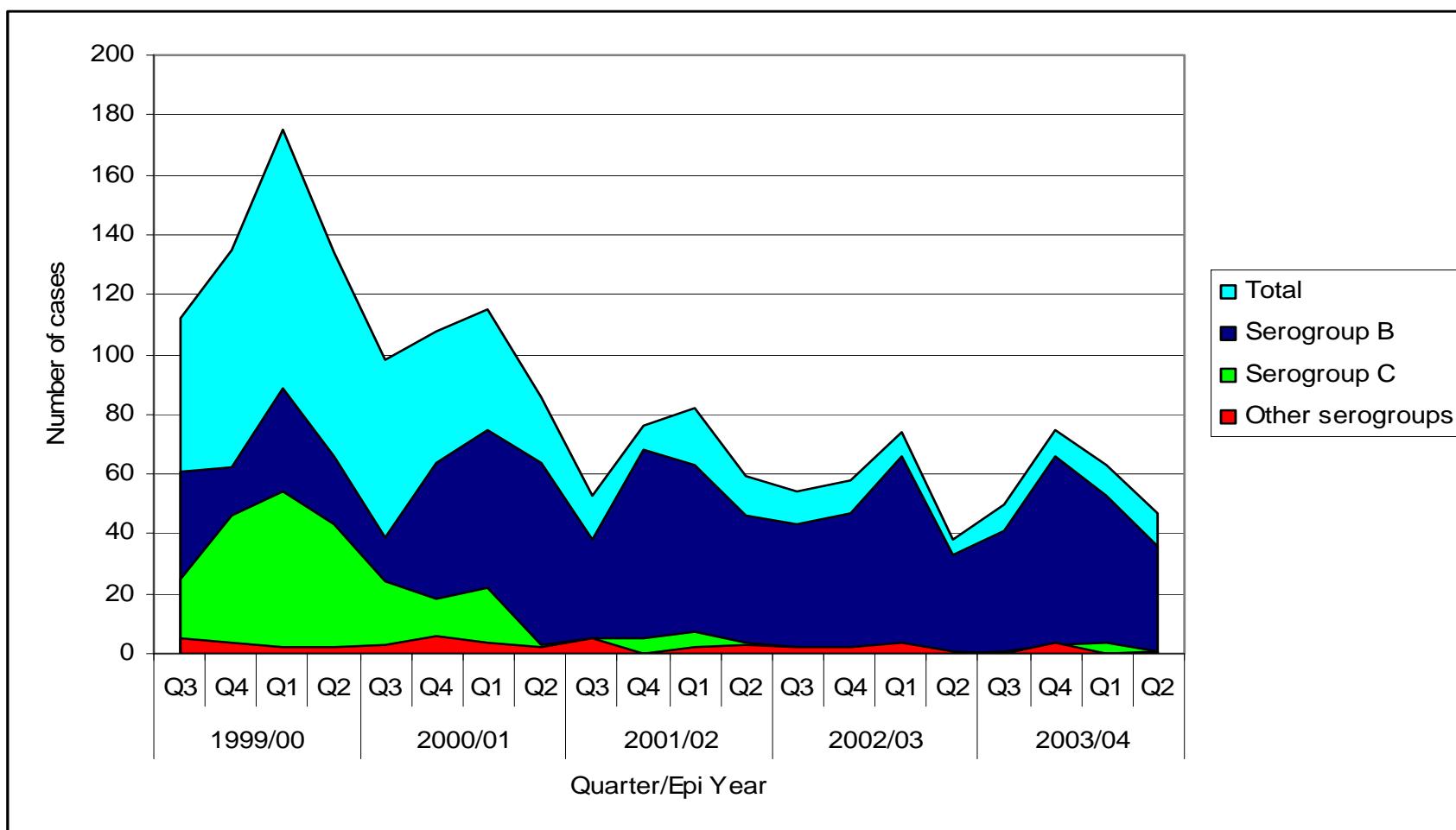
- Anthrax
- C. trachomatis
- Cholera
- Epstein-Barr virus
- ETEC
- Dengue
- Enterotoxigenic Escherichia coli (ETEC)
- Group A streptococcus
- H. pylori
- Hepatitis B improved
- Hepatitis C
- Hepatitis E
- Herpes simplex type 2
- HIV/AIDS
- Hookworm disease
- Influenza for pandemic response
- Japanese encephalitis (improved)
- Leishmaniasis
- Malaria
- Measles (aerosol)
- New combinations of existing vaccines
- Parainfluenza
- Plague
- Respiratory syncytial virus
- Severe acute respiratory syndrome (SARS)
- Schistosomiasis
- Shigellosis
- Streptococcus (Group A and B)
- Tuberculosis
- Typhoid (conjugate)
- West Nile fever

Haemophilus influenzae type B

1987-2003



Meningococcal Disease Notifications, 1999 – 2003/4



Courtesy Dr. Margaret Fitzgerald, HPSC

Smallpox



CDC. Public Health Images Library (PHIL) id# 131. Source: CDC/Barbra Rice

Smallpox disease

- 90% Classic 30% mortality
- 5% Haemorrhagic 90-100% mortality
- 5% Malignant 100% mortality

Smallpox Disease – a bit of history

R_o 5-10

Mortality up to 30%

Pitted scars in 65–80%

In 18th century Europe:

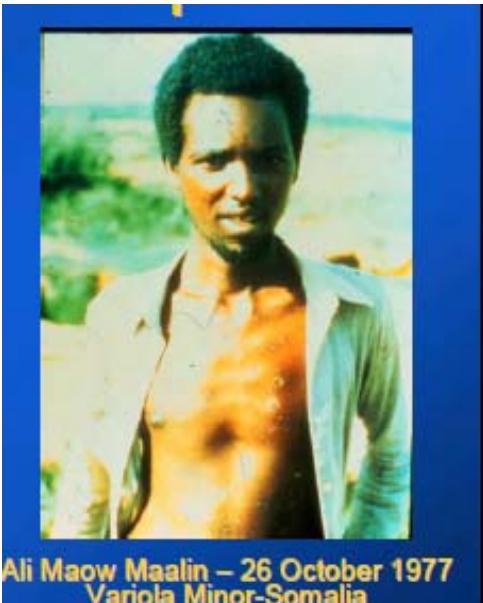
- 400,000 died each year
- 1/3rd blindness cases due to smallpox
- Killed every 10th child born in Sweden and France,
every 7th child born in Russia.
- Mortality rate in infants 80% in London

Smallpox Disease – a bit more history

Killed Queen Mary II of England,
Emperor Joseph I of Austria,
Tsar Peter II of Russia,
Queen Ulrika Elenora of Sweden, King Louis XV of France

In early 1950s an estimated 50 million cases of smallpox occurred each year, fell to around 10–15 million by 1967 because of vaccination

Last case of indigenous smallpox, Somalia, 1977, survived



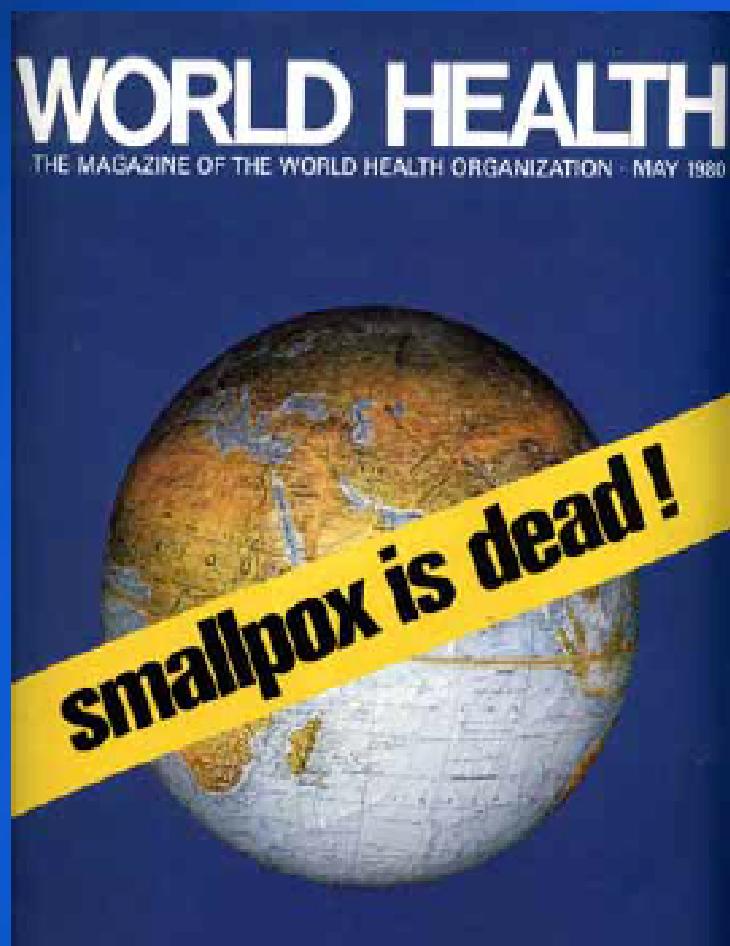
Last death from Smallpox, Birmingham, UK, 1978



Last case of variola major, 1975, Bangladesh, survived



1980



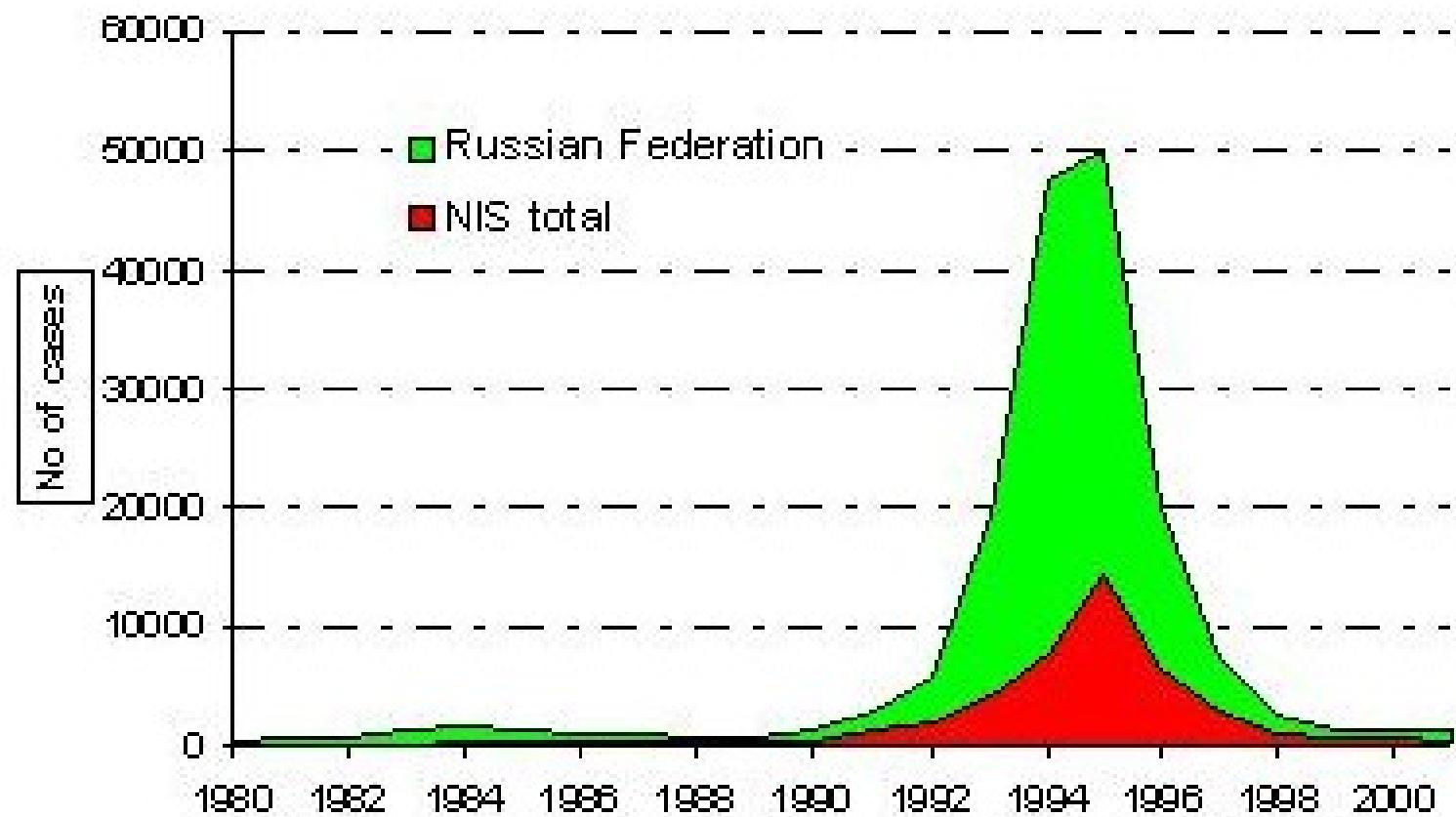
Diphtheria

- 4th century B.C - Hippocrates
- 17th century - Epidemics
 - "*El garatillo*" (*the strangler*) – Spain
 - "*the gullet disease*" – Italy and Sicily
- Case-fatality rate of 5% to 10%
 - highest death rates in very young and elderly.

Diphtheria in Modern Times

- Early 20th century USA
 - 150,000 cases, 13,000 deaths annually
- 1923
 - Ramon develops diphtheria toxoid
- Mass immunisation programmes
 - Diphtheria “conquered” (?)

Diphtheria Resurgence in Europe mid-1990s



Source: DIPNET 2004

History of Polio



- Egyptian hieroglyph indicates presence since at least 1400 BC
- 1840 - Heinle characterizes poliomyelitis
- Poliomyelitis – “grey marrow” in Greek
- 1954 - Salk vaccine
- 1960 - Sabin vaccine
- 1991 – Molla produces polio in vitro from virus RNA
- 2002 – completely synthetic production

Poliomyelitis

Highly contagious

Can infect virtually the entire population

Seasonal in temperate climates, summer and
autumn, less pronounced in tropical areas.

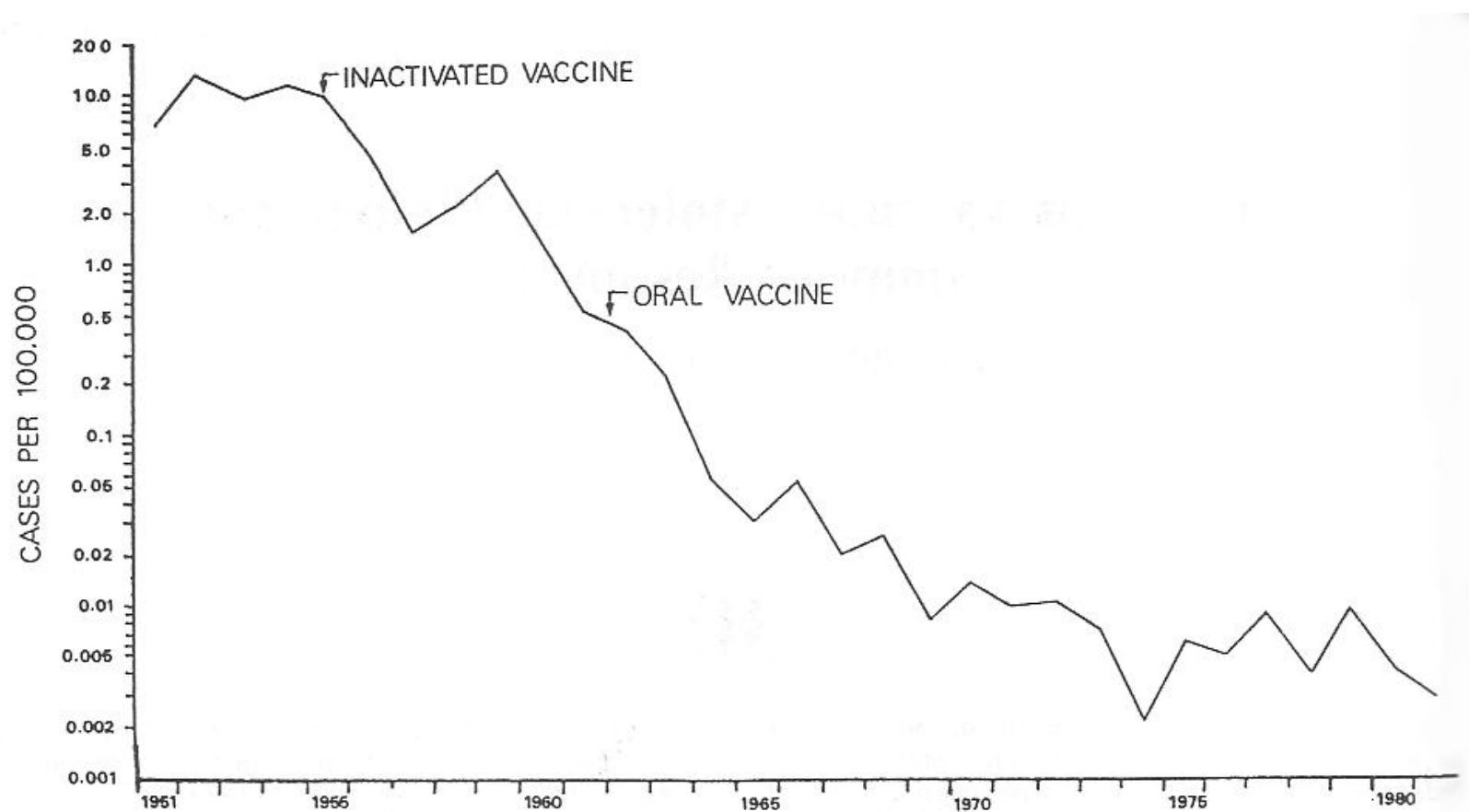
Incubation period, six to 20 days, (3-35).

Excreted in the faeces for several weeks

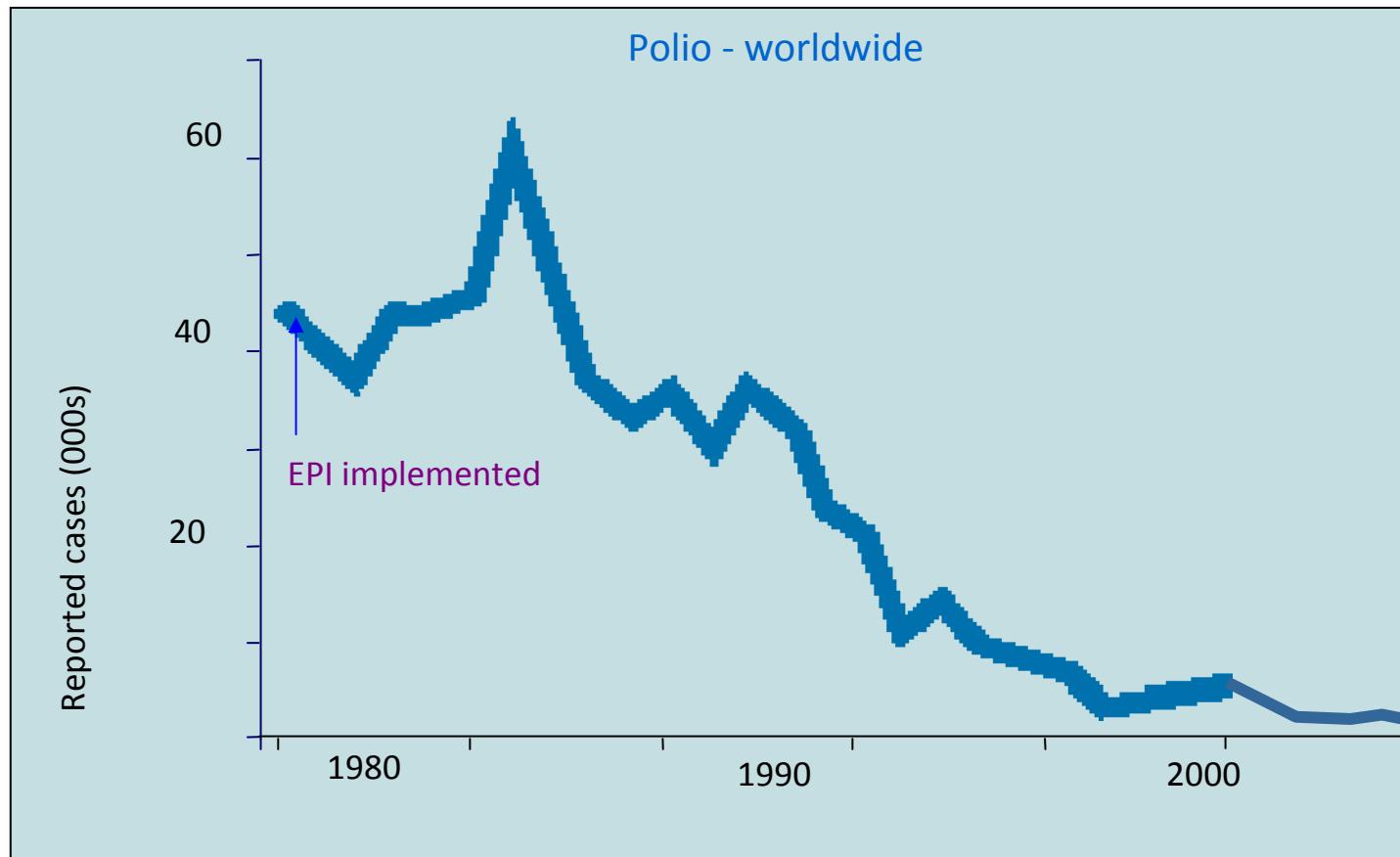
Transmission primarily fecal-oral

Oral-oral route if good sanitation and hygiene.

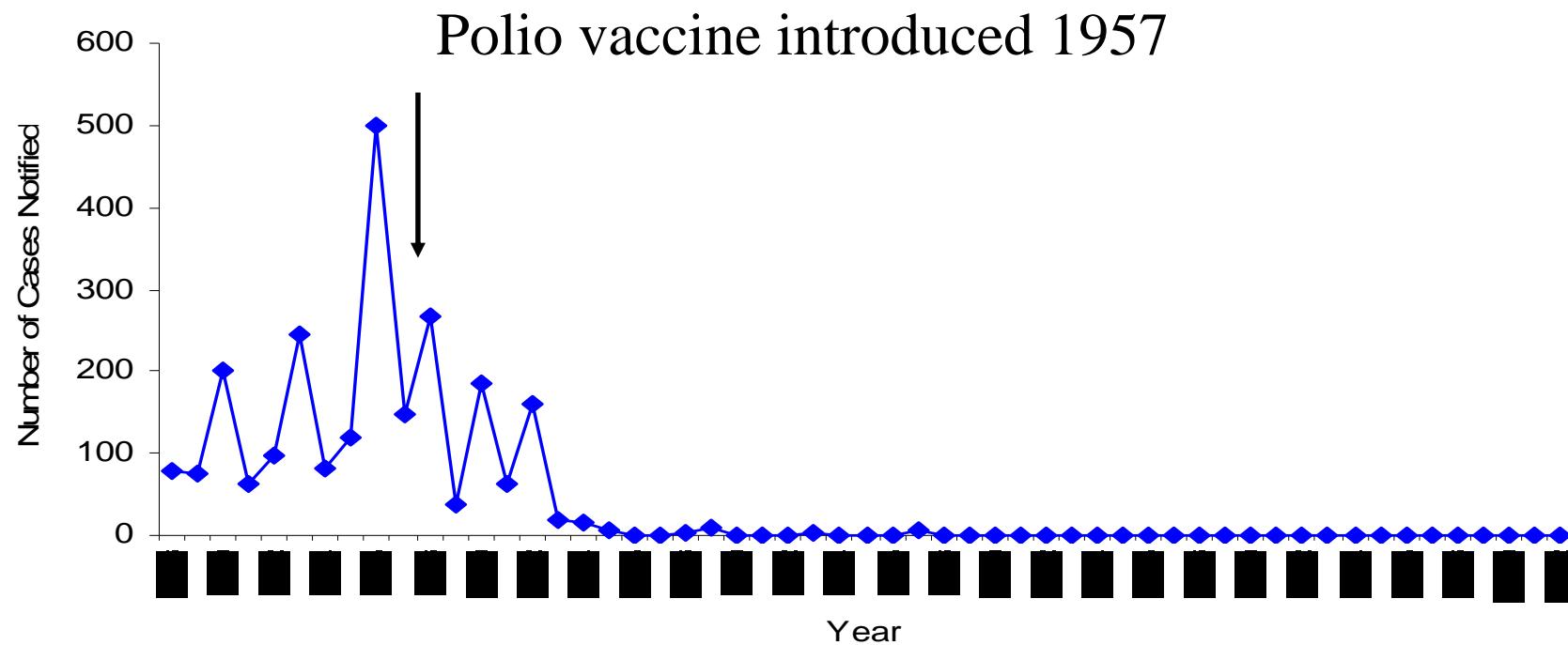
Decline in Poliomyelitis 1951-80



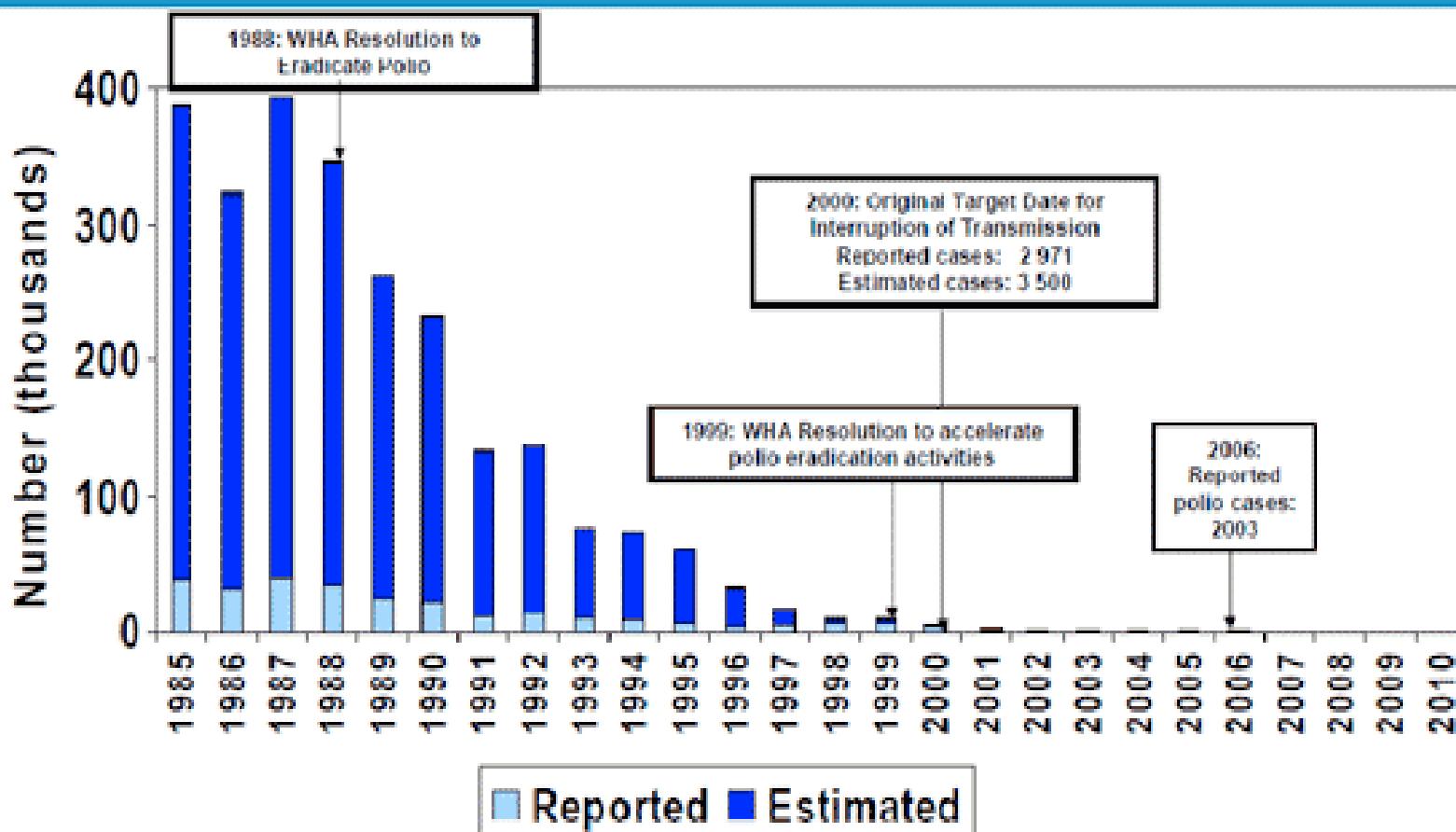
Decline in Poliomyelitis 1980-2005



Polio Cases, Ireland 1948-2004



Progress in Polio Eradication, Estimated and Reported Polio Cases, 1985-2006



Source: WHO/Polio database, 11 September 2007

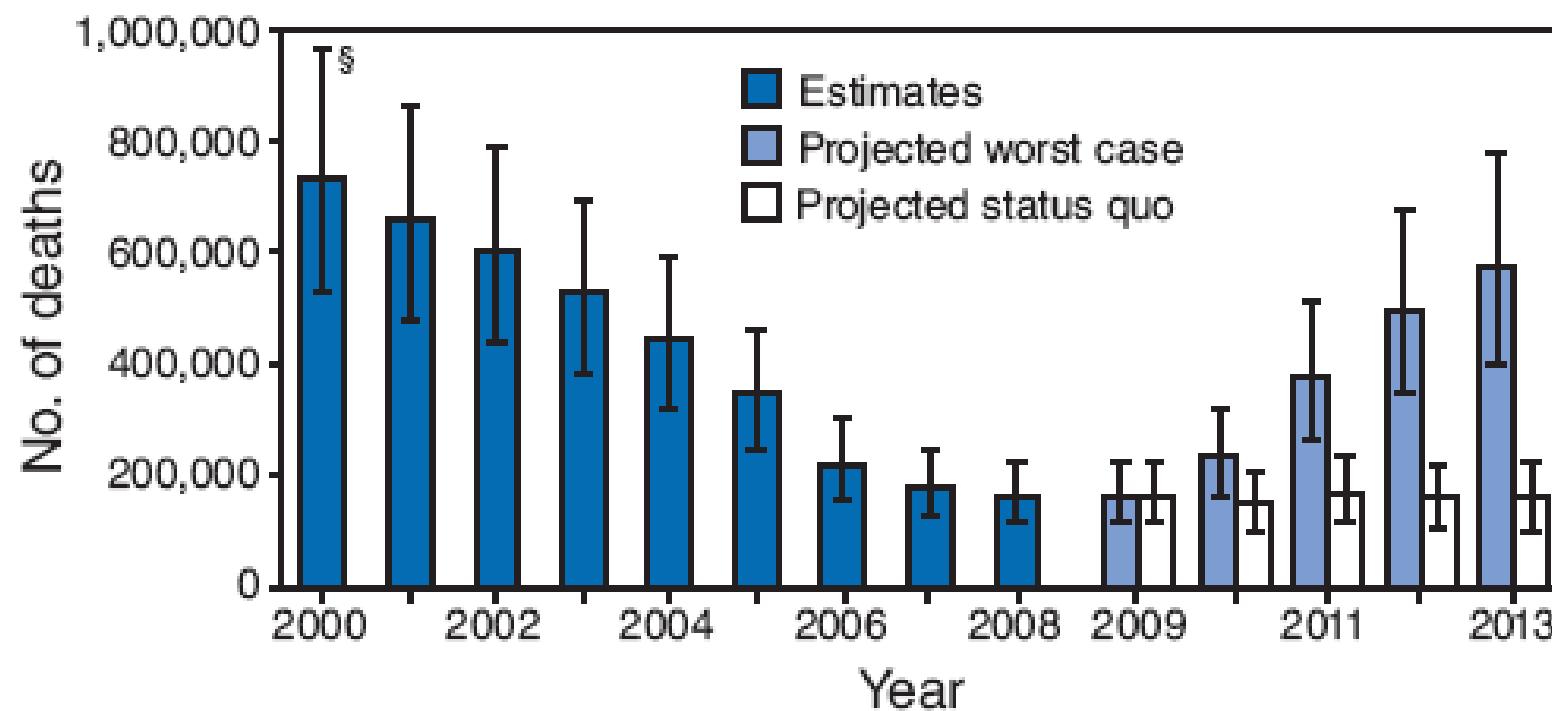
193 WHO Member States.



World Health Organization

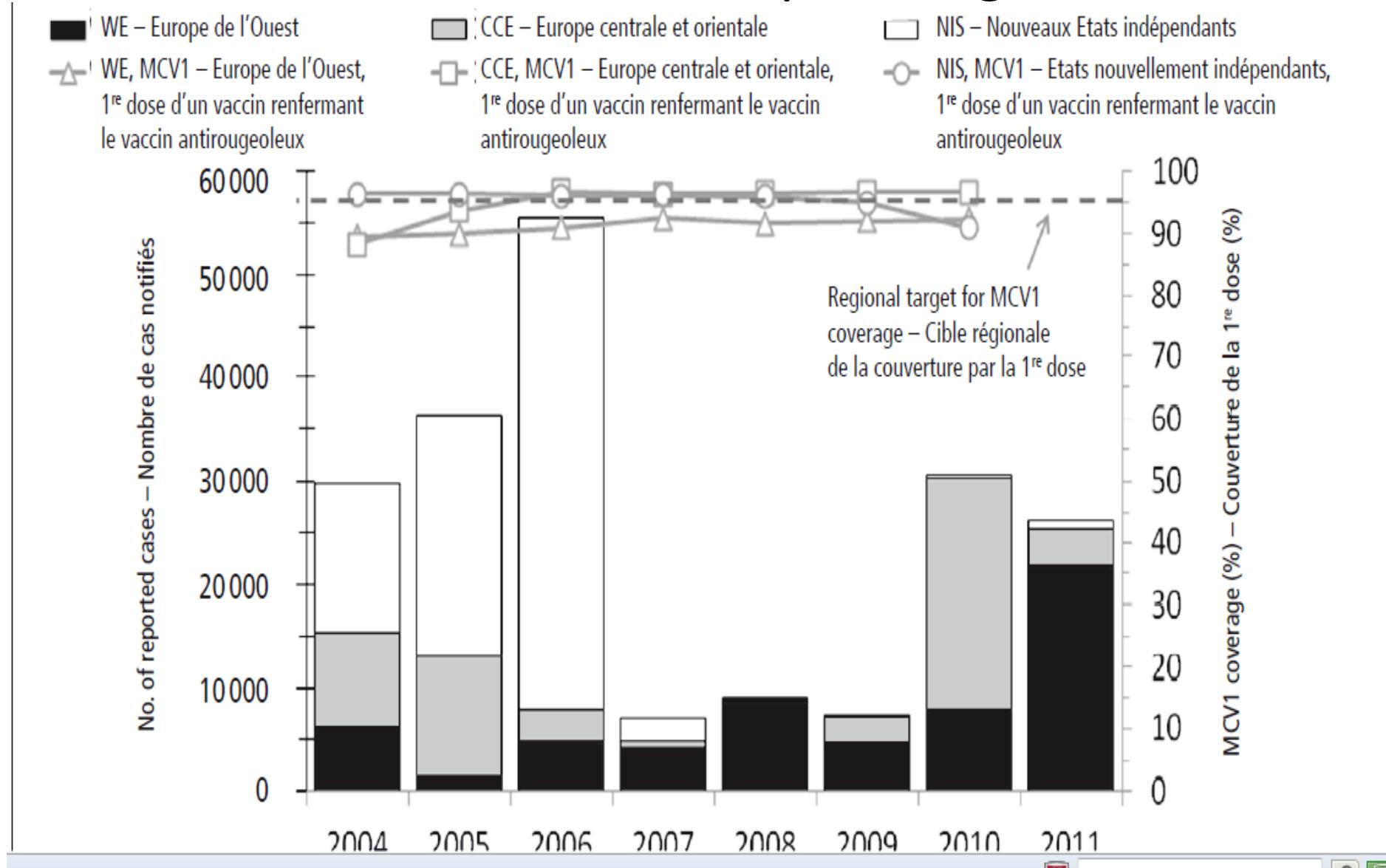


Number of measles deaths, 2000--2008, and worst case/status quo projections*



* Projected "worst case" scenario assumes that none of 47 priority countries carry out catch-up or follow-up supplemental immunization activities (SIAs) during 2010--2013

Measles cases and coverage, children 13-24mths., WHO European region



Measles, Europe, 2011

- Outbreaks reported in 36/53 Member States;
- >26 000 cases reported by October 2011.
- France reported >14 000; predominantly unvaccinated/unknown status
- Older children and young adults

Pertussis Diagnosis

- Clinical:a cough illness lasting at least 2 weeks without other apparent cause accompanied by one of the following
 - ✓ Paroxysms of coughing
 - ✓ Inspiratory ‘whoop’
 - ✓ Post-tussive vomiting

Pertussis Clinical Manifestations

Table 1: Typical course of pertussis — evolution of symptoms, relative sensitivity of diagnostic methods and effect of antibiotic therapy, by phase of pertussis

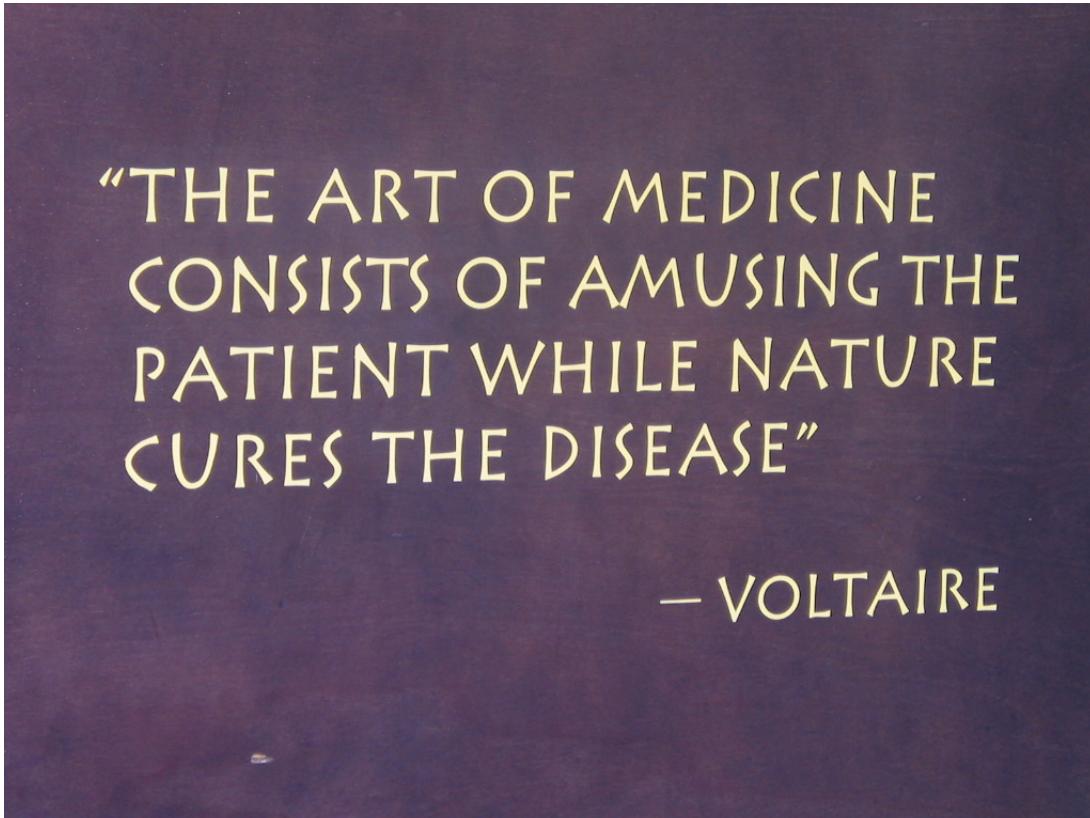
Variable	Catarrhal phase (1–2 wk)	Paroxysmal phase (3–6 wk)	Convalescent phase (> 6 wk)
Symptom			
Cough	++	+++	++
Paroxysmal cough	-/+	+++	-/+
Whooping cough	-	+++	-/+
Vomiting	-	+++	-/+
Cyanosis	-	+++	-
Apnea	-	+++	-
Test sensitivity			
Culture	++	-/+	-
PCR	++	++	-
Serology	-/+	++	++
Effect of antibiotic therapy			
Symptoms alleviated	++	-/+	-

Note: + present, - absent, -/+ equivocal.

Pertussis Complications

- Subconjunctival hemorrhages
- Pneumothoraces
- s.c emphysema, hernias,
- Rectal prolapse
- Rib fractures, herniated discs
- Fits (1.4%), encephalopathy in 0.2% of
<6 months

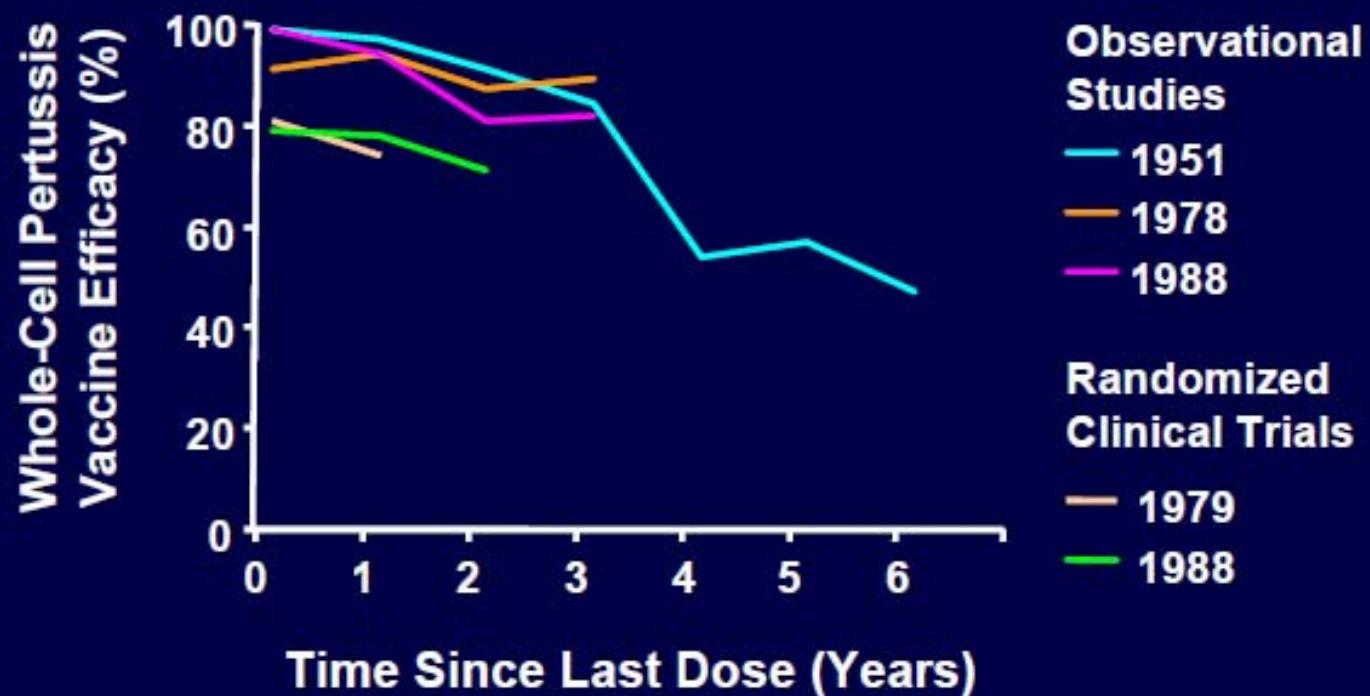
Pertussis Treatment



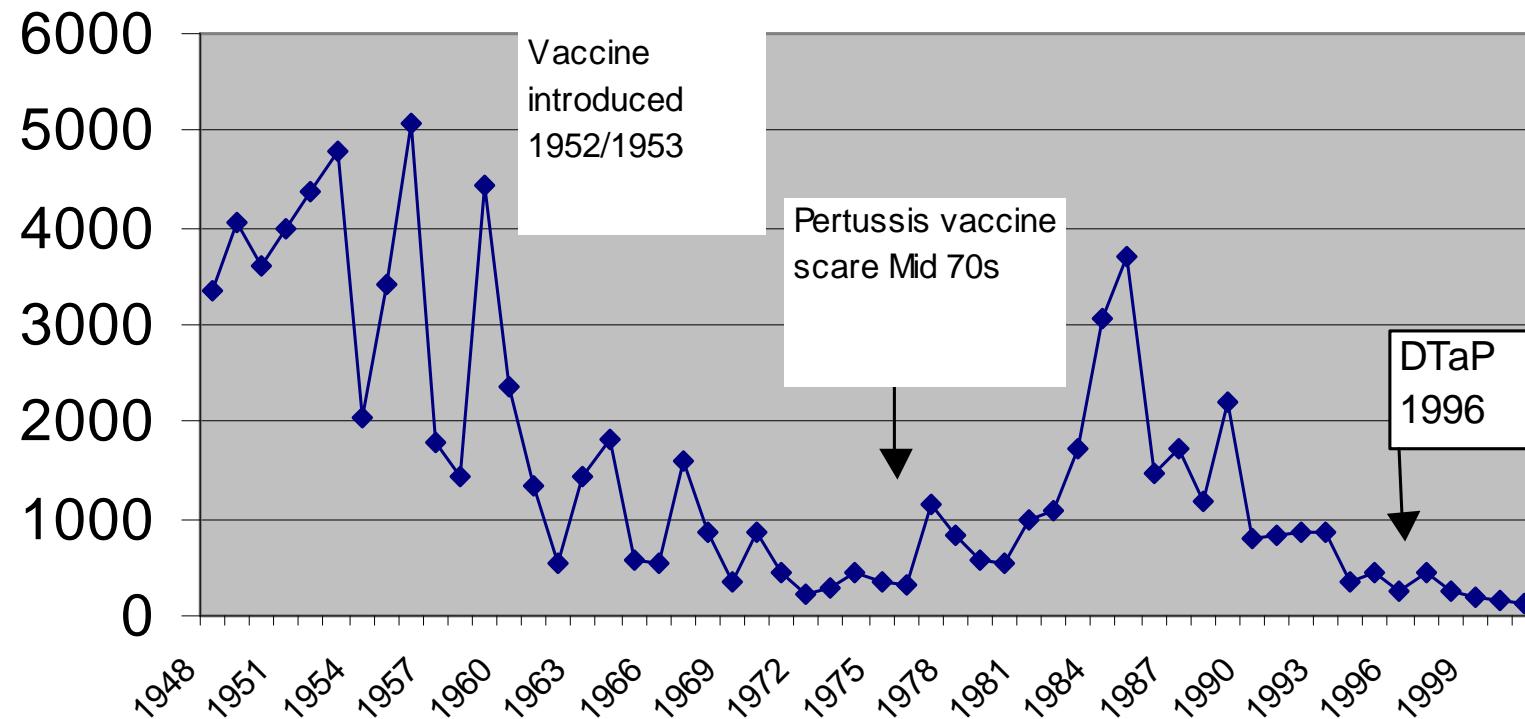
“THE ART OF MEDICINE
CONSISTS OF AMUSING THE
PATIENT WHILE NATURE
CURES THE DISEASE”

— VOLTAIRE

Waning of Vaccine-Induced Immunity

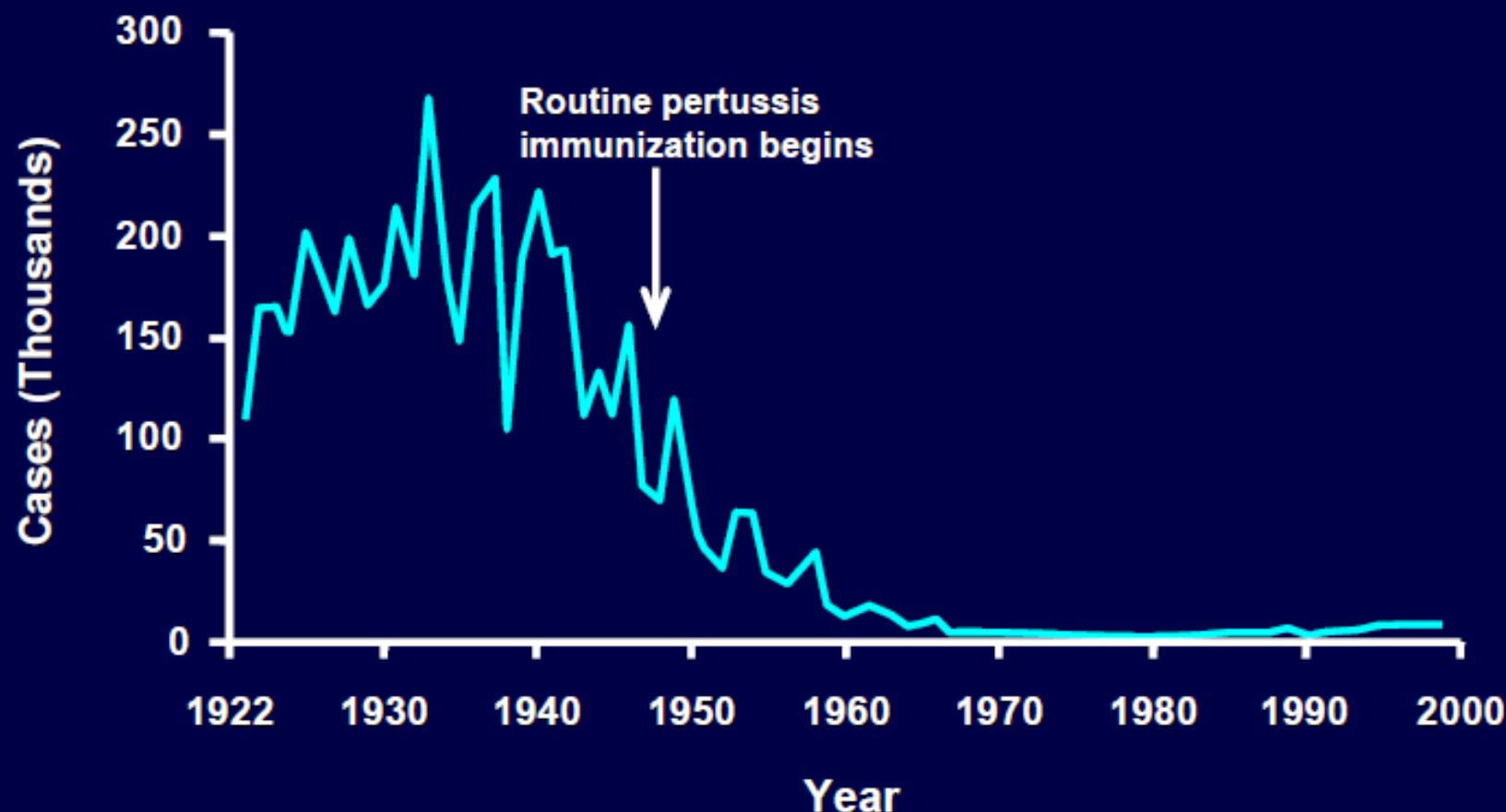


Pertussis Notifications 1948-2001 Ireland



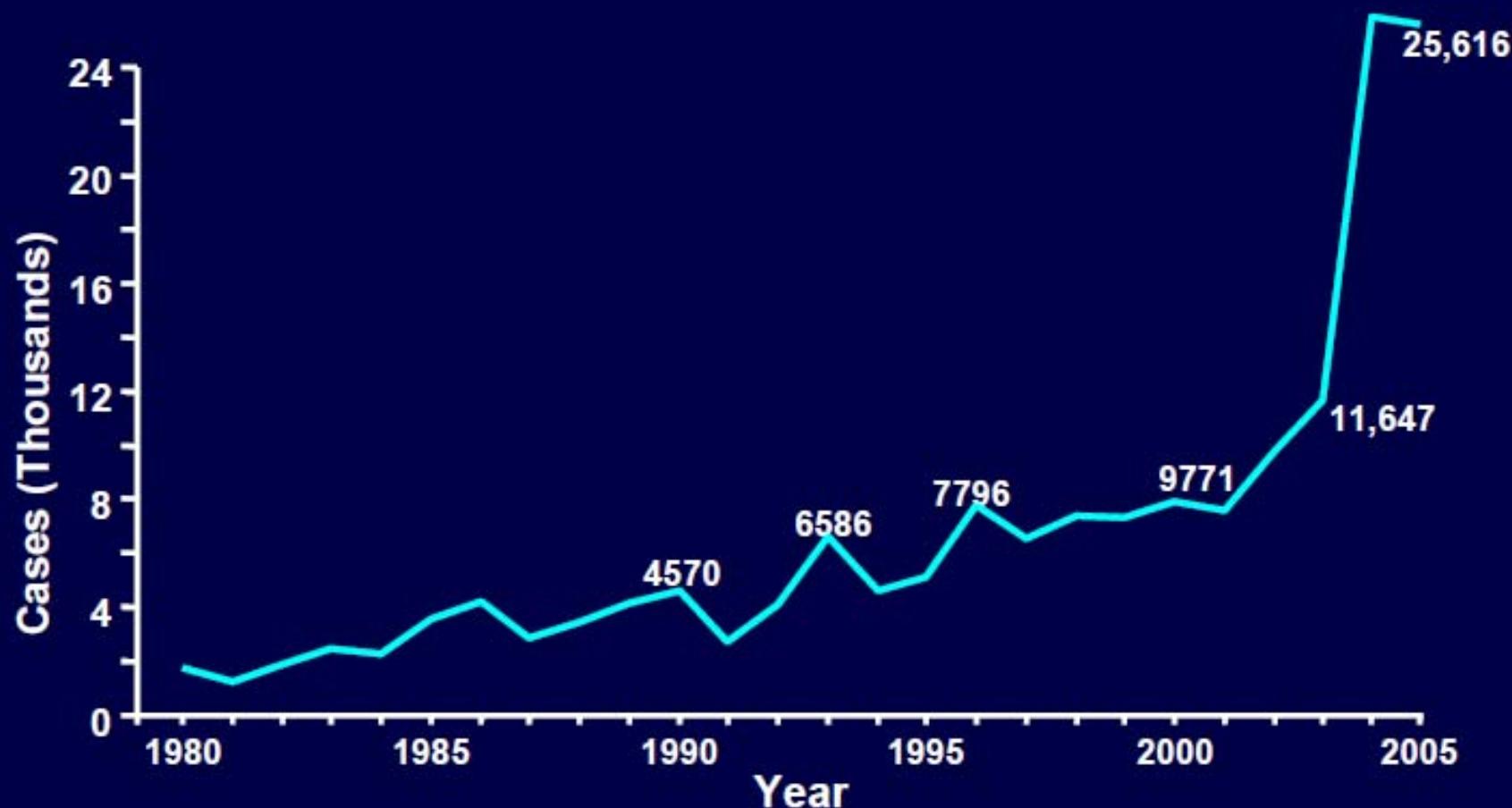
NDSC, Ireland

Reported Pertussis Cases by Year United States, 1922 – 2000



CDC. Pertussis --- United States, 1997–2000. MMWR 2002;51:73-76.

Reports of Pertussis United States, 1980 – 2005

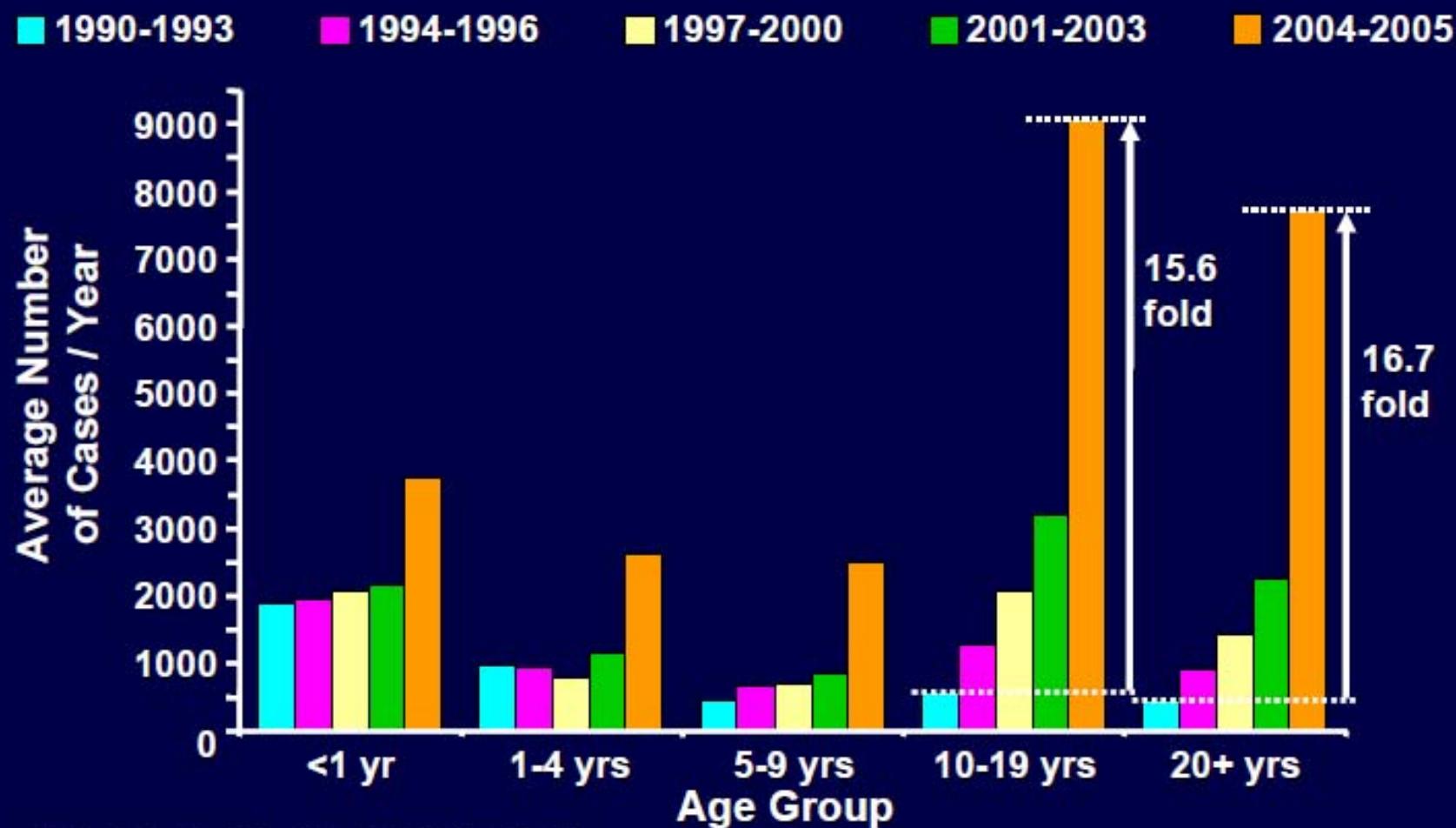


CDC. Summary of notifiable diseases—United States, 2003. Published April 22, 2005, for MMWR 2003;52(No. 54):72-76.

CDC. Summary of notifiable diseases—United States, 2004. Published June 16, 2006, for MMWR 2004;53(No. 53):19.

CDC. Reported cases of notifiable diseases, by geographic division and area — United States, 2005. MMWR 2006;55:890.

Reports of Pertussis in the U.S.

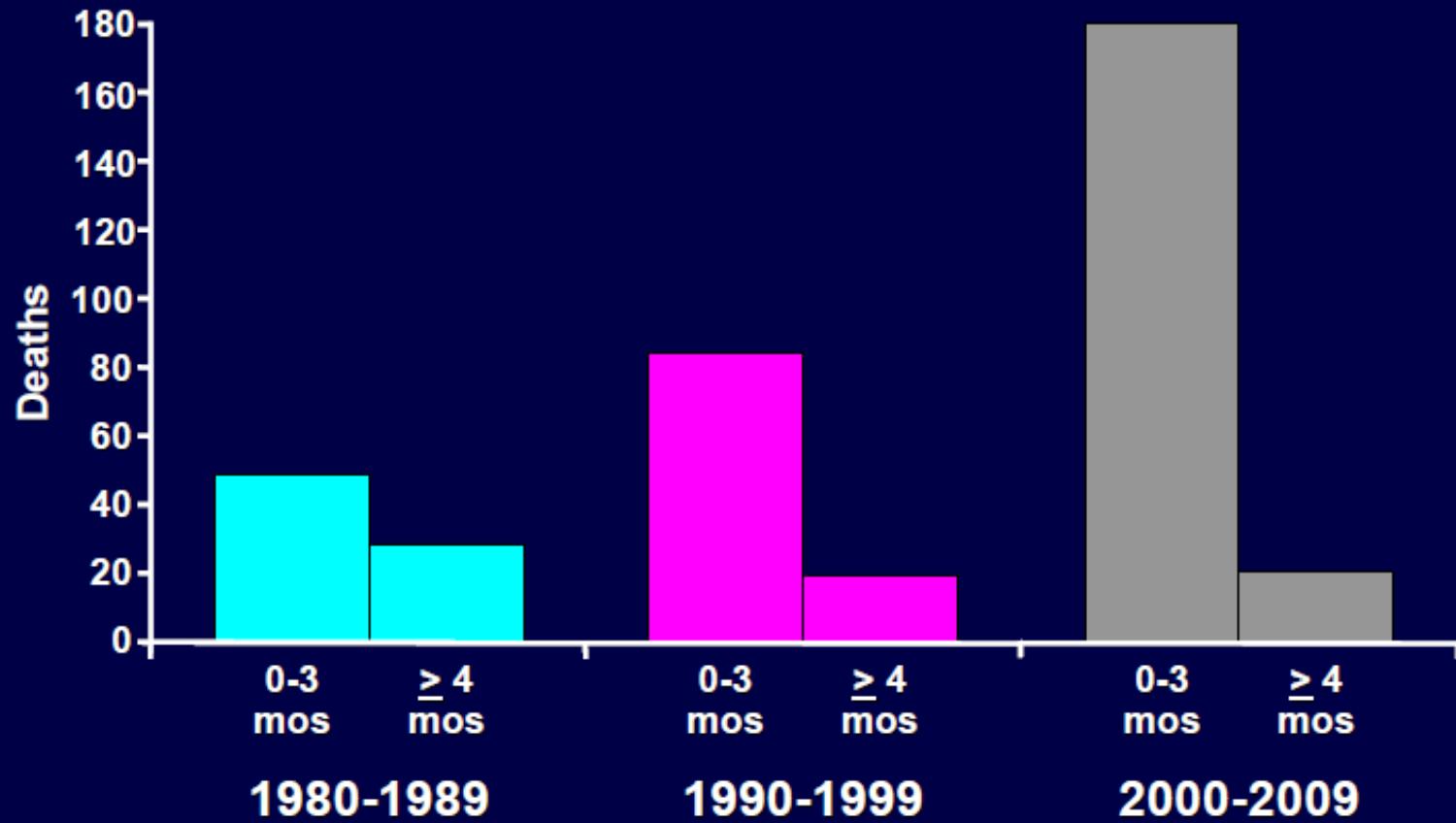


Güris et al. *Clin Infect Dis*. 1999;28:1230-1237.

CDC. *MMWR*. 2002;51:73-76, 2001;50(53):1-108, 2002;51(53):1-84, 2003;52(54):1-85.

National Center for Immunization and Respiratory Diseases, CDC. Pertussis Surveillance Reports for 2004 & 2005. 20

Pertussis Deaths by Decade and Age Group 1980-1989 vs. 1990-1999 vs. 2000-2009 (estimated)

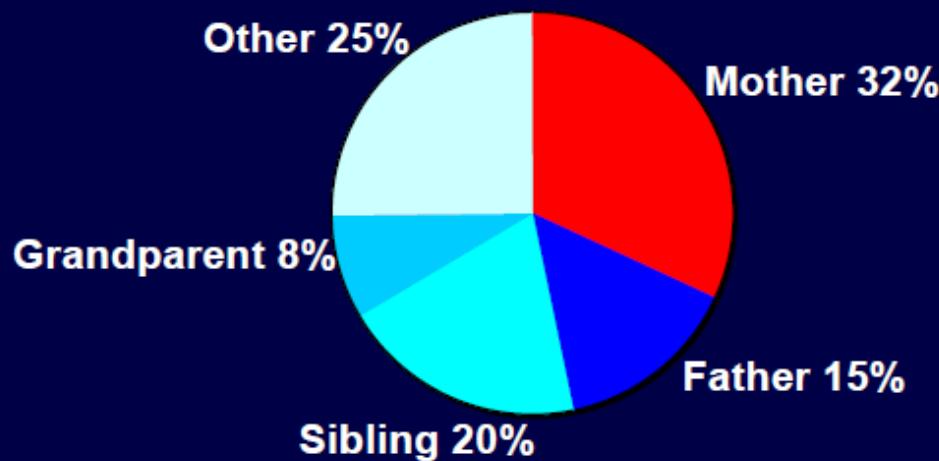


Vitek et al. *PIDJ* 2003;22:628-634.

CDC. *MMWR* 2006;55(No RR-17):5.

CDC Study – Infant Pertussis: Who Was the Source?

- 774 infant cases from 4 states
- 264 cases had source identified
- Sources:



Bisgard, K. *PIDJ*. 2004;23:985-9.

What should we do regarding increase in Pertussis?

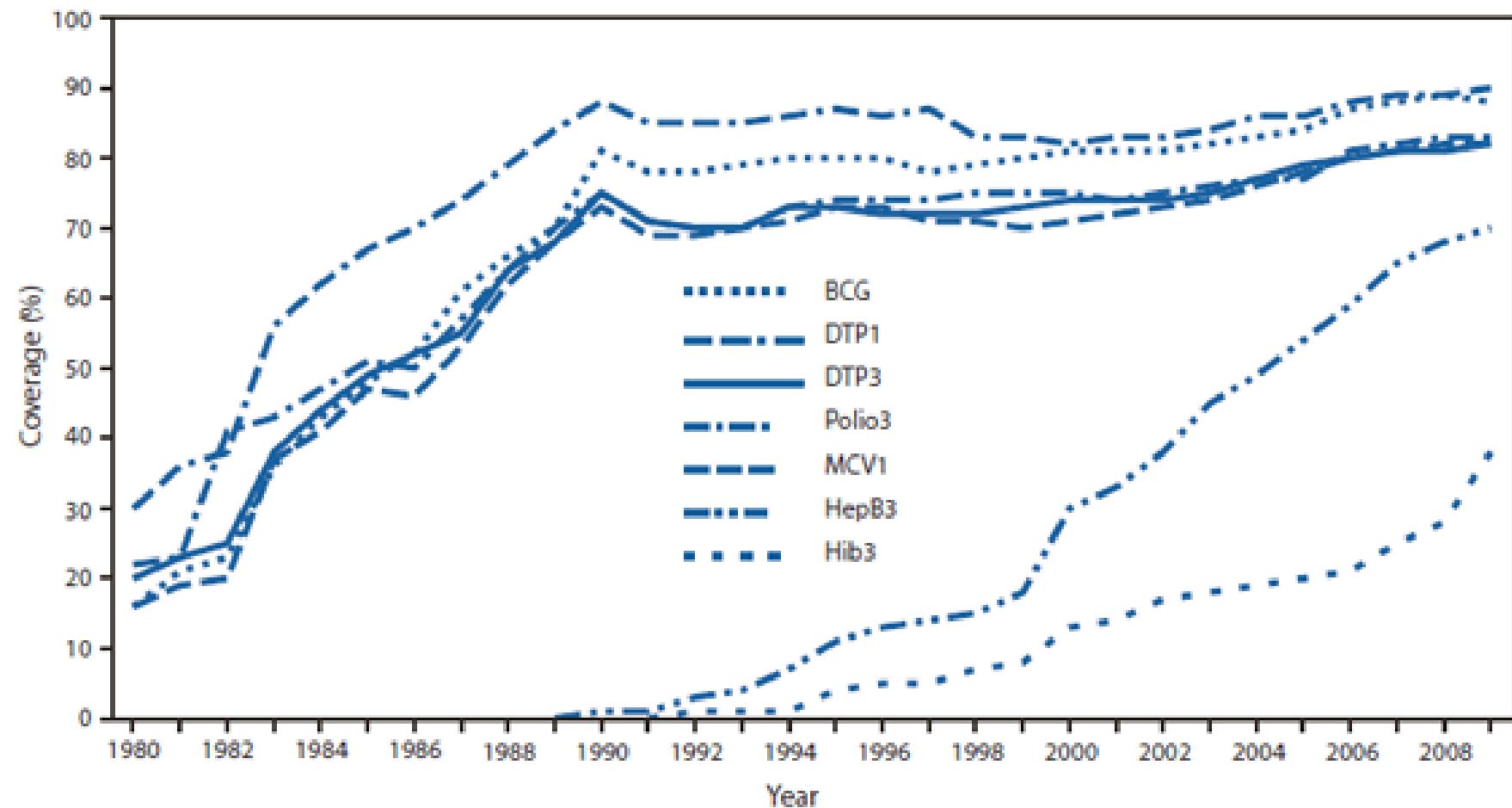
Stop vaccinating?

Vaccinate 10-yearly?

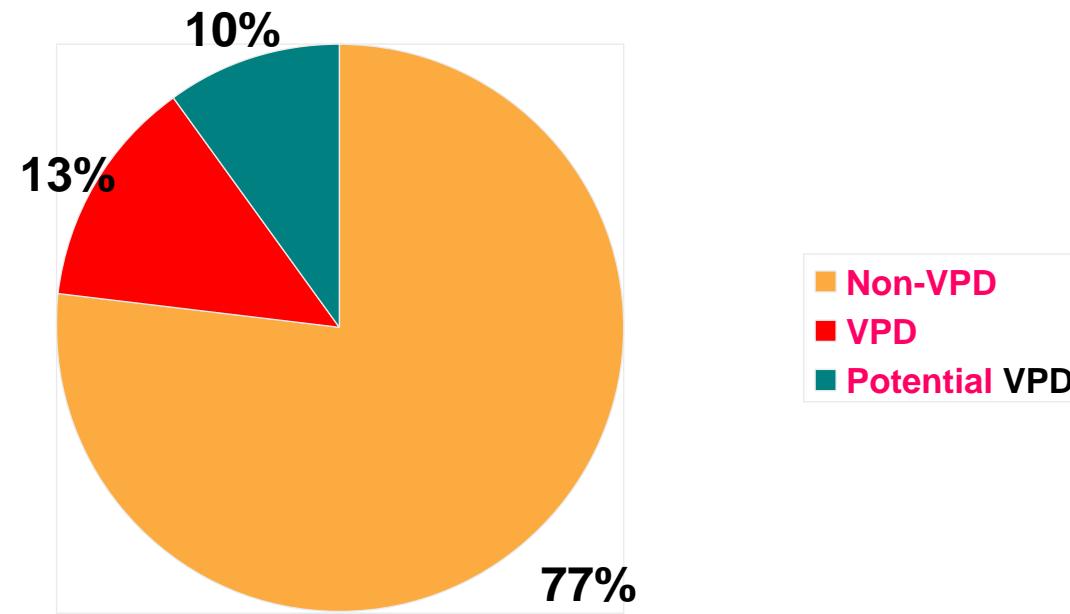
Cocooning of young infants?

Vaccinate in third trimester?

Vaccination coverage by 12 mts, World, 1980--2009



How many under 5s deaths are Vaccine-Preventable?



Almost 2 million preventable by vaccines