

Vaccine Hesitancy Epidemic And Vaccine Preventable Diseases

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- ◆ **Disclosure**

- clinical research grants: Novartis
- speakers bureau: sanofi pasteur

- ◆ **Discussion**

- vaccines not approved by FDA
- “off label” use of FDA approved vaccines

Vaccine Hesitancy: An Emerging Epidemic

- ◆ **Vaccines and public health**
- ◆ **Vaccine safety concerns**
 - overwhelm the immune system
 - thimerosal
 - aluminum
 - autism
- ◆ **Addressing vaccine hesitancy**

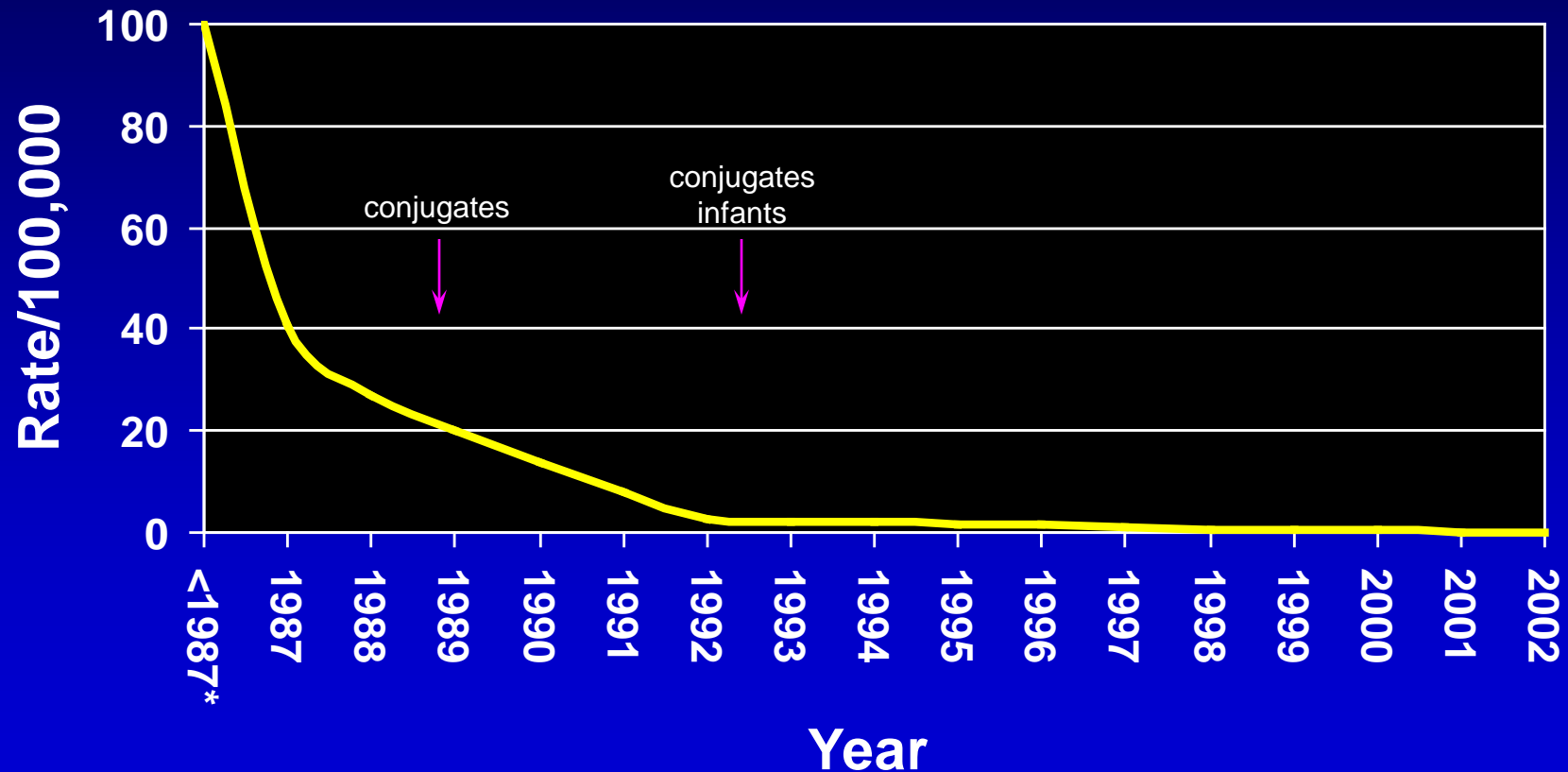
Vaccine-Preventable Diseases: Baseline 20th Century & Current Morbidity

Disease	Number of Cases		% Decrease
	Baseline	2012*	
Smallpox	48,164	0	100.00
Diphtheria	175,885	1	99.99
Measles	503,282	55	99.96
Mumps	152,209	199	99.87
Pertussis	147,271	41,880	71.56
Polio (par.)	16,316	0	100.00
Rubella	47,745	8	99.98
CRS	823	2	99.76
Tetanus	1,314	36	97.26
Hib	20,000	21	99.89

*Provisional
MMWR 1999;48:245, 2013;61

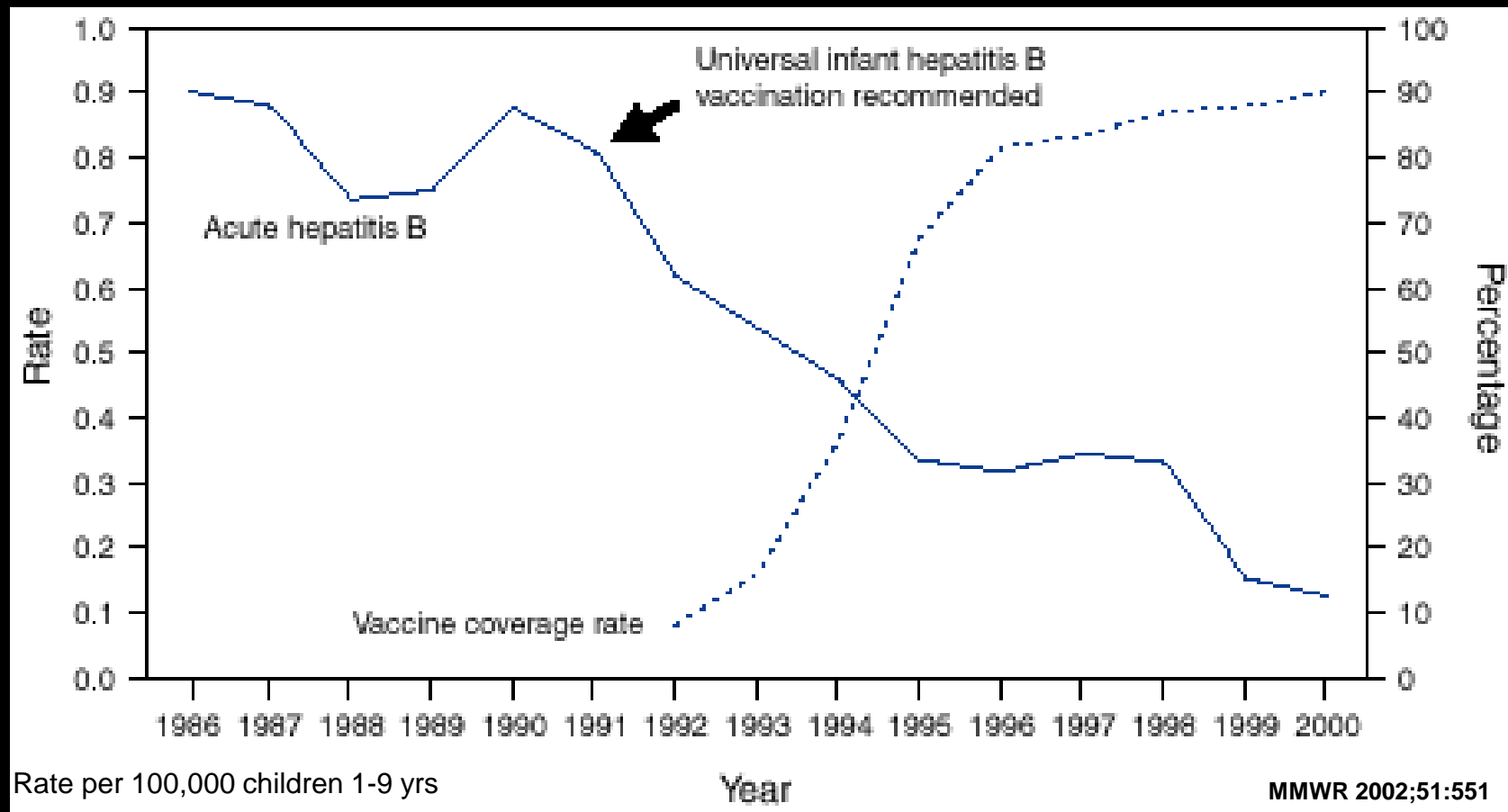
Invasive *H. influenzae* Type B Disease

Incidence, <5 years -- US

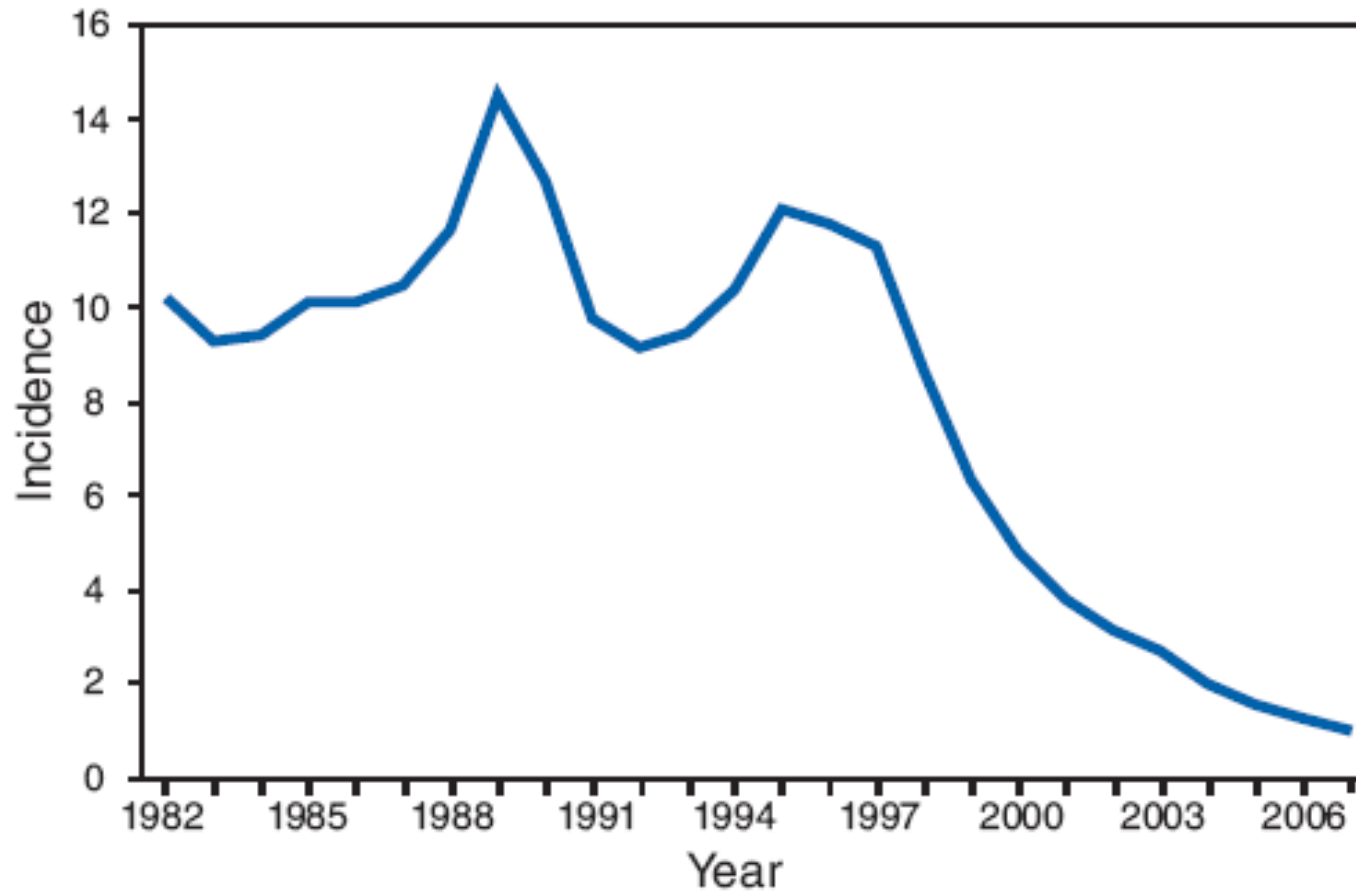


*est.

Acute Hepatitis B Rate (1-9 years, US) and Percentage of Children (19-35 mo) Who Received HBV



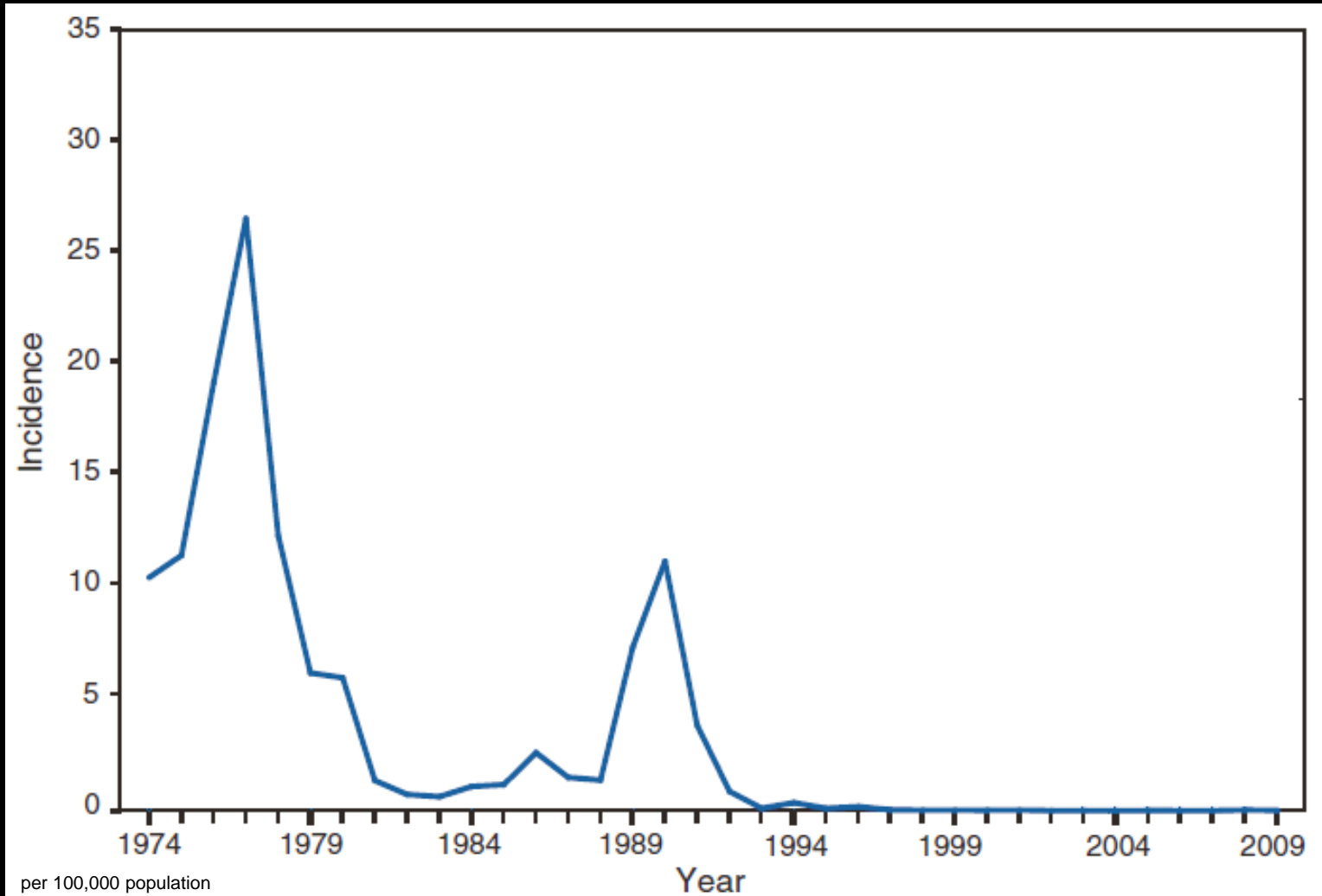
Hepatitis A Incidence, US



* Per 100,000 population.

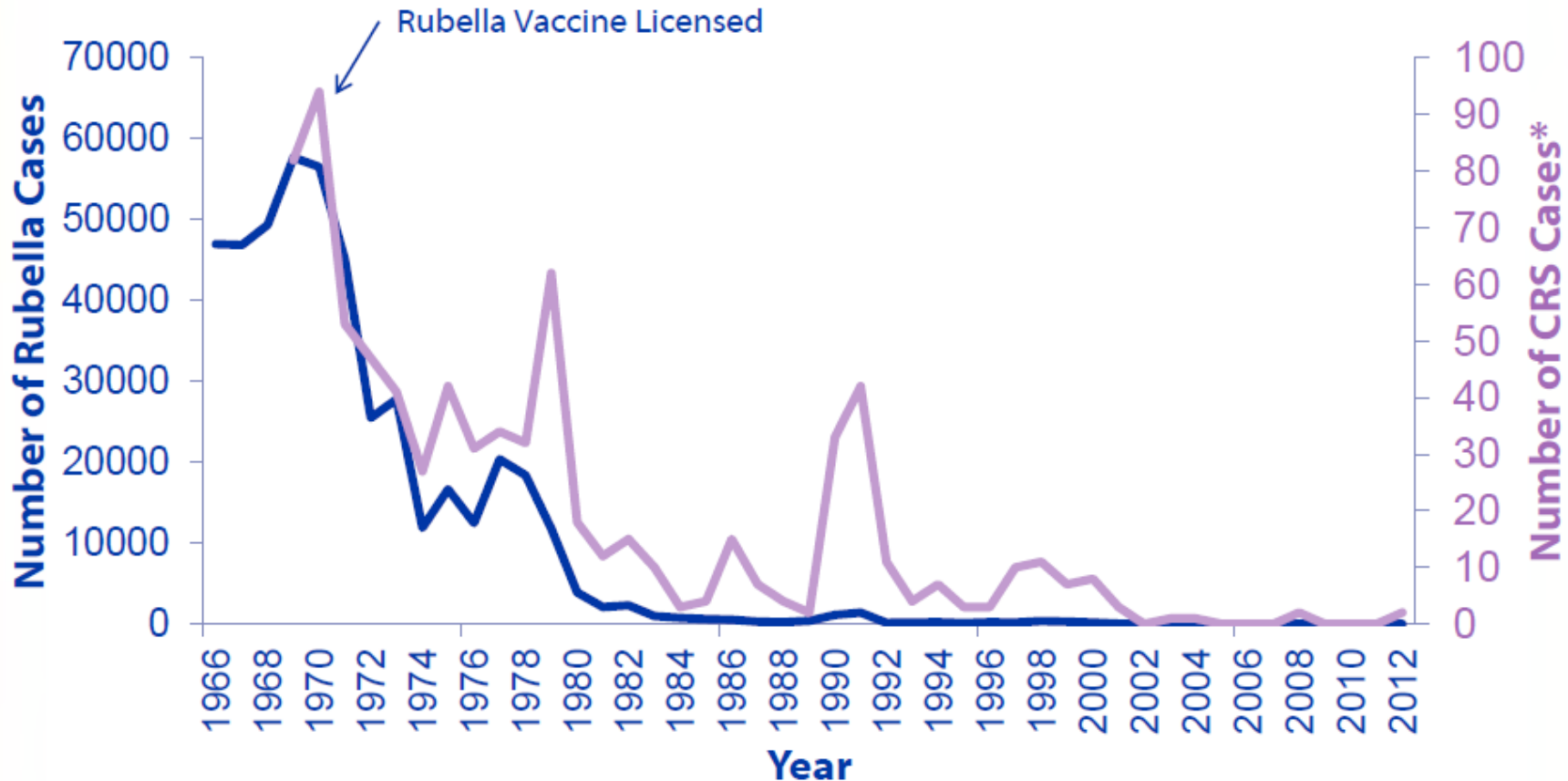
MMWR 2009;58(SS-2):18

Measles Incidence, US



per 100,000 population

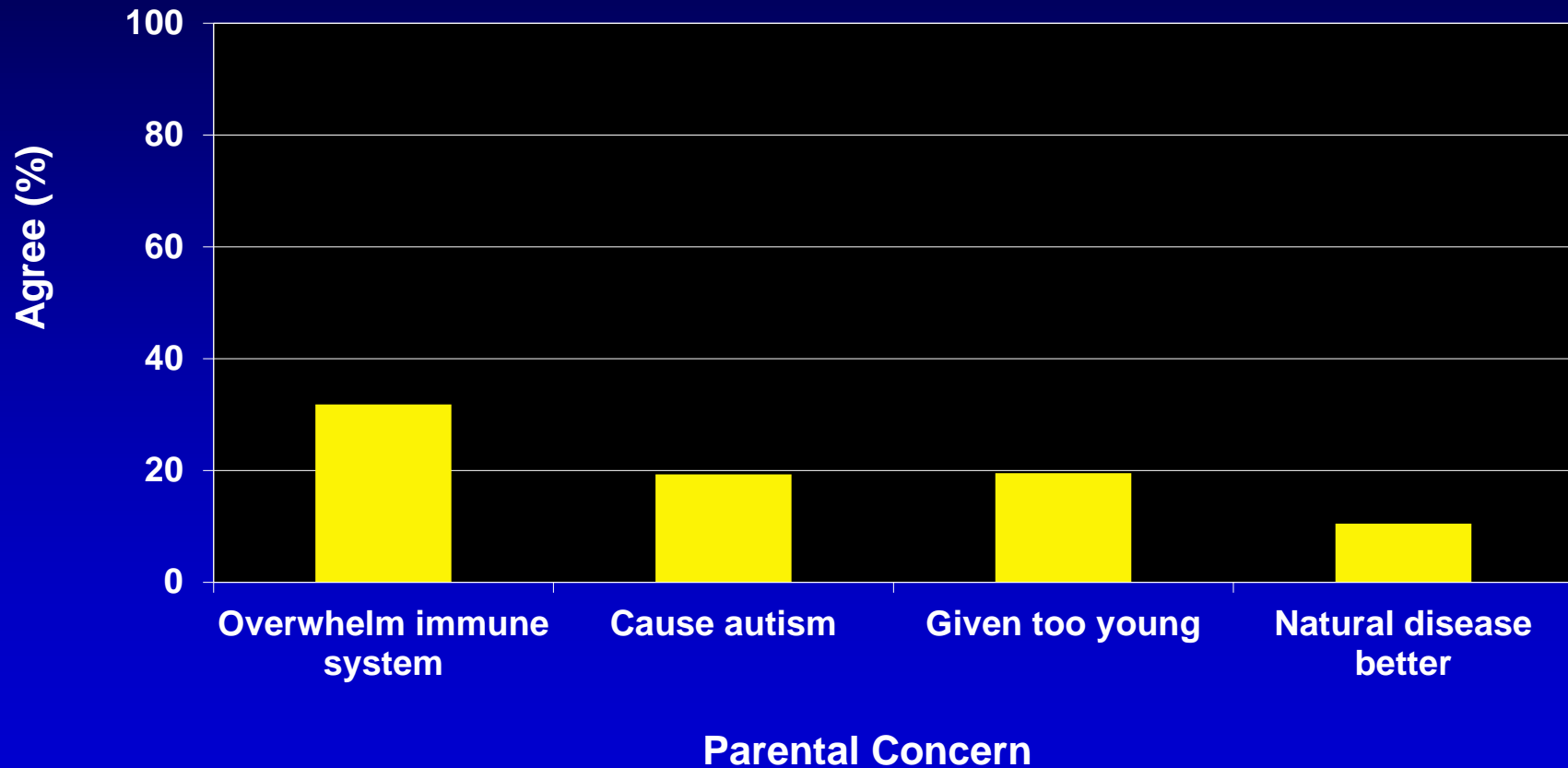
Rubella and CRS, United States, 1966-2012[†]



*By year of birth

[†]Preliminary data as of June 2012

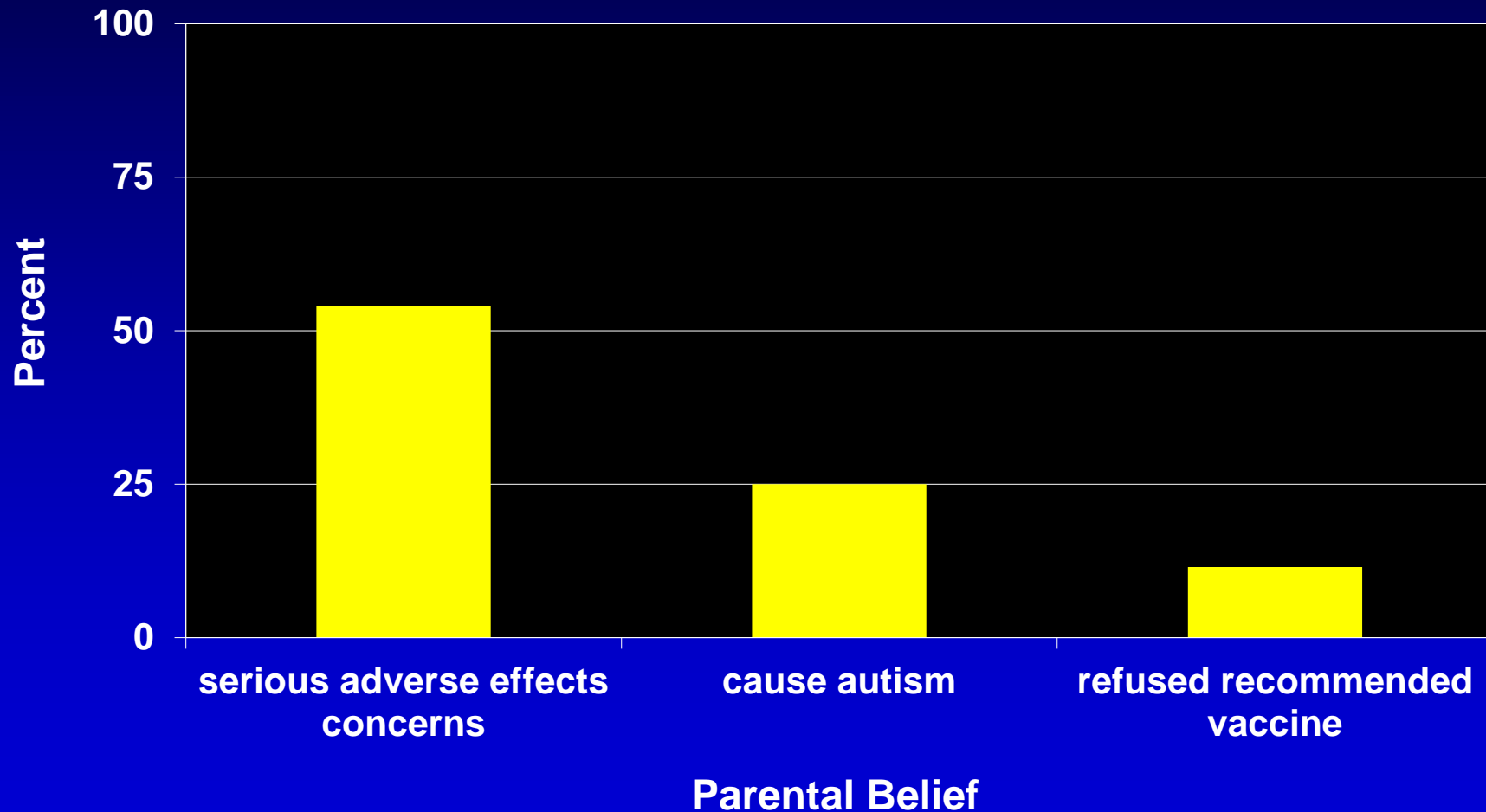
Vaccine Hesitancy: Oregon Survey



Vaccine Adverse Event Myths

- ◆ **No credible scientific evidence that vaccines cause:**
 - autism
 - multiple sclerosis
 - diabetes
 - asthma
 - inflammatory bowel disease
 - SIDS
 - overwhelm immune system

Parental Vaccine Safety Concerns

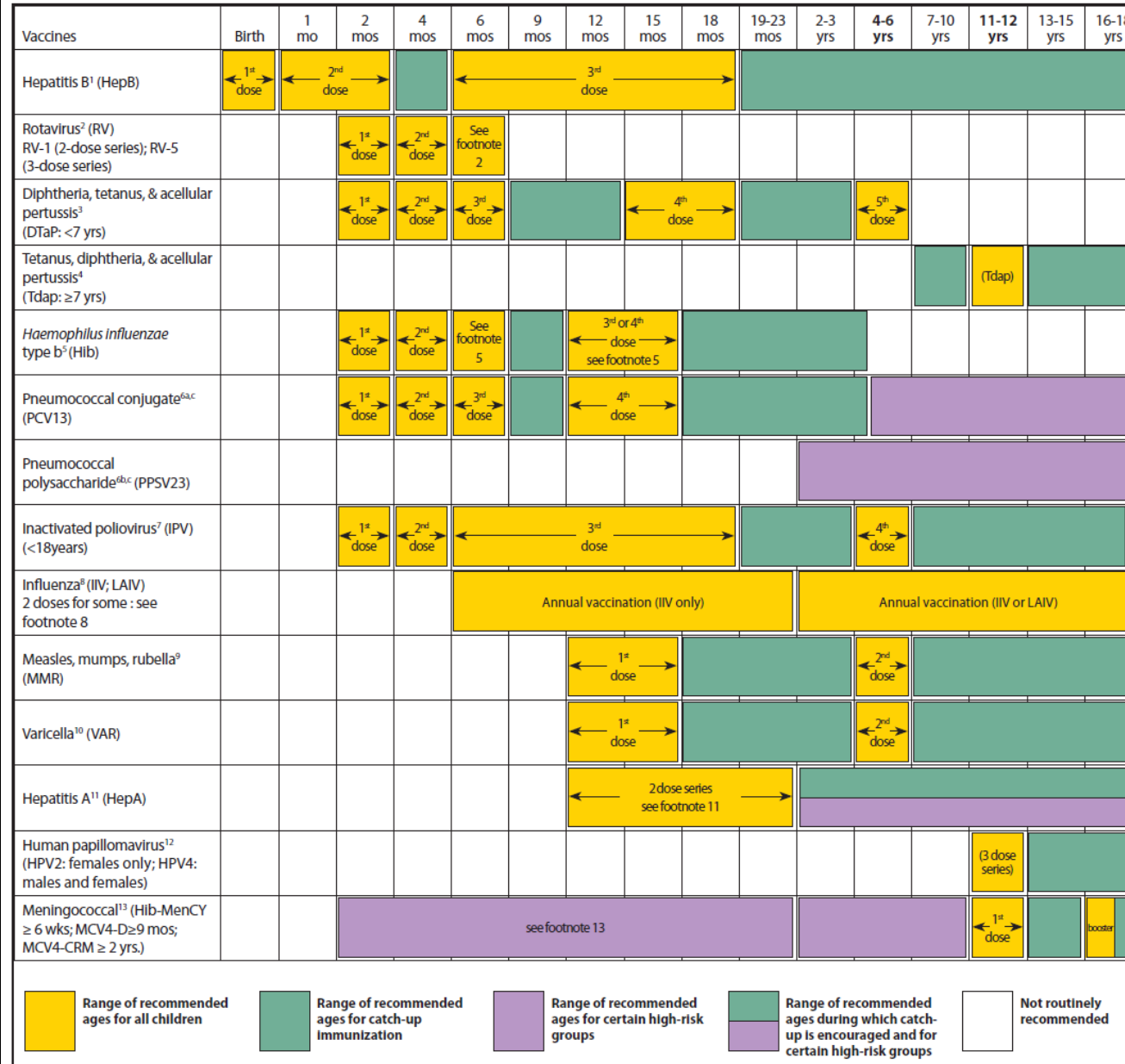


Overwhelm Immune System?

- ◆ **Infant immune system**
 - naïve
 - can respond to thousands of antigens simultaneously
- ◆ **Challenges other than vaccines**
 - natural environmental exposures
 - » strep throat: >50 antigens
 - » otitis media: >2,000 antigens

FIGURE 1. Recommended immunization schedule for persons aged 0 through 18 years —2013 (for those who fall behind or start late, see the catch-up schedule [Figure 2])

These recommendations must be read with the footnotes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the green bars in Figure 1. To determine minimum intervals between doses, see the catch-up schedule (Figure 2). School entry and adolescent vaccine age groups are in bold.



Number of Immunogens in Vaccines

1900		1960		1980		2013	
Vaccine	Immunogens	Vaccine	Immunogens	Vaccine	Immunogens	Vaccine	Immunogens
Smallpox	~200	Smallpox	~200	Diphtheria	1	Diphtheria	1
		Diphtheria	1	Tetanus	1	Tetanus	1
		Tetanus	1	Pert-WC	~3000	Pert-AC	2-5
		Pert-WC	~3000	Polio	15	Polio	15
		Polio	15	Measles	10	Measles	10
				Mumps	9	Mumps	9
				Rubella	5	Rubella	5
						Hib	2
						Varicella	69
						PCV	14
						Hepatitis B	1
						Hepatitis A	1
						MCV	4
						RV	2-7
						HPV	4
						Influenza*	6-114
Total	~200	Total	~3217	Total	~3041	Total	142-258

Thimerosal Concerns: Neurotoxin?

- ◆ **Thimerosal**
 - preservative
 - ethylmercury
- ◆ **Toxicity data**
 - methylmercury
- ◆ **7 well done studies**
 - methods
 - » both retrospective & prospective
 - » ecological & cohort
 - » several 100,000 children
 - results: no association

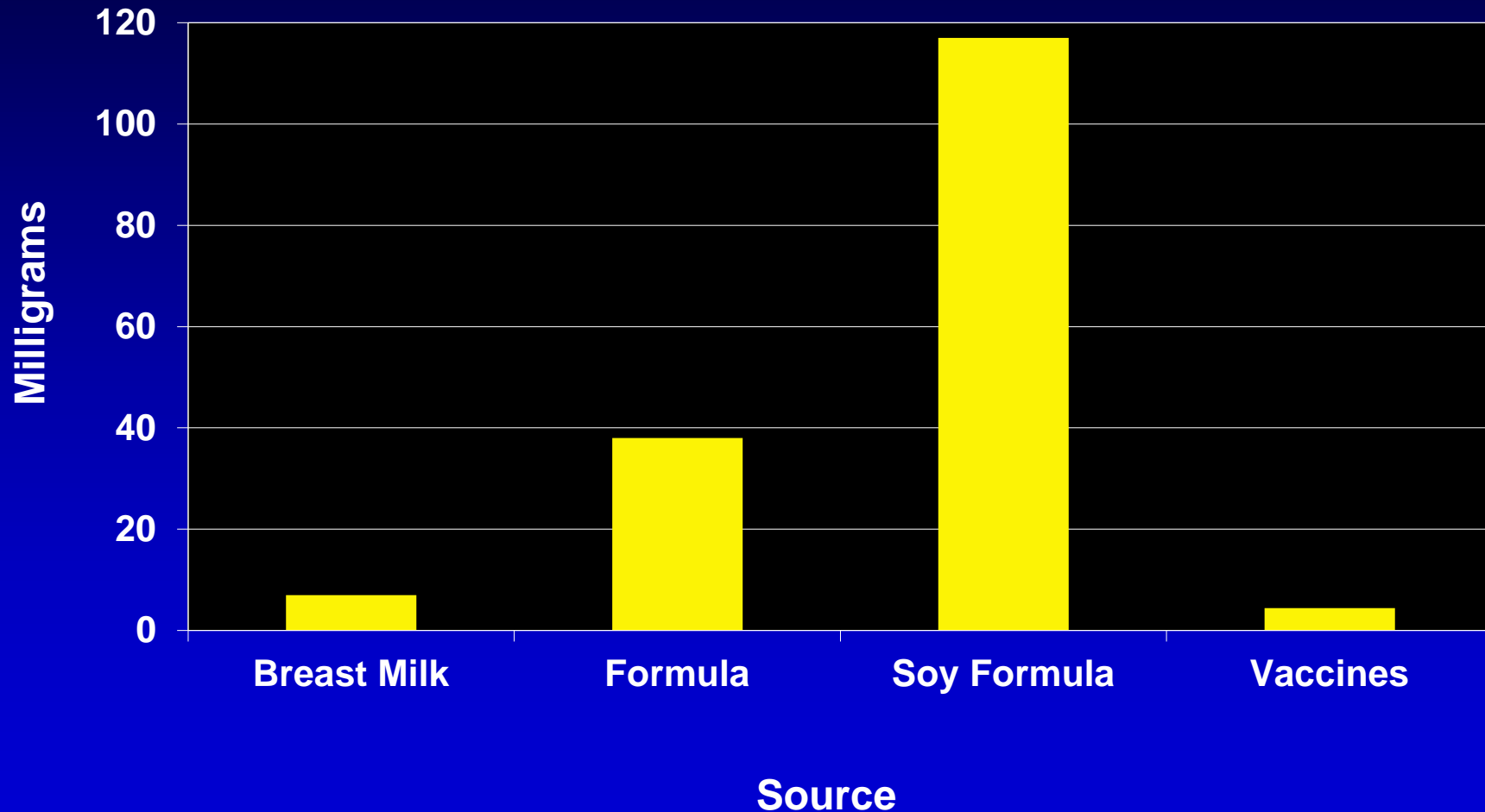
Thimerosal Content: US Vaccines

Vaccine	Trade name	Manufacturer	Thimerosal Concentration
DTaP	Tripedia [®]	Sanofi Pasteur	≤0.00012%
	Infanrix [®]	GlaxoSmithKline	0
	Daptacel [®]	Sanofi Pasteur	0
DTaP-HepB-IPV	Pediarix [®]	GlaxoSmithKline	0
Tdap	Adacel [®]	Sanofi Pasteur	0
	Boostrix [®]	GlaxoSmithKline	0
<i>Haemophilus influenzae</i> type b conjugate (Hib)	ActHIB [®]	Sanofi Pasteur	0
	PedvaxHIB [®]	Merck & Co, Inc	0
Hib/Hepatitis B combo	Comvax [®]	Merck & Co, Inc	0
Hepatitis B	Engerix B [®]	GlaxoSmithKline	0
	Recombivax HB [®]	Merck & Co, Inc	0
Hepatitis A/Hepatitis B	Twinrix [®]	GlaxoSmithKline	<0.0002%
Influenza*	Various	Various	Varies

Aluminum Concerns

- ◆ **Aluminum in vaccines**
 - adjuvant
 - maximum amount 0.85 mg/dose
- ◆ **Aluminum exposure**
 - deodorant
 - food
 - » adults average 7-9 mg/day
 - 200 mg in antacids
 - breast milk
 - » 0.04 mg/L
 - formula
 - » 0.225 mg/L

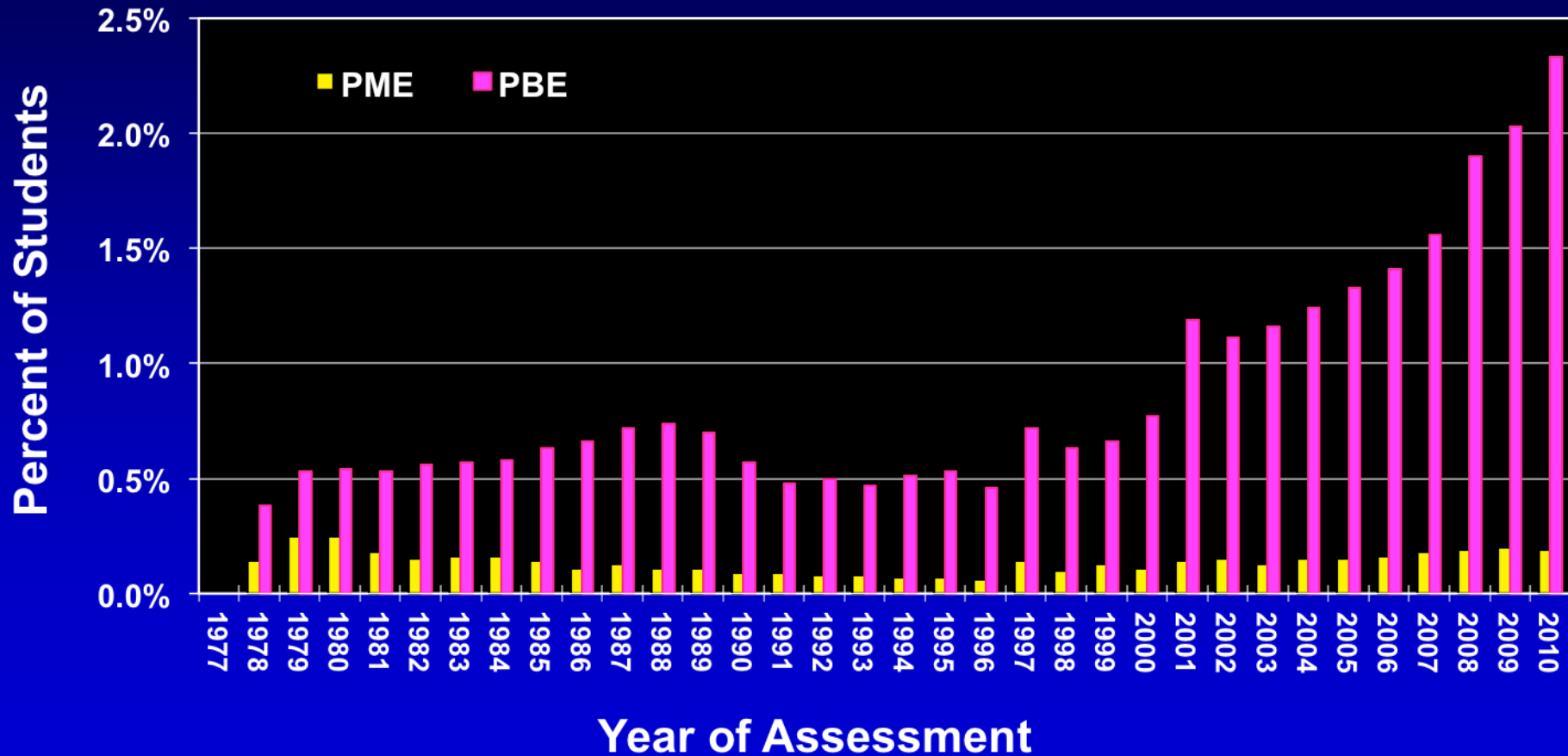
Aluminum Exposure: 1st 6 Months of Life



MMR & Autism

- ◆ **1998: Wakefield Lancet publication**
 - case series
 - » 12 children
- ◆ **Biological plausibility: no**
- ◆ **10 well done studies**
 - methods
 - » both retrospective & prospective
 - » ecological & case control
 - » millions of children
 - results: no association

Permanent Medical Exemptions & Personal Beliefs Exemptions, Kindergarten Students, California





MMWRTM

Morbidity and Mortality Weekly Report
www.cdc.gov/mmwr

Early Release
Vol. 58 / January 23, 2009

Invasive *Haemophilus influenzae* Type B Disease in Five Young Children – Minnesota, 2008

TABLE. Characteristics of five reported cases of invasive *Haemophilus influenzae* type b (Hib) disease* in persons aged <5 years — Minnesota, 2008

Patient	Month of illness onset	Patient age at illness onset	Clinical syndrome [†]	Outcome	Hib vaccination status
1	January	15 mos	Meningitis	Survived	2 doses at 2 and 5 months (PRP-OMP) [§]
2	February	3 yrs	Pneumonia	Survived	0 doses
3	November	7 mos	Meningitis	Died	0 doses
4	November	5 mos	Meningitis	Survived	2 doses at 2 and 4 months (PRP-TT) [¶]
5	December	20 mos	Epiglottitis	Survived	0 doses

ARTICLE

Parental Refusal of Pertussis Vaccination Is Associated With an Increased Risk of Pertussis Infection in Children

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The authors have indicated they have no financial relationships relevant to this article to disclose.

Pediatrics 2009;123:1446–1451

What's Known on This Subject

Ecological studies have shown that exemptions to school immunization requirements are associated with an increased incidence of pertussis. However, these studies did not examine this relationship using individual-level data in a well-defined study population of children.

What This Study Adds

We examined the relationship between parental vaccine refusal and the risk of pertussis infection in children by using medical chart-verified data on vaccination and disease status.

- ◆ **Refused pertussis vaccination**
 - **22.8 times increased risk of pertussis**

ARTICLE

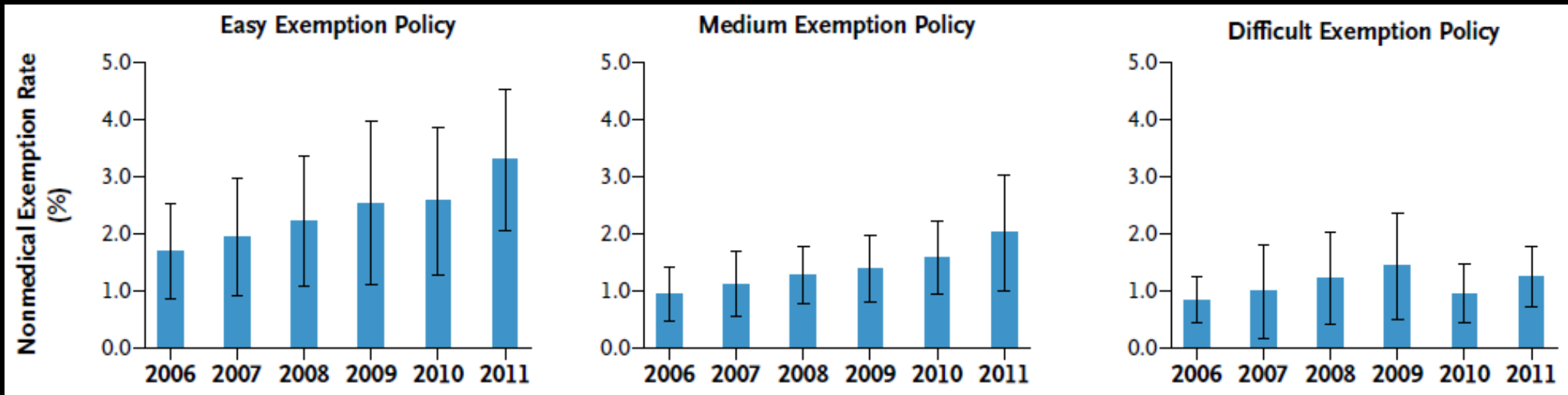
Parental Refusal of Varicella Vaccination and the Associated Risk of Varicella Infection in Children

Jason M. Glanz, PhD; David L. McClure, PhD; David J. Magid, MD, MPH; Matthew F. Daley, MD; Eric K. France, MD, MSPH; Simon J. Hambidge, MD, PhD

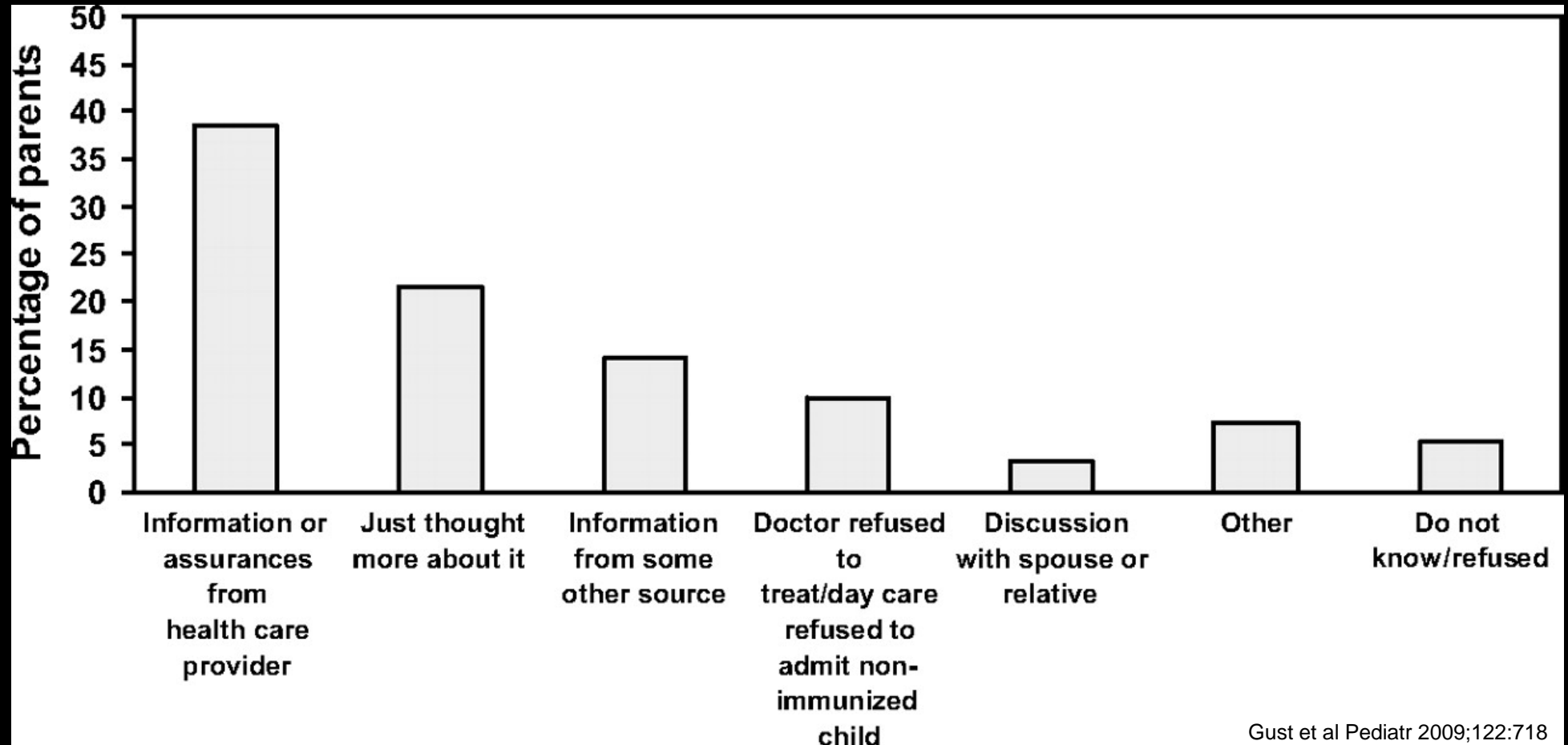
Arch Pediatr Adolesc Med. 2010;164(1):66-70

- ◆ **Refused varicella vaccination**
 - **8.6 times increased risk of varicella**

Vaccination Policies & Rates of Exemption



Why Parents Who Planned To Delay/Refuse Vaccine Changed Their Minds



Parental Immunization Refusal

- ◆ **Listen carefully to concerns**
 - encourage questions
- ◆ **Discuss known risks and benefits**
 - risks to unimmunized child
- ◆ **Concerns about specific vaccines**
 - discuss
 - administer other vaccines
- ◆ **Multiple injection concerns**
 - modify schedule
- ◆ **Revisit discussion in future visits**
- ◆ **Document**

Vaccine Safety Discussion Strategies

- ◆ **Empathize:** acknowledge that there are many conflicting messages in the media
- ◆ **Assess level of scientific evidence desired**
- ◆ **Maximize benefits to their child**
 - not a public health discussion
 - vaccines provide protection
 - risk of disease for omitted vaccines
- ◆ **Provide appropriate resources**
 - e.g., CDC, AAP, NNII, CHOP

Continued Vaccine Refusal

◆ Challenges

- time commitment for discussions

 - » frustration

◆ “Fire” patient from practice/clinic?

- acknowledge differences

 - » “it sounds like you and I have different philosophies”

- offer referral to a different practice/clinic

 - » “you might be more comfortable with this group”

Vaccine Hesitancy: An Emerging Epidemic

- ◆ **Immunization challenges**
 - education of health care providers
 - education of patients and parents
 - discussion