

**Measles, mumps and rubella**

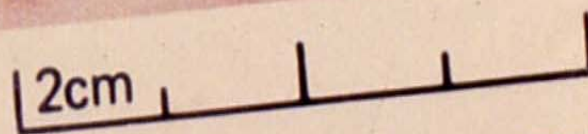
**Gone but not forgotten**

David Isaacs















# Measles is Misery



IMMUNISE  
AT 15 MONTHS!



NSW DEPARTMENT OF HEALTH  
Health Information and Translation Services











# Measles

- **Highly infectious human disease**
- **1 in 15 cases develop complications**
  - otitis media, pneumonia, encephalitis, SSPE
- **Pre vaccine epidemiology**
  - 2 - 5 year cycle of epidemics
  - most common in 5 - 9 year olds
  - world wide 7 - 8 million deaths annually

Figure 2. Maculopapular rash of measles. (Courtesy of B. Mandal.)





# Measles

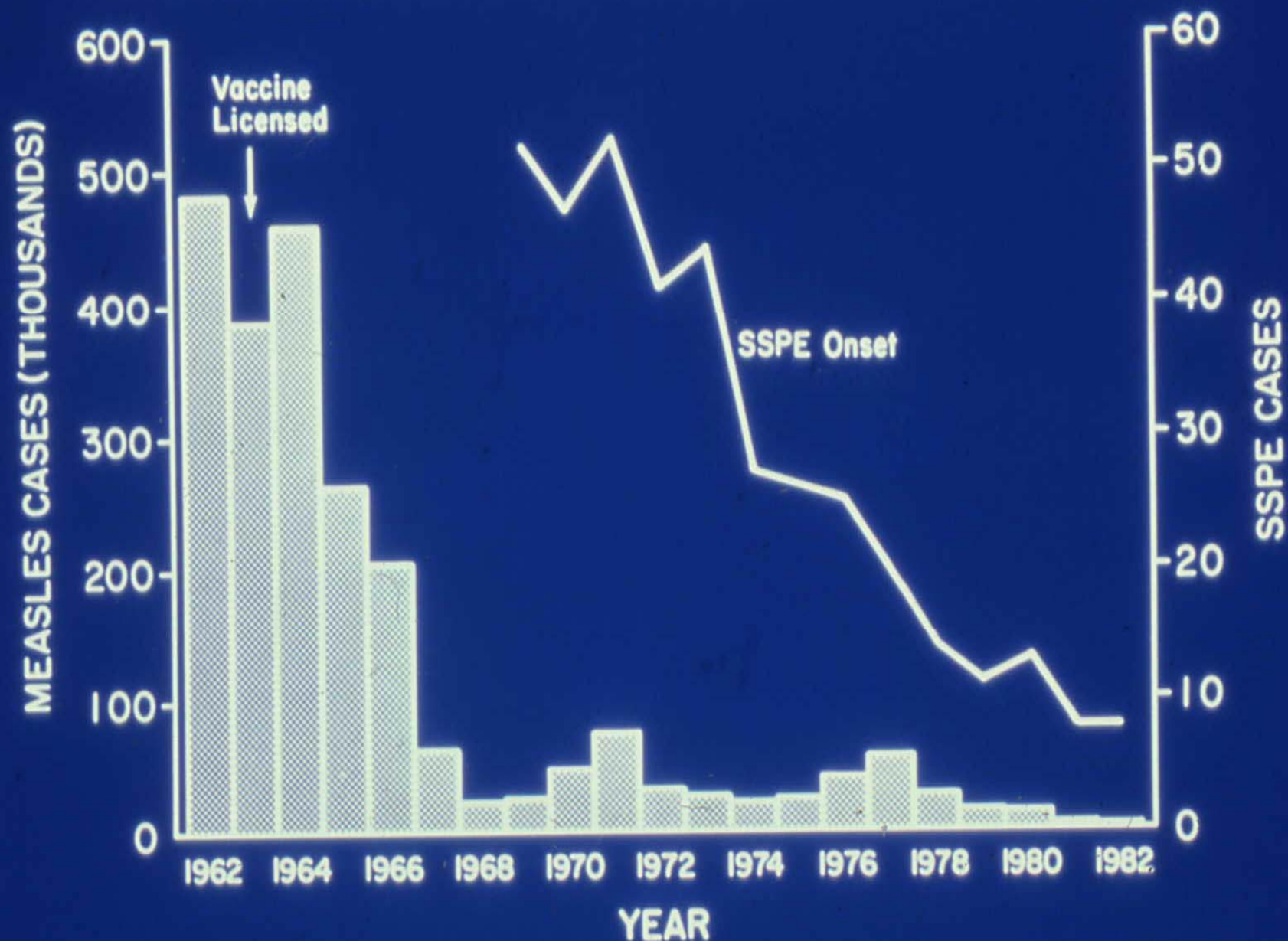
- 99.9% of unimmunised children get measles
- 1 in 5,000 to 10,000 cases die
- Mortality : 888,000 deaths in 1998 (more than breast cancer, violence)
- Morbidity : encephalitis (0.1%), convulsions (0.5%), pneumonia (1-7%), otitis media (5-9%)

# Measles: a global perspective

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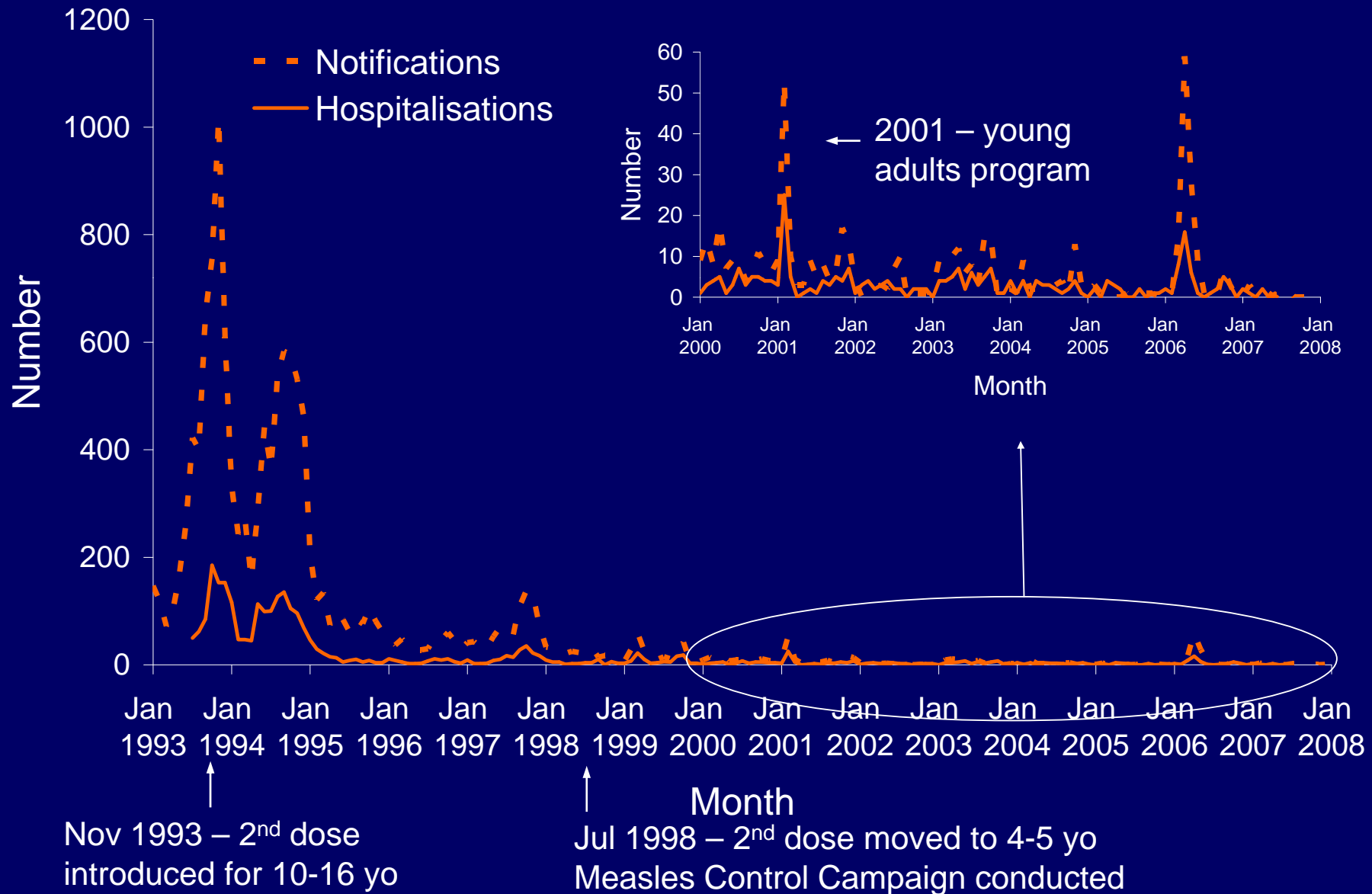
- **Vaccine available for over 40 years**
- **Still caused 197,000 estimated deaths in 2007**
  - leading vaccine preventable killer of children
- **Highest disease incidence in Africa**
- **Most deaths (98%) are in poorest countries**
  - low vaccination coverage, high case fatality ratio

# REPORTED MEASLES AND SUBACUTE SCLEROSING PANENCEPHALITIS (SSPE) CASES, UNITED STATES





# Measles in Australia

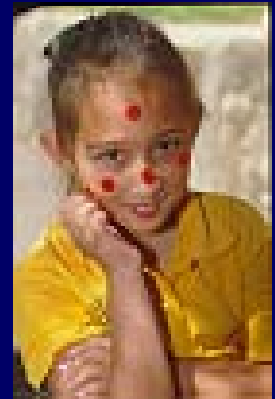


# Measles elimination in Australia: 1

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## The Measles Control campaign (MCC)

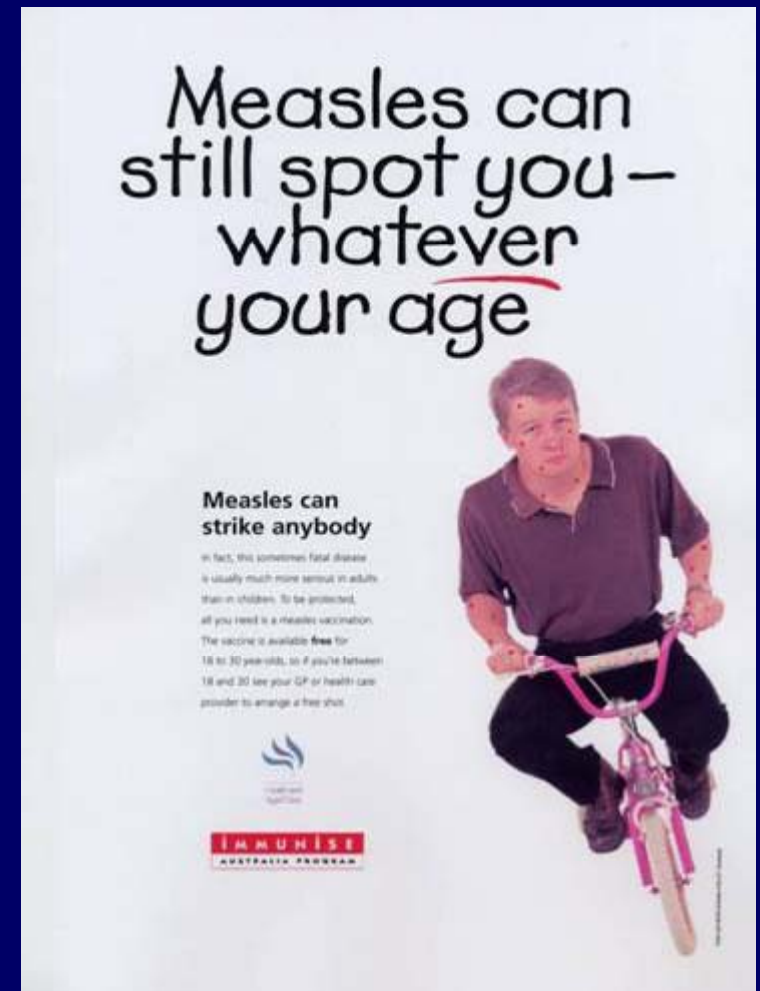
- July-December 1998
- mass vaccination 1.7 million primary school children (96% vaccinated)
- reminder letter to overdue infants
- information pack to secondary school students



# Measles elimination in Australia: 2

## Since the MCC

- Outbreaks in young adults
- Cohort born in 1970s + early 1980s most susceptible
- \$20 million funding to vaccinate 18-30 y/o in 2001
- Lowest rates on record in 2005 (10 cases) and 2007 (11 cases)





# Measles global control

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- **Measles Initiative**

- UN, Red Cross, CDC, WHO, Unicef
- 74% ↓ measles deaths between 2000 & 2007
- Goal: 90% ↓ measles deaths by 2010

- **Strategy**

- strong routine immunisation
- opportunity for 2nd dose to all children
- effective surveillance
- better treatment of measles

## Achieving 90% measles coverage, 2007



■ ≥ 90% (115 countries or 60%)

■ < 90% (78 countries or 40%)

## Providing 2<sup>nd</sup> opportunity\*, 2003-2007



■ Yes 2<sup>nd</sup> opportunity (183 countries or 95%)

■ No 2<sup>nd</sup> opportunity (10 countries or 5%)

\* 2<sup>nd</sup> Opportunity = country has implemented a two dose routine measles schedule and/or within the last 4 years has conducted a national immunization campaign achieving ≥ 90% coverage of children < 5 yrs

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Source: WHO/IVB database  
September 2008

Dear Friends

I have been thinking about organizing an approach to the Gates Foundation about supporting the global elimination of measles and rubella.

Traditionally, Gates has been more interested in new technology than in using already proven vaccines, but as these are “low hanging fruit,” perhaps it would be willing to support activities other than vaccine purchase to accomplish elimination.

A recent modelling meeting at Princeton on the burden of measles and rubella should soon provide a report that will be useful.

The March of Dimes will support this effort, and I hope GAVI also.

Would you be willing to sign a letter in support of this initiative?

With kind regards,

Stanley

# Measles global elimination

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- **Countries with low measles incidence**
- **Strategies**
  1. prolonged high coverage ( $> 95\%$ ) with 2 doses of MMR
    - ◆ USA, Finland
  2. mass vaccination- 'catch up' campaign
    - ◆ Americas, UK, Australia

PLUS 'keep-up' coverage and 'follow-up' campaigns
- **Other requirements for elimination**
  - surveillance, rapid outbreak response





# Mumps

**To mump is to mope**

**Before vaccine:**

**500 admissions per year in Australia**

**Meningitis or encephalitis**

**Pancreatitis**

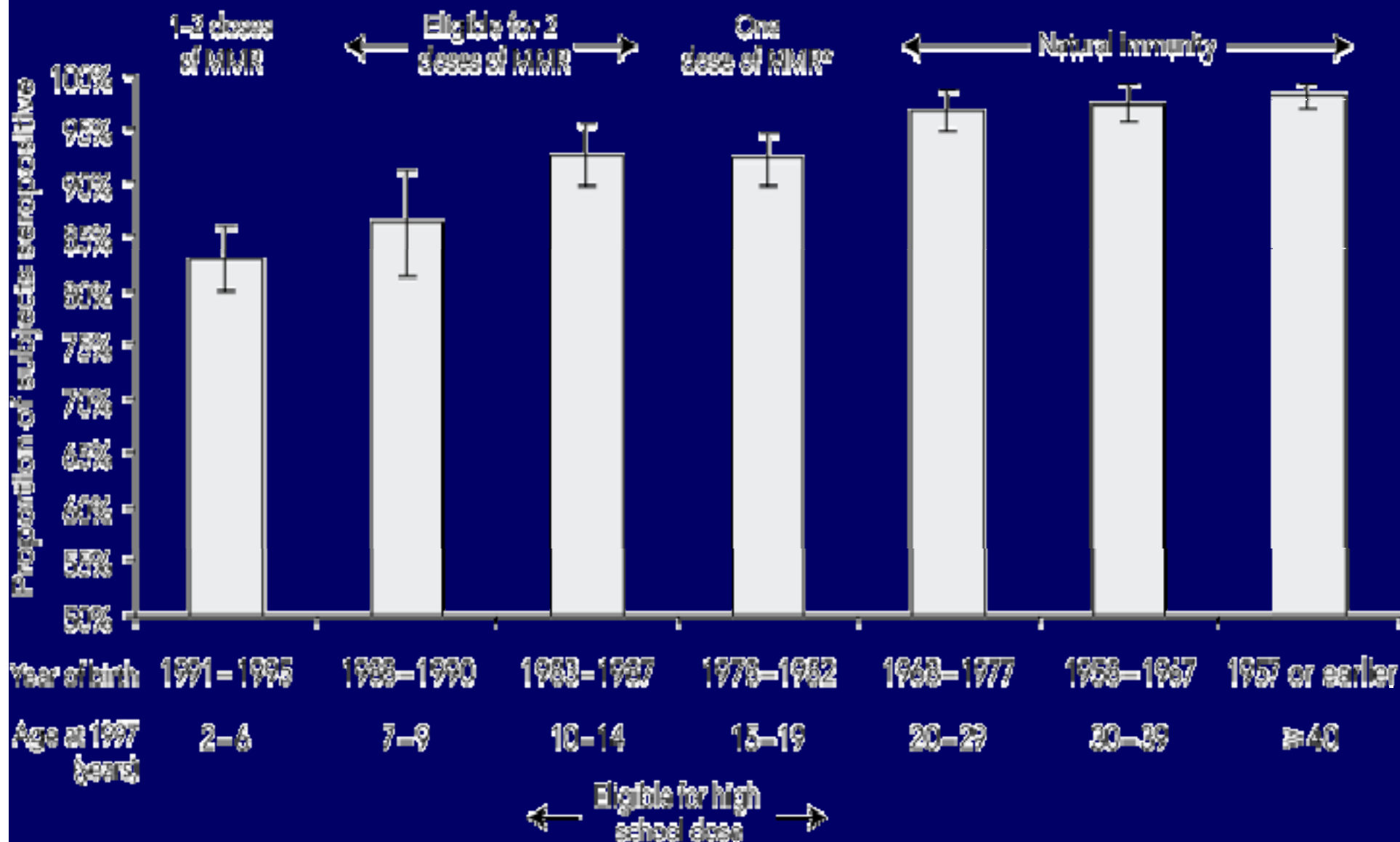
**Oophoritis**

**Orchitis**

# History of mumps immunisation in Australia

- 1981: mumps vaccine for children > 1 year
- 1983: replaced by a measles–mumps vaccine
- 1989: MMR vaccine
- 1994: Second dose of MMR vaccine for 10-16y
- 1998: Second dose moved to 4y

# Proportion of Australian population (n = 2787) seropositive for mumps in 1997, by birth cohort, age group and immunisation program history\*

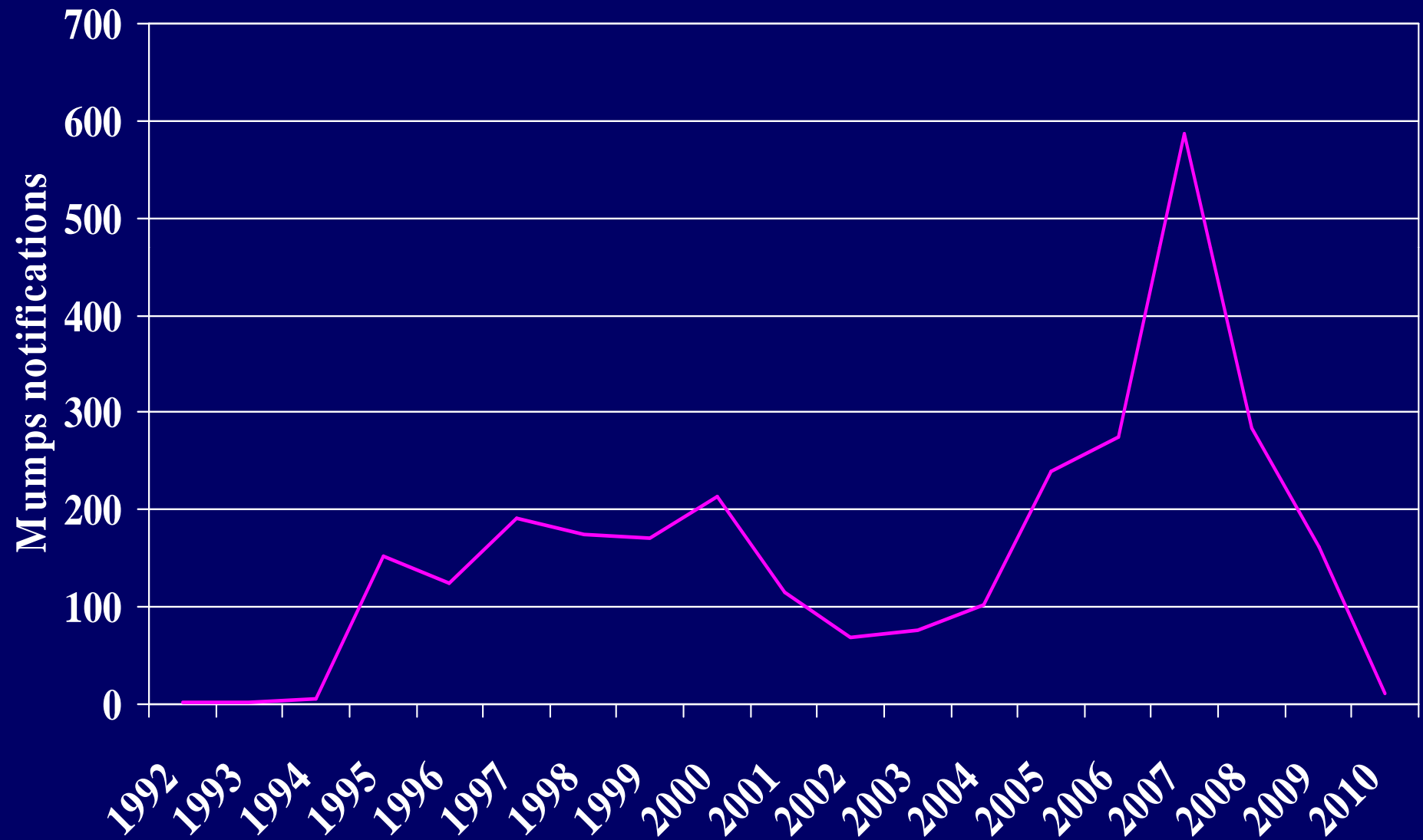




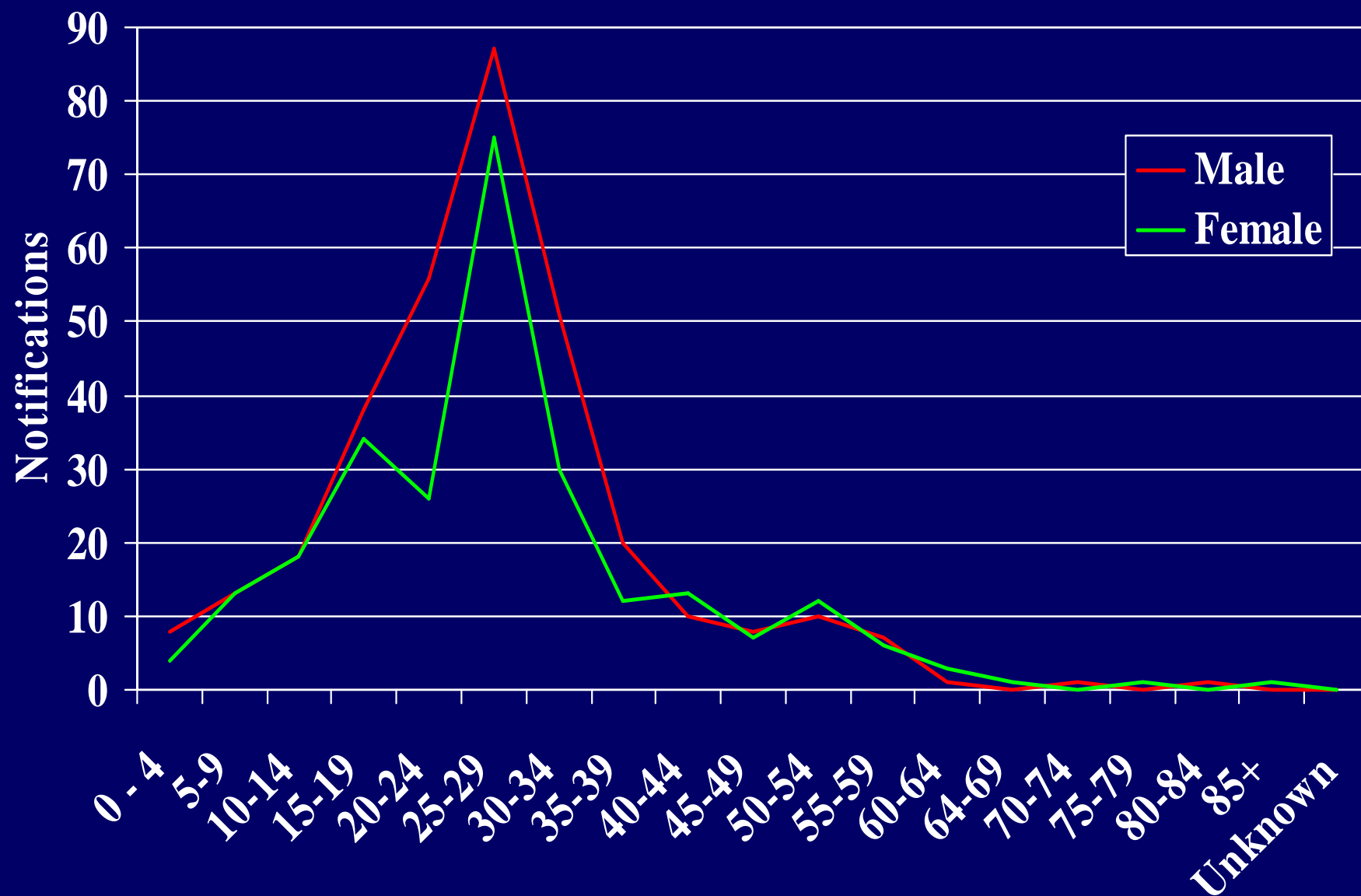
# Year of birth and susceptibility

- **Born before 1970: natural immunity, low incidence**
- **Born in 1980s: single dose, coverage 68% <5y**
  - low coverage
  - decreasing exposure to wild-type virus
  - highest incidence
- **Born after 1990: good vaccine coverage**
  - low incidence

## Mumps notifications, Australia 1991 - 2010



## Mumps notifications by age & gender, Australia, 2007



# Rubella

**Mild illness with rash, cervical lymphadenopathy, arthritis, mild fever**

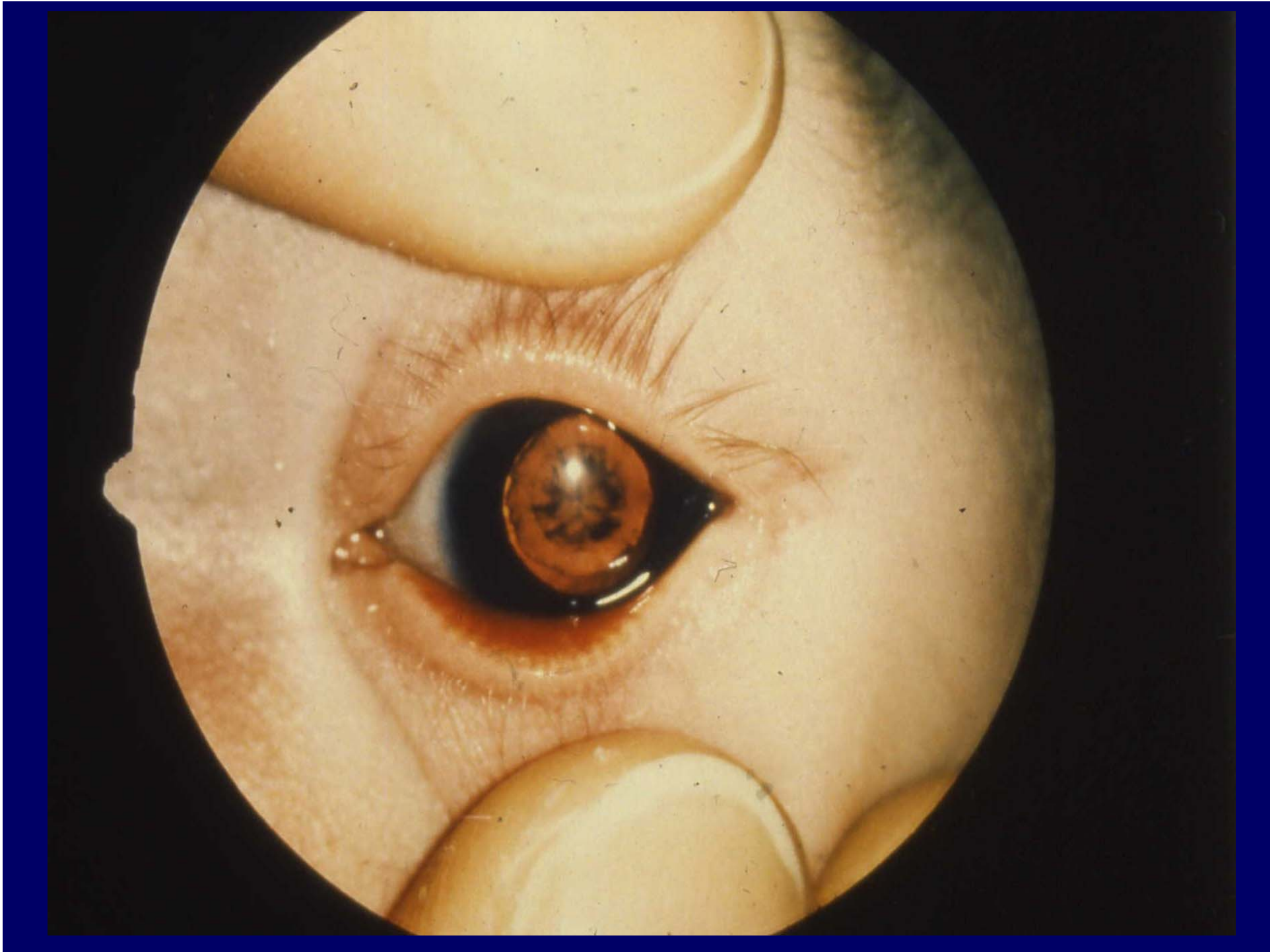
## **Congenital rubella syndrome**

- mainly first trimester**
- congenital cataracts**
- sensorineural deafness**
- cardiac defects**
- mental retardation**

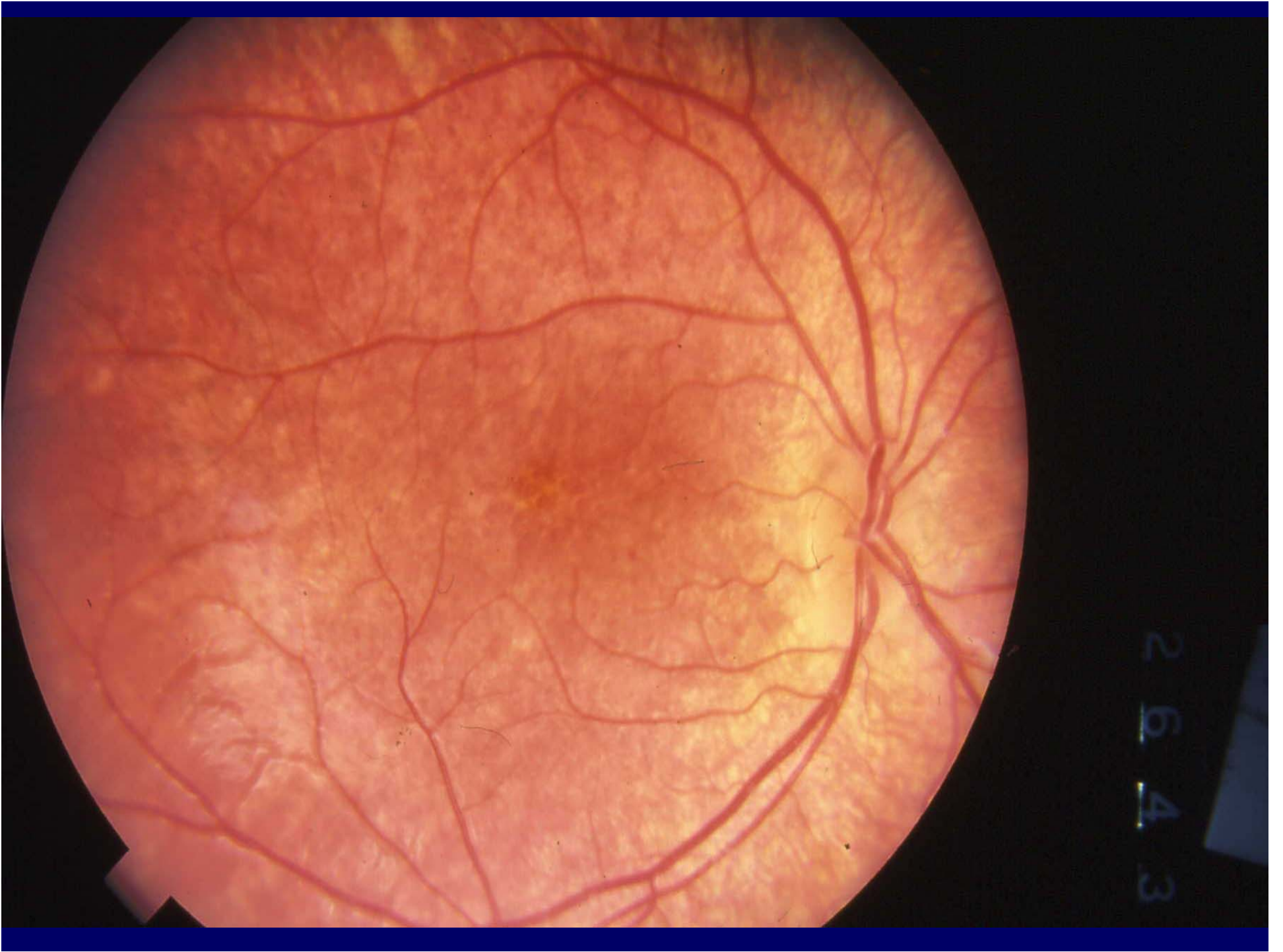














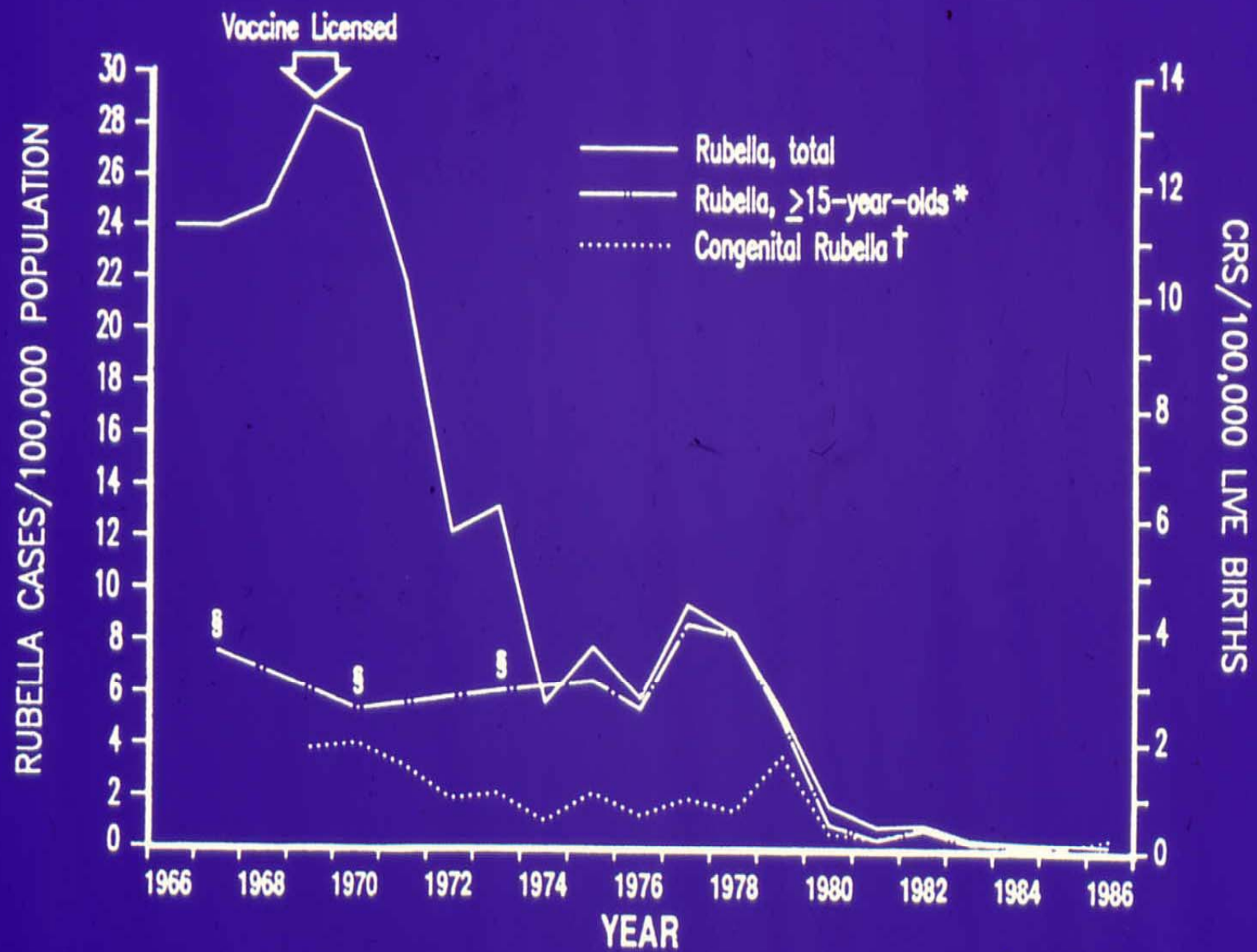




# Rubella (german measles)

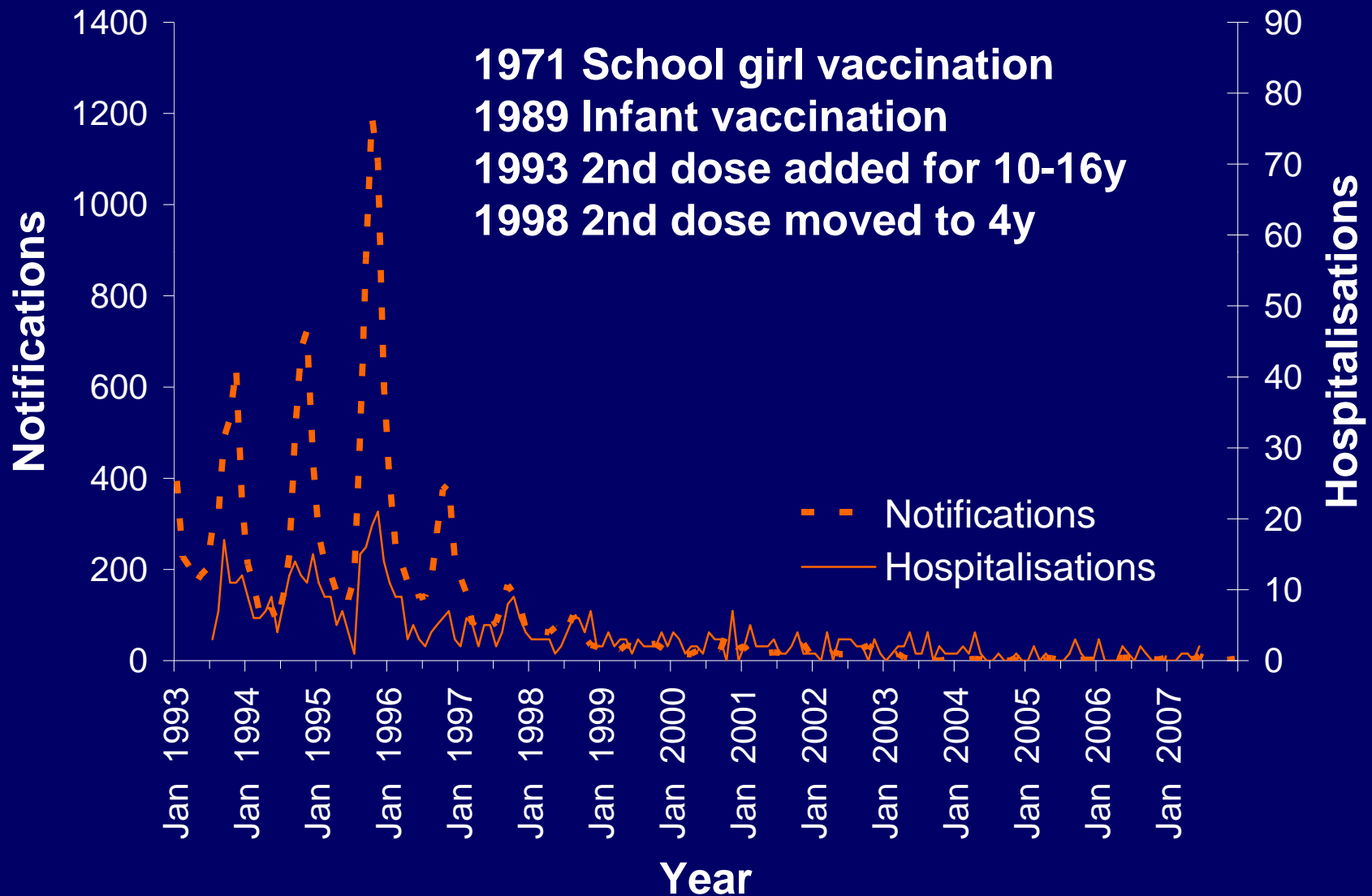
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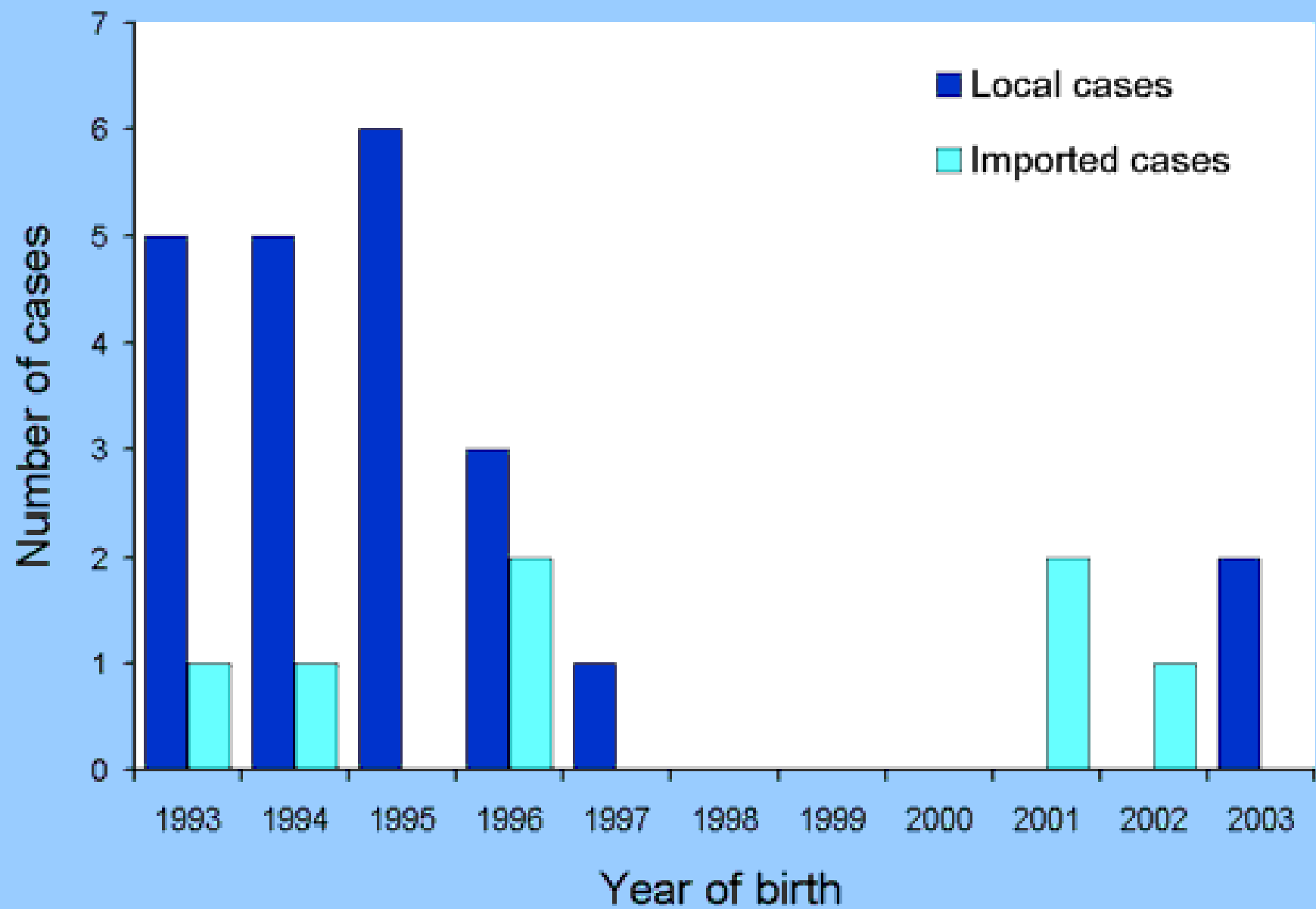
- **Usually mild childhood disease**
- **Infection in pregnancy**
  - fetal death
  - congenital rubella syndrome
- **Pre-vaccination**
  - seasonal (spring) epidemics every 5-9 years
  - USA 1964/5 - 20,000 cases of CRS
  - Australia 120 cases of CRS per yr
- **Vaccination strategies**
  - no vaccination
  - vaccinate women of child-bearing age
  - universal infant vaccination (coverage >80% required)



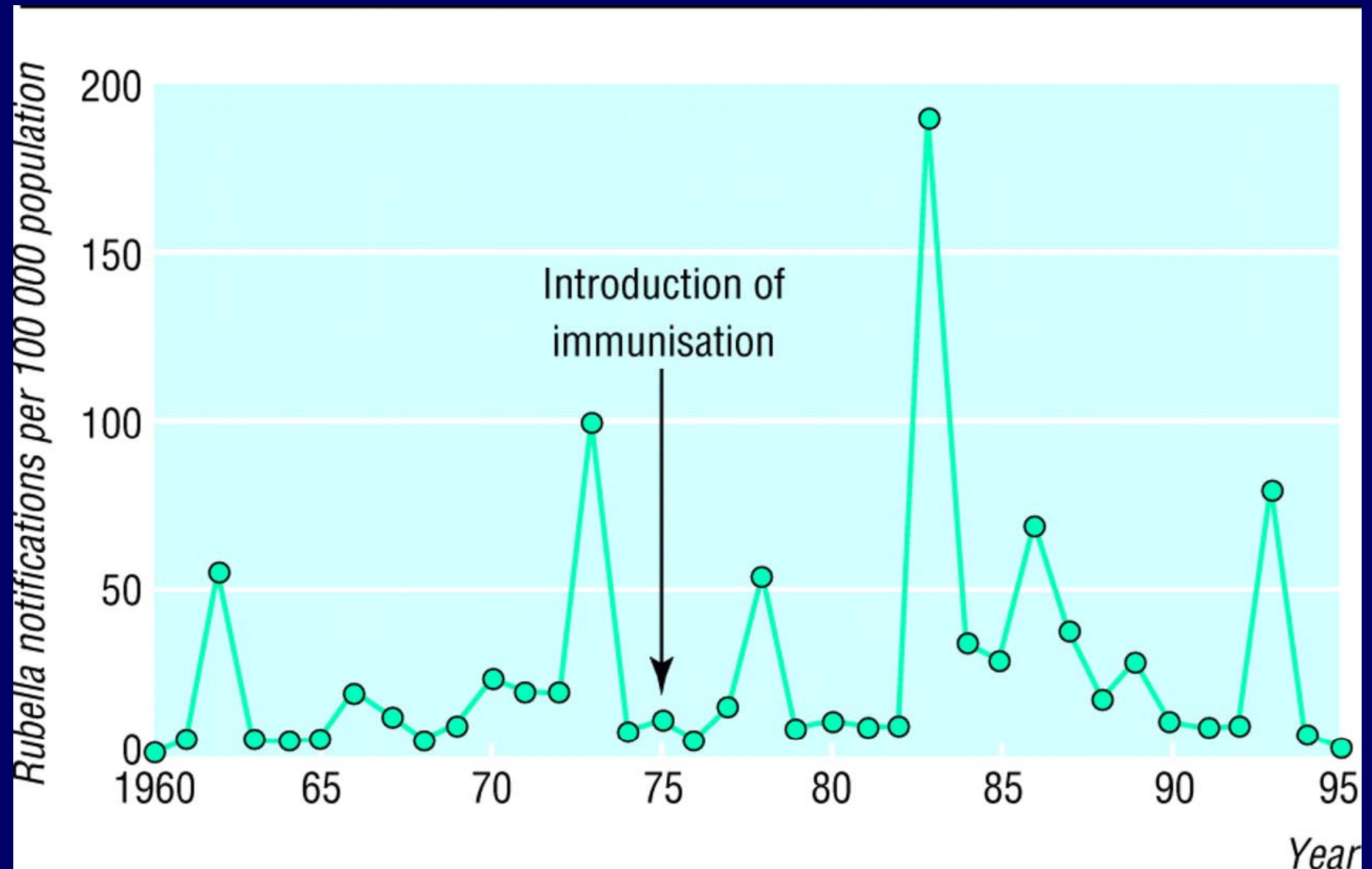


# Rubella in Australia

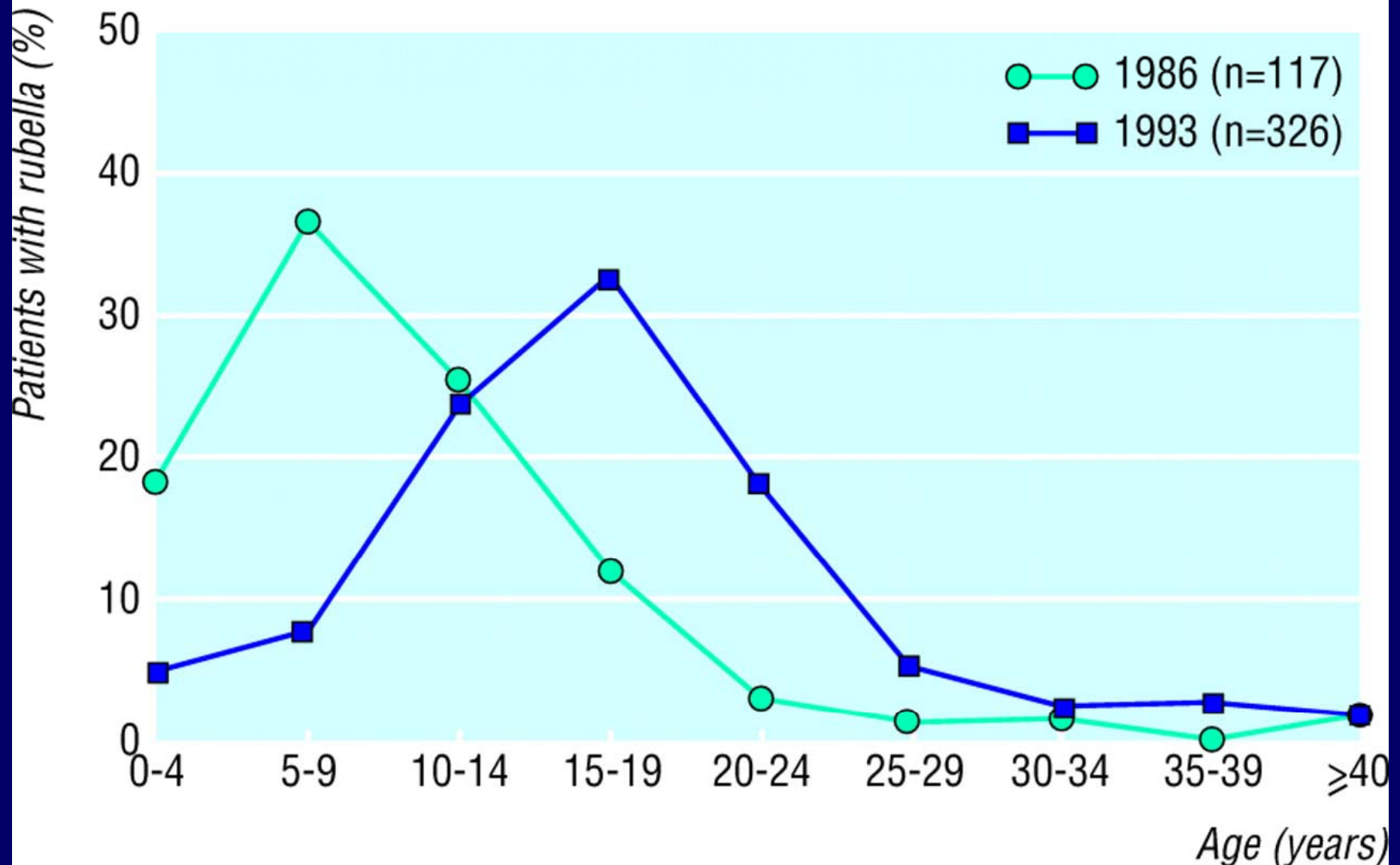




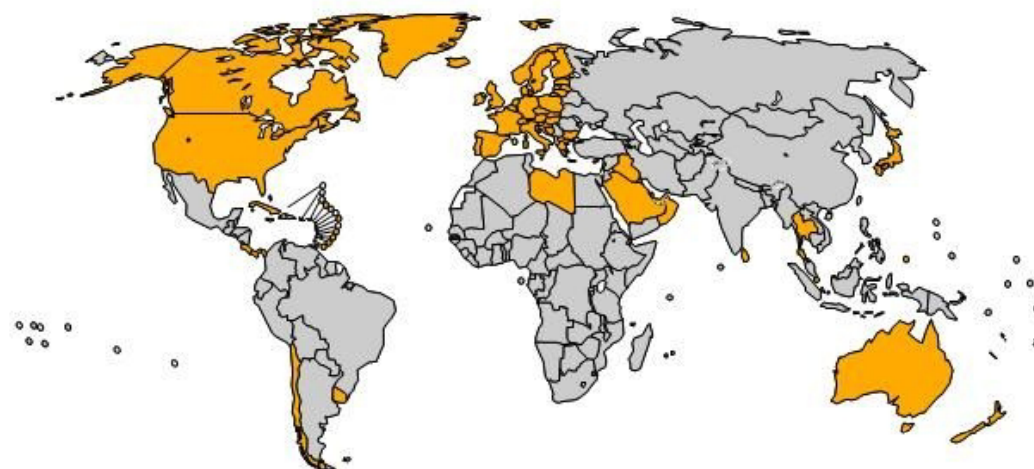
# Rubella epidemic in Greece, 1983



# Incomplete immunisation shifts age of infection to right



## Countries using rubella vaccine in their national immunization system



**1996**

65 countries

12% of birth cohort

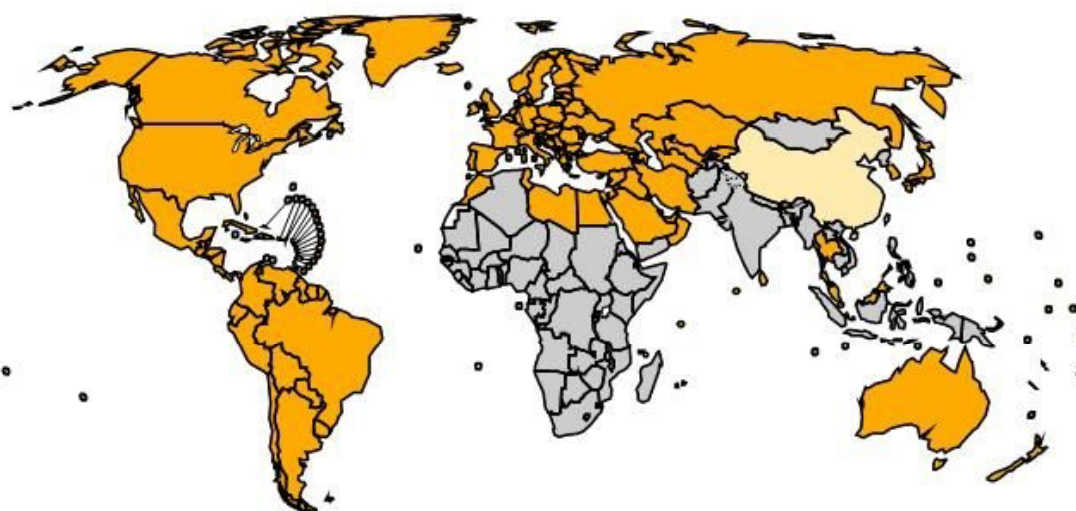
**2007**

125\* countries

31% of birth cohort

(1 country partially introduced)

\*Does not include China



Source: WHO/IVB database, 2007 and the "World Population Prospects: the 2006 Revision", New York, UN

193 WHO Member States. Data as of September 2008

Date of slide: 3 September 2008

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# Susceptibles

- **Women born in countries not using rubella vaccine, e.g. South-East Asia**
- **Women born in Australia and never immunised**
- **Serological screening disasters (very rare)**



# Acknowledgement:

## The epidemiology of vaccine preventable diseases

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Helen Quinn

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**NCIRS**

*National Centre for Immunisation Research and Surveillance*



The University  
of Sydney