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1970-1979

# Immunization Hesitancy: A Rising Tide



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# A Syllogism

- **All successful public health programs ultimately rely on a broad societal consensus for support**
- **The societal consensus supporting US childhood immunization programs is beginning to erode**
- **A public dialogue about values that underlie immunization programs is needed to sustain and strengthen the consensus required to derive the full potential of modern vaccinology to protect the public health**

# Acknowledgement

**I am indebted to these bioethicists for their generous teaching and collaboration:**

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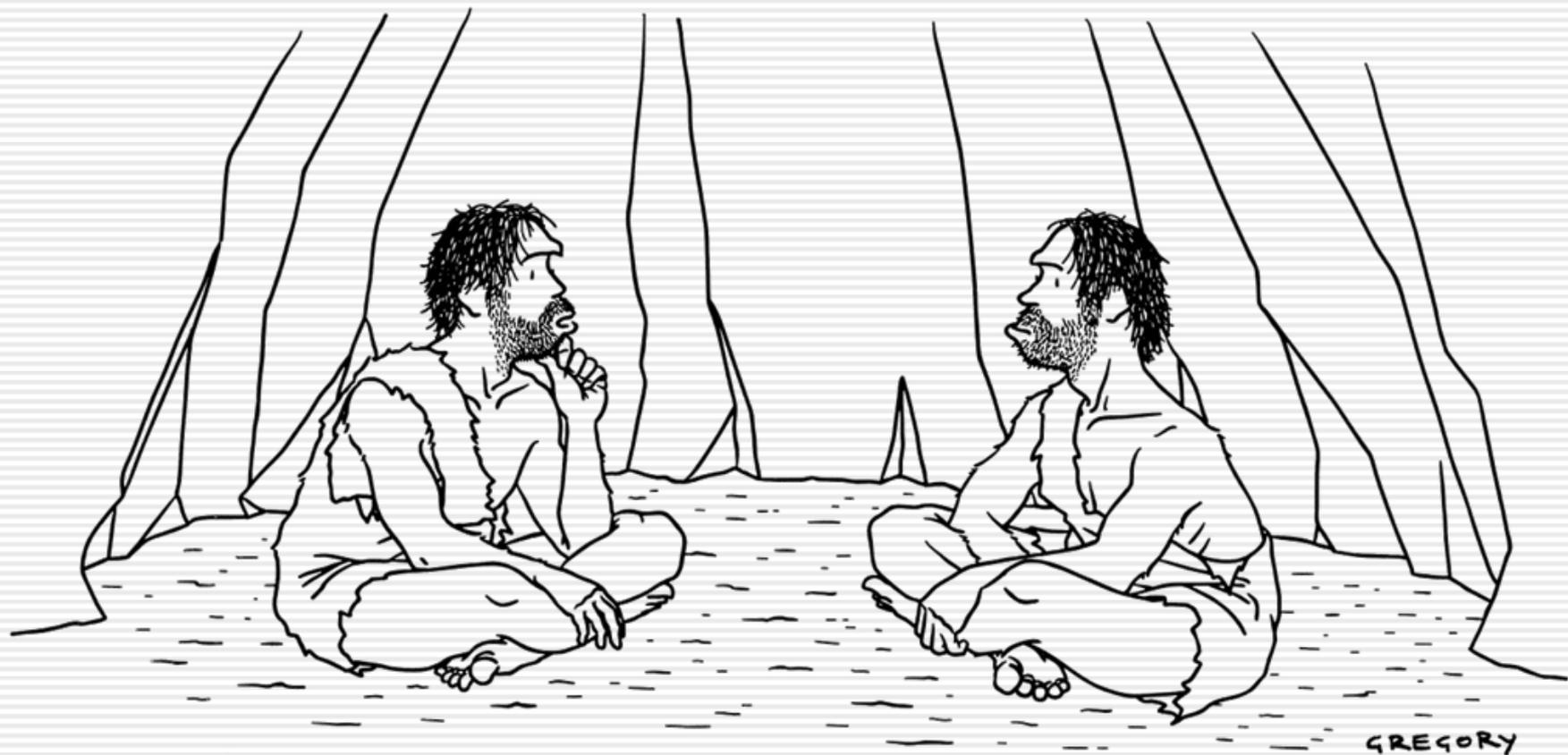
# Disclosures

**In the past 12 months I have had no relevant financial relationships with the manufacturers of any commercial products or providers of any services discussed in this CME activity.**

**I do not intend to discuss an unapproved or investigative use of a commercial product or device in my presentation.**

**I am not a bioethicist**





*“Something’s just not right—our air is clean, our water is pure, we all get plenty of exercise, everything we eat is organic and free-range, and yet nobody lives past thirty.”*

# Vaccine-Preventable Diseases:

## 20th Century Annual Morbidity Compared to Current Morbidity

Disease	20 <sup>th</sup> Century Annual Morbidity†	2007 Reported Cases††	Percent Decrease
Smallpox	29,005	0	100%
Diphtheria	21,053	0	100%
Measles	530,217	43	>99%
Mumps	162,344	800	>99%
Pertussis	200,752	10,454	95%
Polio (Paralytic)	16,316	0	100%
Rubella	47,745	12	>99%
Congenital Rubella Syndrome	152	0	100%
Tetanus	580	28	95%
<i>Haemophilus influenzae</i>	20,000	202*	99%

†Source: JAMA. 2007;298(18):2155-2163

†† Source: CDC. MMWR August 22, 2008/57(33);901,903-913. (Final data)

\* 22 type b and 180 unknown (< 5 years of age)

# Recommended Childhood Vaccines

	1988	1991	1994	1997	2000	2009
<b>DTP / DTaP</b>	✓	✓	✓	✓	✓	✓
<b>Polio</b>	✓	✓	✓	✓	✓	✓
<b>MMR</b>	✓	✓	✓	✓	✓	✓
<b>Hib</b>		✓	✓	✓	✓	✓
<b>Hepatitis B</b>			✓	✓	✓	✓
<b>Varicella</b>				✓	✓	✓
<b>Pneumococcal (PCV 7)</b>					✓	✓
<b>Meningococcal (MCV 4)</b>						✓
<b>Influenza</b>						✓
<b>Hepatitis A</b>						✓
<b>Rotavirus</b>						✓
<b>Human Papilloma Virus (HPV)</b>						✓

# A Rising Tide of Immunization Hesitancy

**2000**

- **19% of parents do not think vaccines are proven safe**

**2004**

- **92% of pediatricians report parental vaccine refusal**

**2008**

- **~20% of parents now defer or refuse some vaccines**

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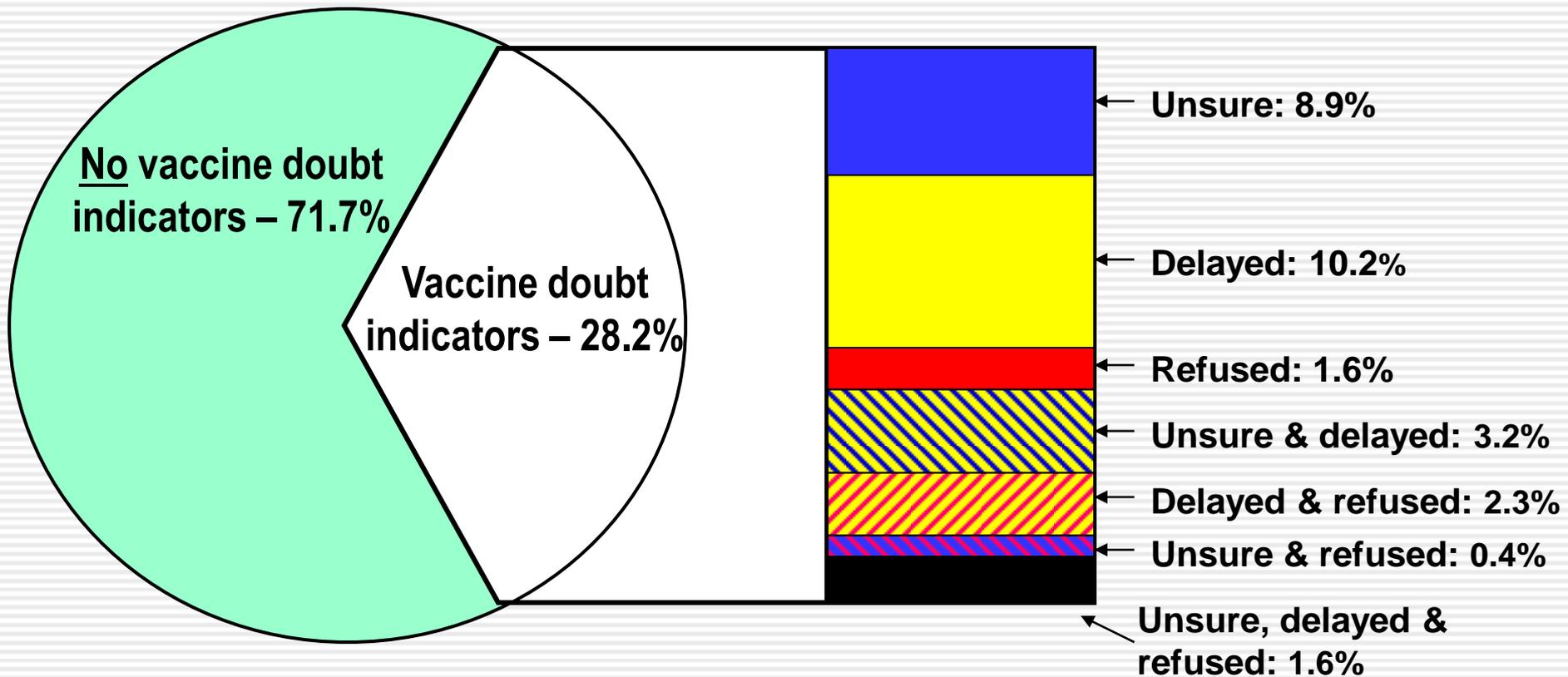
Gellin BG et al *Pediatrics* 2000;106(5):1097-1102

Freed GL et al. *Am J Prev Med* 2004;26(1):11-14

Salmon DA et al. *Arch Pediatr Adolesc Med* 2005;159: 470-476

Gust DA et al. *Pediatrics* 2008;122:718-725

# Proportions of parents who reported vaccine doubt indicators



# Parents Who Refuse Vaccines

**Compared to parents who immunize their children, parents who refuse vaccines are, in general:**

- **Older, better educated, non-Hispanic white**
- **Concerns about vaccine safety**
  - Cause harm **69%**
  - Overload immune systems **49%**
- **Child not at risk for disease** **37%**
- **Disease not dangerous** **21%**

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Salmon DA et al. *Arch Pediatr Adolesc Med* 2005;159:470-476

Bardenheier B et al. *Arch Pediatr Adolesc Med* 2004;158:569-575

Gust DA et al. *Pediatrics* 2008;122:718-725



# Parental Concerns circa 2009

- **Drugs**
- **Anabolic steroids**
- **Alcohol**
- **Bullying**
  - Cyber bullying
- **Child & sexual abuse**
- **School anxieties**
- **Exposure to violence & sex**
  - Media & Internet
- **Sexuality issues**
  - ‘sexting’; stereotyping
- **Gangs**
- **Obesity**
- **Environmental hazards**
  - Mercury
  - Lead
  - Phthalates & Bisphenol A
  - Hormones in meat, milk
  - Pesticides
  - Contaminated foods
  - High fructose corn syrup
  - 2nd hand smoke
  - Excess sun exposure

# Origins of Immunization Hesitancy I

## Social & Cultural

- **Decline in vaccine-preventable diseases**
- **Recognition of the limits of medicine & technology**
- **Resurgence of complementary medicine**
- **Growth of consumerism**
- **Failures of US health care system**
- **Growth of the vaccine injury compensation fund:  
as of 1/09 almost \$3 billion**

# Origins of Immunization Hesitancy II

## Science, Media & the Internet

- **Distortion of scientific process:**
  - Science: hypothesis - test - accept or reject - refine
  - Media: hypothesis “validated” by repetition
- **Differing criteria for causality:**
  - Medical; legal; public opinion
- **Challenge of risk communication:**
  - Power of case reports vs. science
- **21st century access to media, Internet:**
  - Controversy sells
  - Source credibility, media concept of balance

# From the Scientific American, April 2005

**Good journalism values balance above all else. We owe it to our readers to present everybody's ideas equally....**

**...[I]f politicians or special-interest groups say things that seem untrue or misleading, our duty as journalists is to quote them without comment or contradiction. To do otherwise would be elitist and therefore wrong....**

# News Value of Controversy

**The media regard balance as evidence of journalistic integrity; equate one expert with another; value controversy over search for truth.**

**Andrew Wakefield**

**Jenny McCarthy**

**Robert Sears**

**NVIC**

**David Salisbury**

**Ann Schuchat**

**Larry Pickering**

**NNii**

***Communication trumps science because most parents have no clear idea how to evaluate the credibility of their source of immunization information!***

# History of School Immunization Laws

- 1804 – Massachusetts passed laws requiring populations be vaccinated against smallpox
- 1855 – Massachusetts passed first compulsory school immunization law
- 1905 – US Supreme Court upheld compulsory population vaccination – Jacobson vs. Massachusetts**
- 1922 – US Supreme Court upheld constitutionality of school immunization requirements

# 1905 – Jacobson vs. Massachusetts

## **Plaintiff Jacobson:**

**Right of every free man to care for his own body and health in such a way as to him seems best**

## **Justice Harlan:**

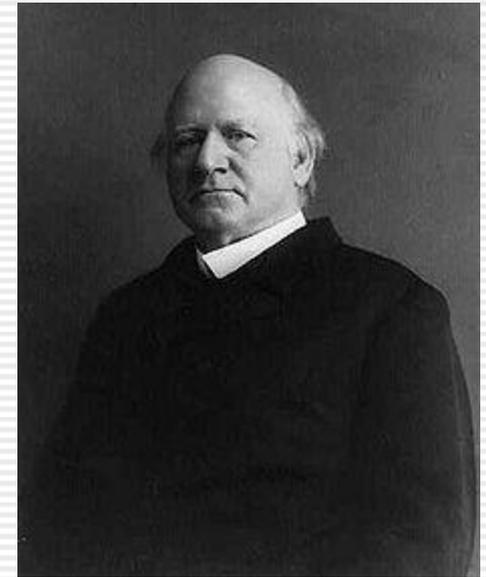
**No absolute right to be wholly freed from constraint.  
Organized society could not exist without manifold restraints**

# 1905 – Jacobson vs. Massachusetts

## Justice Harlan:

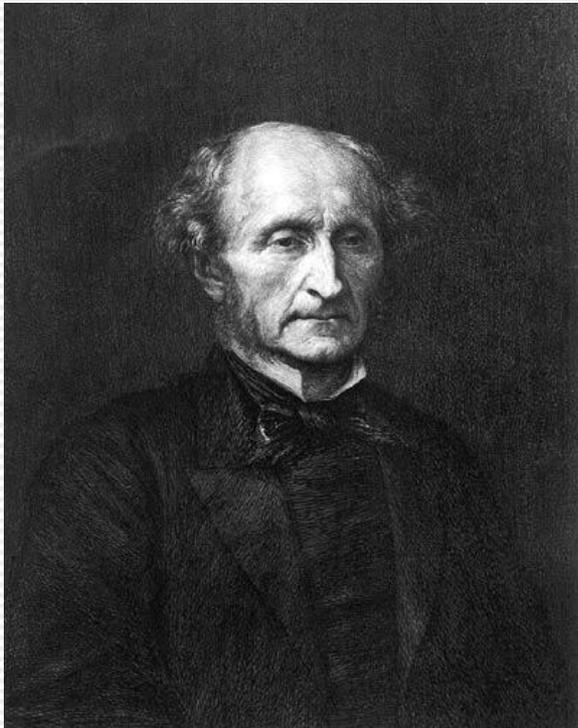
Limits based on “the necessity of the case”; not exceed what is reasonably required for the safety of the public

Compulsory measures should not pose a health risk to the subject; must not be arbitrary and oppressive



# The Harm Principle

**John Stuart Mill, *On Liberty***



**The only purpose for which power can rightfully be exercised over any member of a civilized community, against his will, is to prevent harm to others**

**His own good, either physical or moral, is not a sufficient warrant**

# When is it justifiable to restrict individual freedom?

- **When action (or inaction) places another individual at substantial risk of serious harm**
- **To protect helpless individuals from a significant threat of harm**
- **The restriction of freedom must be effective in preventing that harm**
- **No less restrictive alternative exists that would be equally effective at preventing the harm**

# What constitutes a threat to the public health or public harm?

- **Contagion or epidemic**
  - Smallpox, Tuberculosis, Polio, Diphtheria, Measles
- **Illness, injury, disability, death**
  - Haemophilus, Pneumococcal & Meningococcal Disease, Hepatitis A, Hepatitis B, Varicella
- **Adverse effect on children**
  - Car seats, Booster seats
- **Cost of care, disability**
  - Motorcycle helmets, Rotavirus

# What level of vaccine safety is required?

**What disease risk balanced by what assurance of vaccine safety and efficacy justifies a universal immunization recommendation or mandate?**

- **Safety is relative, not absolute**
- **Can reject, but not prove, the null hypothesis:**
  - Cannot prove there is no association between a vaccine and an adverse event
  - Can conclude only there is no evidence of an association

# Rotashield® Vaccine – withdrawn from market in 2000

## With vaccine:

1,000,000 were vaccinated

100 got sick

1 died

## Without vaccine:

1,000,000 won't be vaccinated

16,000 will get sick

10 will die

*If one is culpable for vaccine-related deaths, then one is also culpable for deaths caused by withholding vaccine*

# Balance of Benefits & Burdens

- **What should be the balance between:**
  - **the state's duty to protect the public health**  
*and*
  - **an individual's right of free choice?**

# Enforcing School Laws by Exclusion

## **Measles in LA – 1977**

**2 deaths, 3 encephalitis, numerous pneumonia cases and hospitalizations**

**March 31, 1977**

**Order to exclude children without proof of immunization by May 2, 1977**

**May 2, 1977**

**~50,000 / 1.4 million without proof of immunity excluded**

**Most back with proof within days**

# Measles in 6 States Strictly Enforcing School Laws vs. Other States, 1978

	Measles Incidence per 100,000 <18 yrs	
	1977	1978*
<b>6 Enforcing States</b>	<b>40.6</b>	<b>2.7</b>
<b>Other States</b>	<b>90.3</b>	<b>35.2</b>

\*1<sup>st</sup> 31 weeks

# Impact of Exemptions on Disease Transmission

- Colorado**      Exemptors 22.2 times more likely to acquire measles <sup>+</sup>  
5.9 times more likely to acquire pertussis <sup>+</sup>  
At least 11% of vaccinated children acquired measles from contact with an exemptor <sup>+</sup>
- National**      Exemptors 35 times more likely to acquire measles <sup>++</sup>

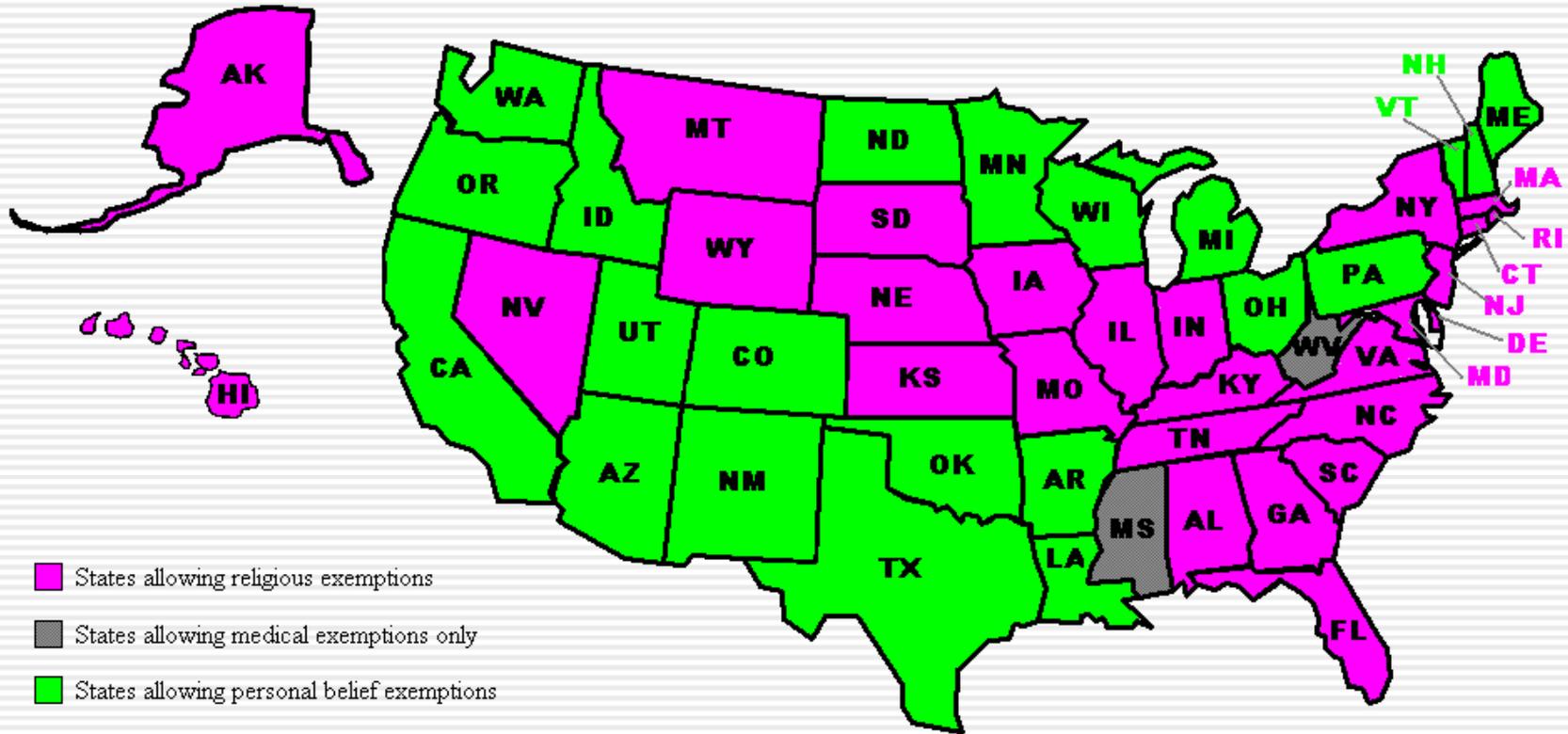
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Adapted from Orenstein, 2005

<sup>+</sup> Felkin DR et al. *JAMA* 2000;284:3145-3150

<sup>++</sup> Salmon DA et al. *AMA* 1999;282:47-53

# Types of Exemptions: Medical, Religious, Personal Belief

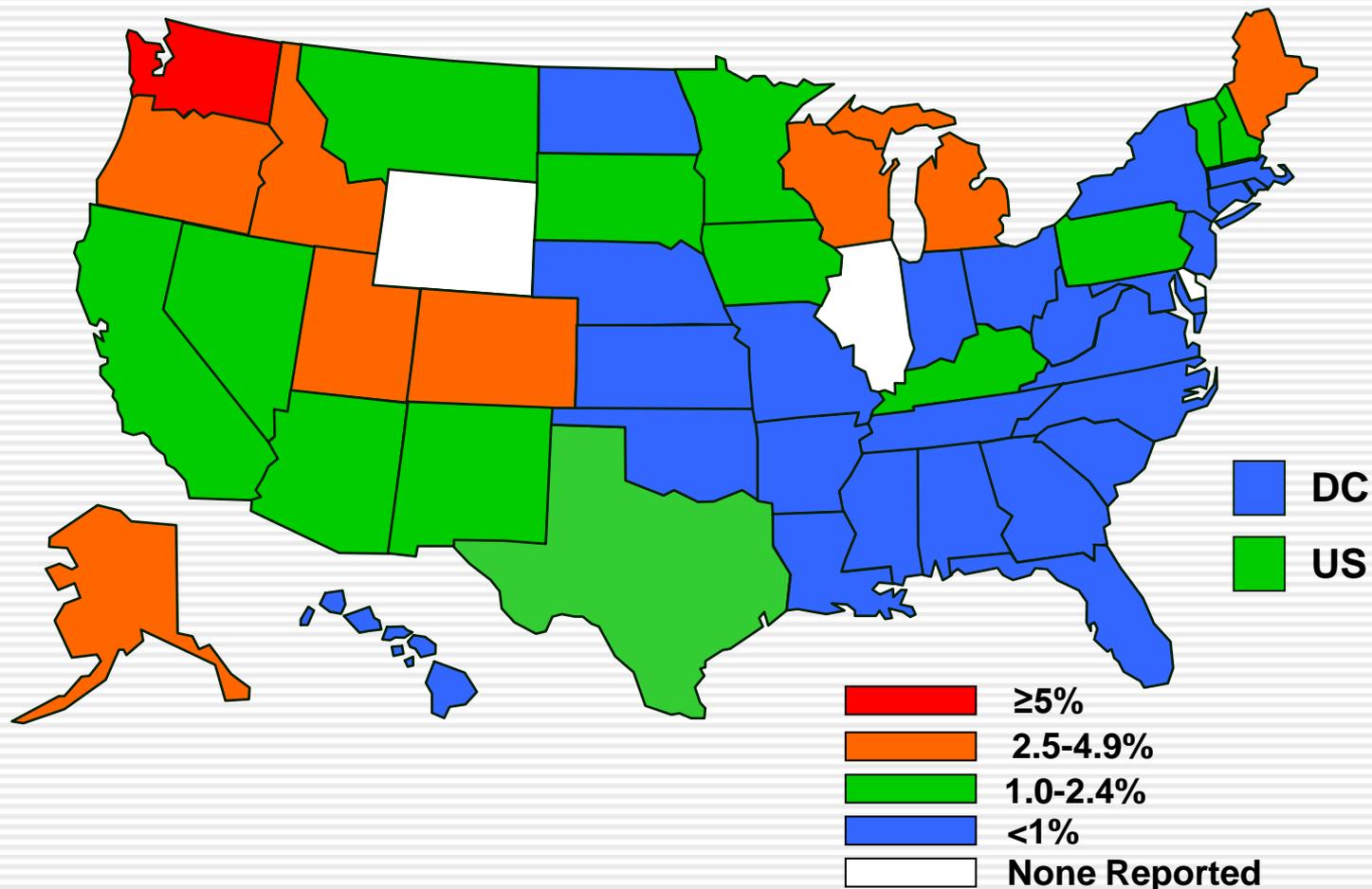


<sup>a</sup>Arizona offers a personal belief exemption for school but not daycare

<sup>b</sup> Personal belief exemptions include religious, philosophical and any other unspecified non-medical exemption

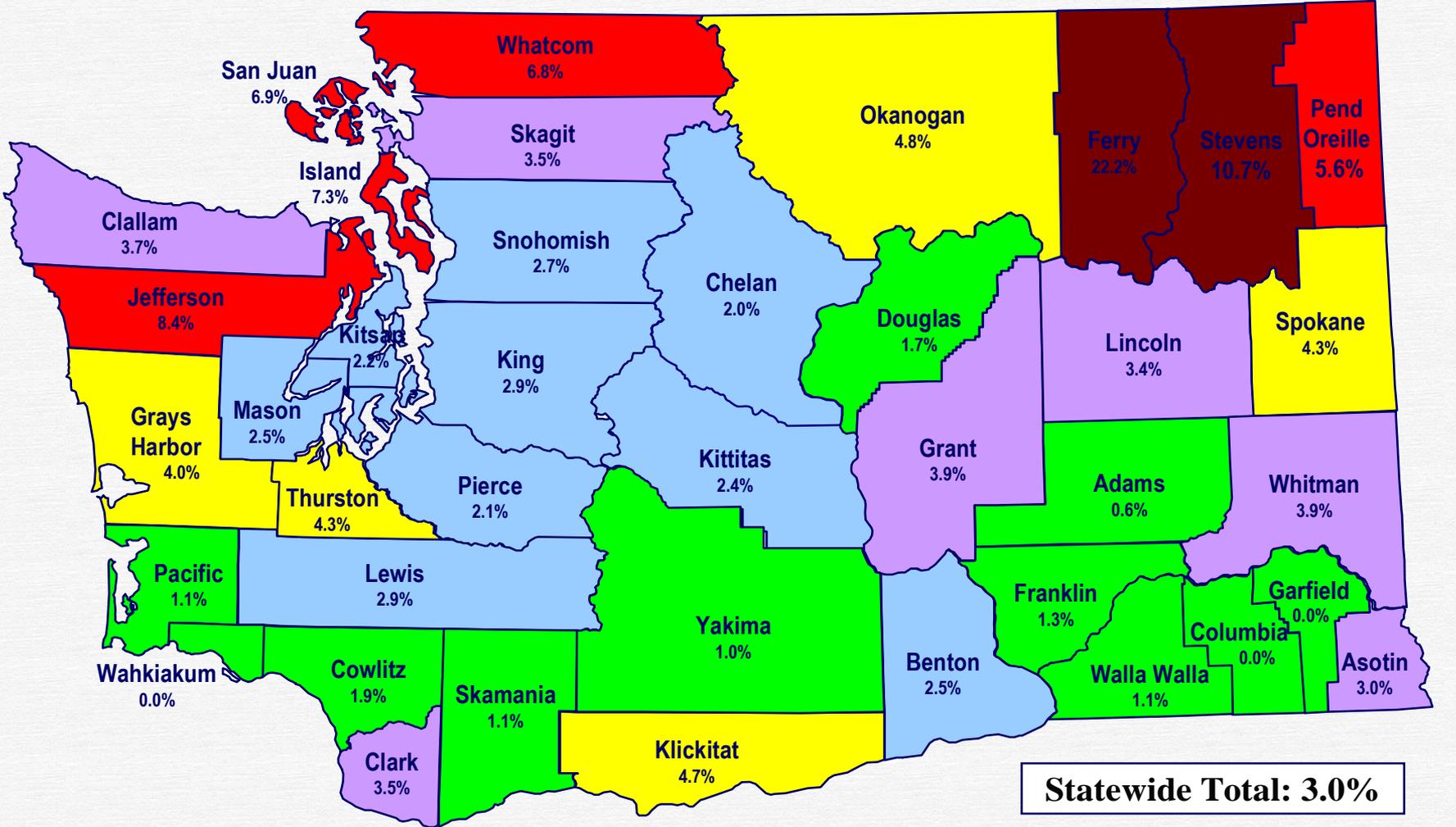
Source: Institute for Vaccine Safety <http://www.vaccinesafety.edu/cc-exem.htm>

# US Immunization Exemptions 2005-2006 School Year

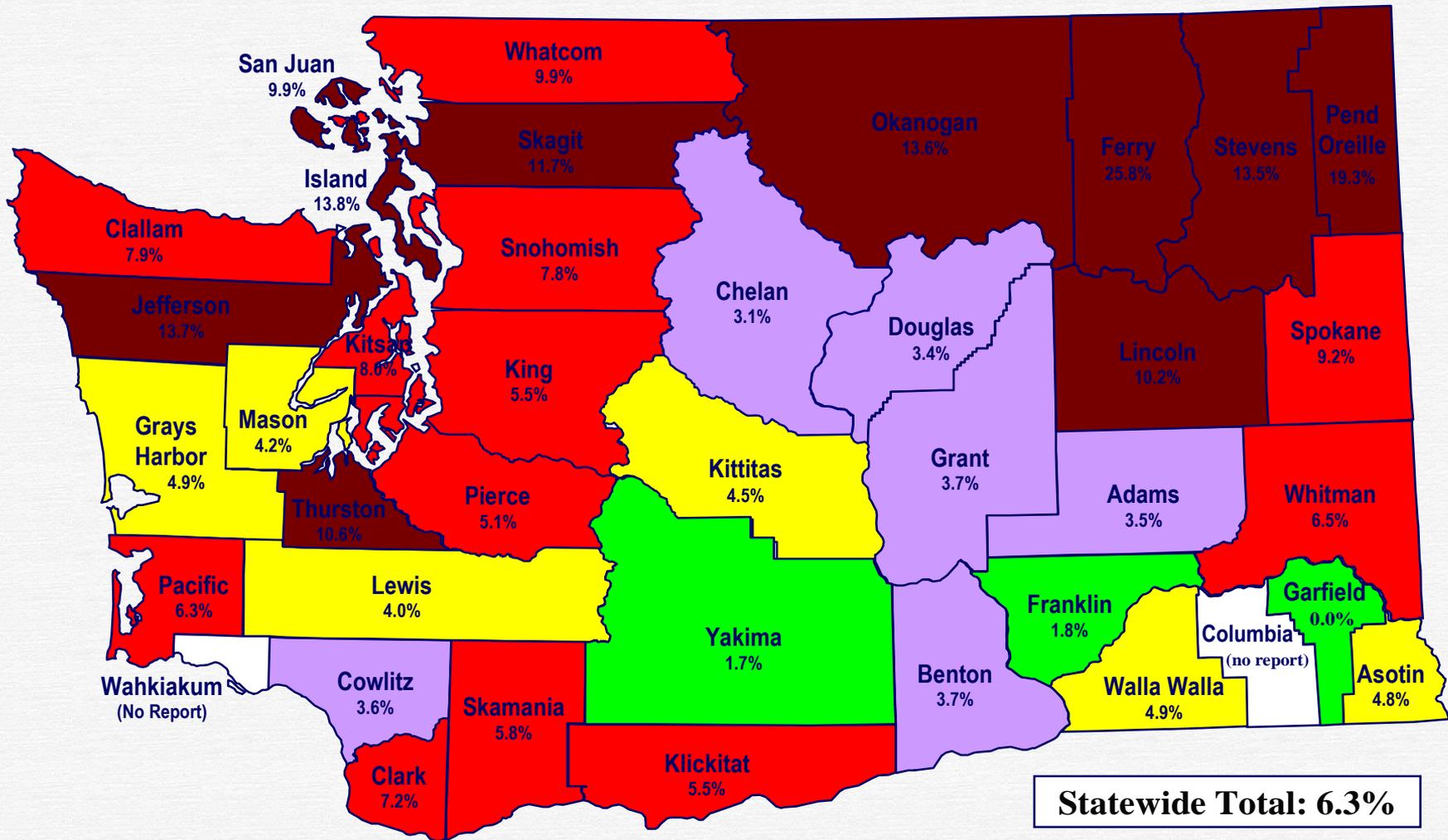


Source: CDC School Immunization Survey

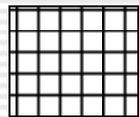
# WA State Counties' School Entry Exemption Rates 1999-2000



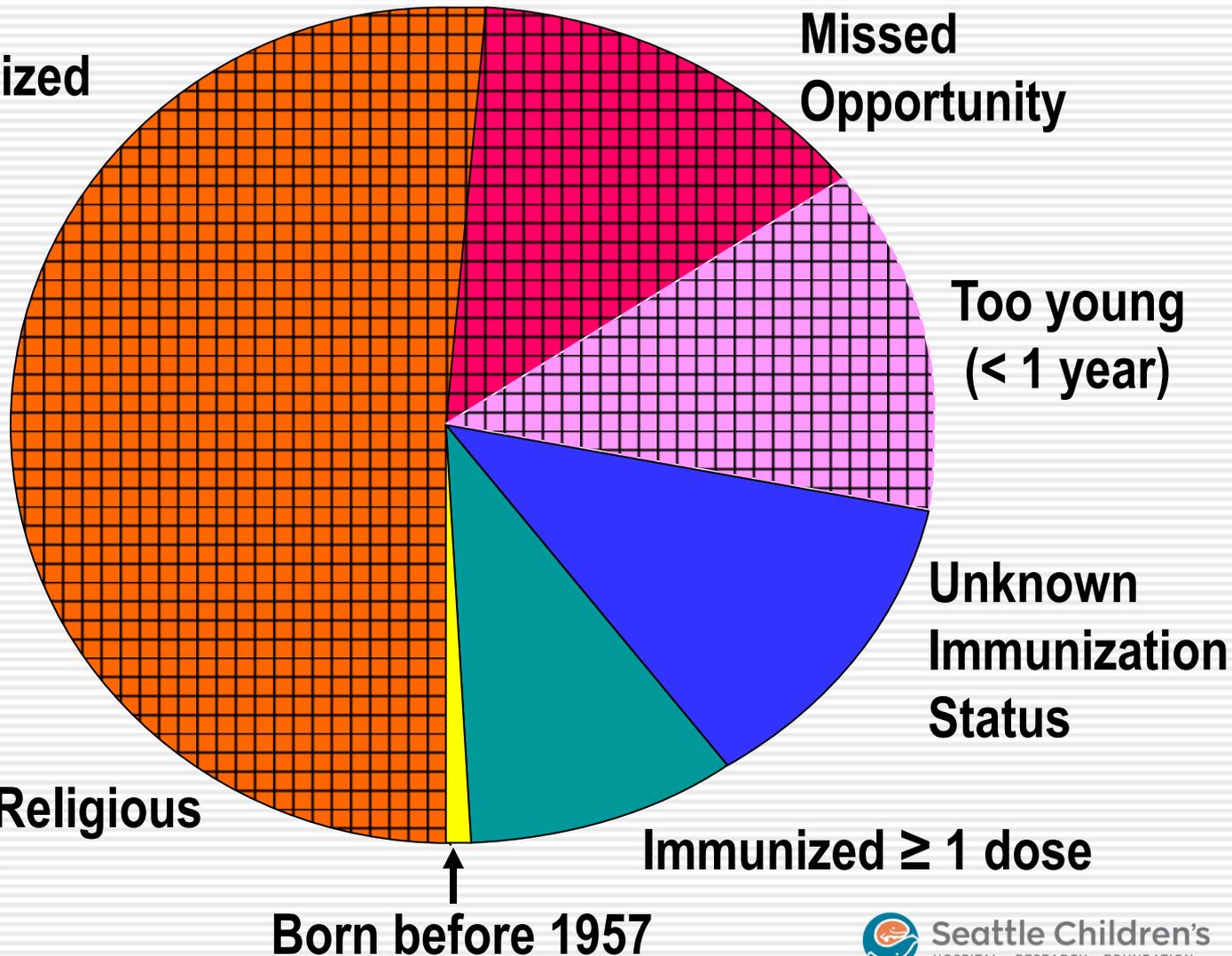
# WA State Counties' School Entry Exemption Rates 2007-2008



# 123 Measles Cases US Residents January 2008



**Unimmunized**



**Missed Opportunity**

**Too young (< 1 year)**

**Unknown Immunization Status**

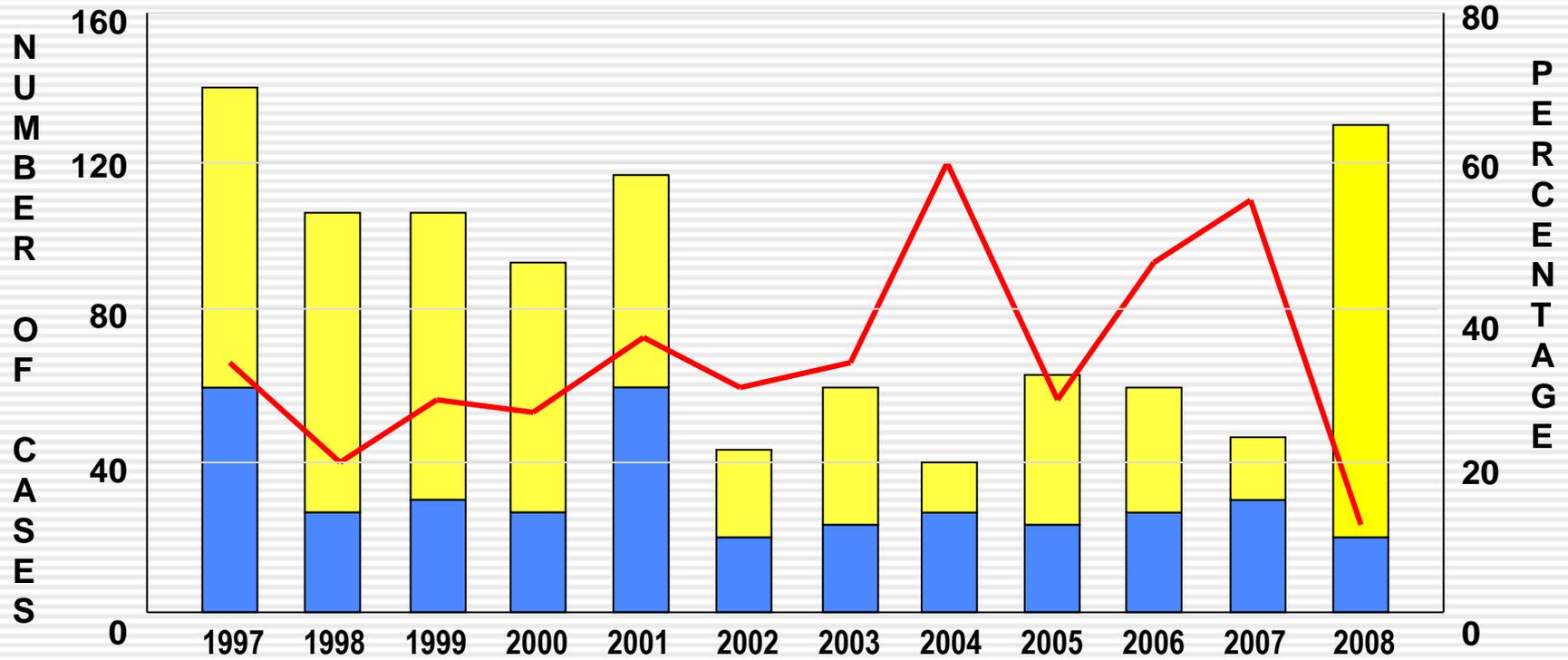
**Philosophical / Religious Beliefs**

**Immunized  $\geq$  1 dose**

**Born before 1957**



# Trend in Cases of Imported Measles\* as a Proportion of All Measles Cases, US 1997 – 2008



- Importation-associated/Other\*
- Importations
- % Importations

\* Source unknown measles cases.

Source: Adapted from *MMWR* August 2008, 57(33):894

# School Laws: Key Success Factors – Parents' Attitudes Toward Mandates

	<u>AGREE</u>	<u>DISAGREE</u>
<b>I am opposed to immunization requirements because:</b>		
• <i>only I know what is best for my child</i>	18%	75%
• <i>go against freedom of choice</i>	18%	75%
<b>Parents should be allowed to send their child to school even if <i>not</i> immunized</b>	14%	79%

# School Laws: Key Success Factors – Physicians' Support

**School laws work because parents rely on physician recommendations in making their immunization decisions and most physicians... are supportive of compulsory immunization.**

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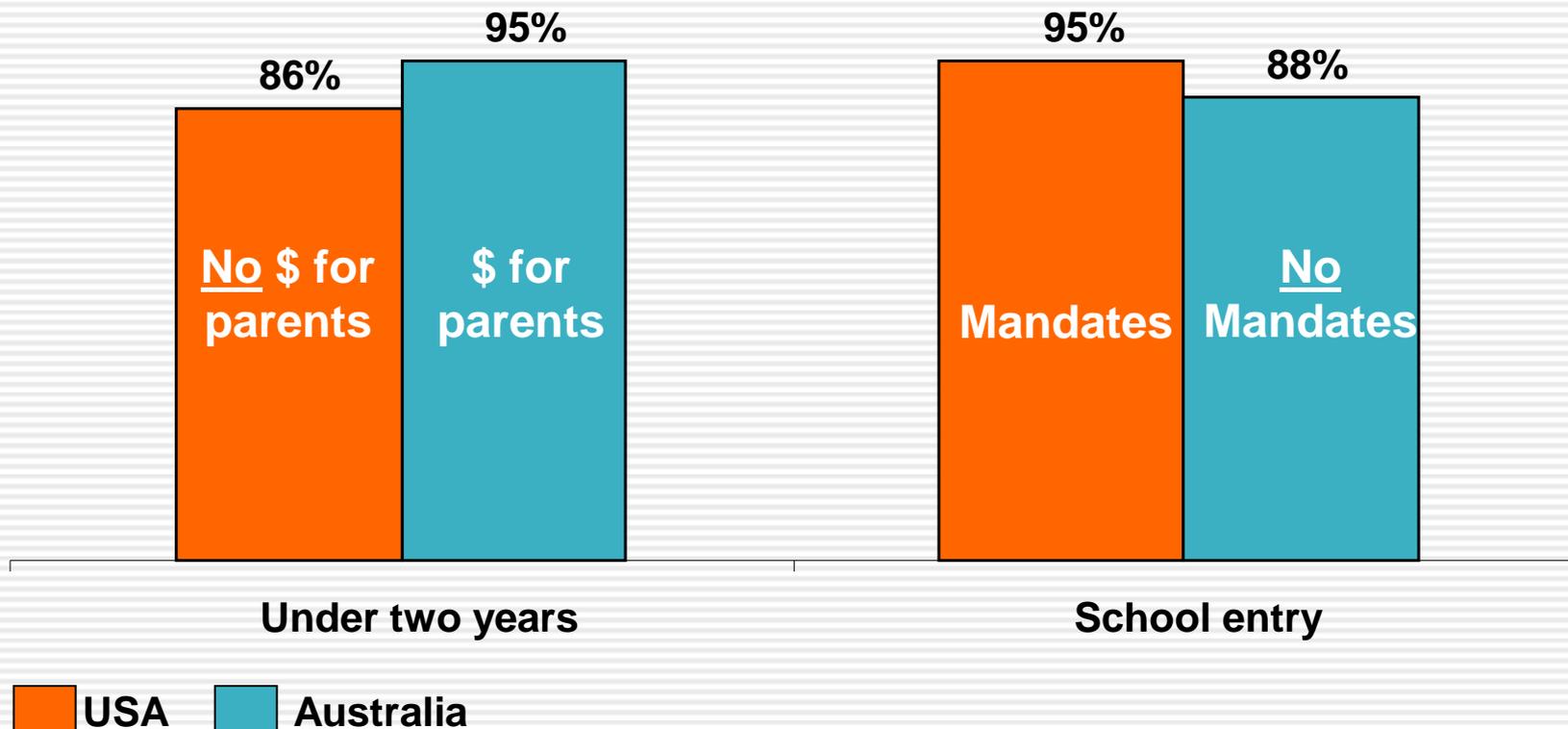
Orenstein WO, Hinman AR.  
*Vaccine* 1999;17(suppl 3):S19-S24

# Immediate Challenges

- **Prudent, limited use of mandates**
- **Exemption process that ensures informed decision making**
- **Development of effective public health communication strategies**
- **Increased investment in vaccine safety science**
- **Expanded public engagement in developing public health policies**

# Alternative Strategies: Australia

USA and Australia child vaccination rates in 2008



Adapted from J Leask, 2009  
Lawrence GL et al. *Vaccine* 2004;22:2345-2350

# Prudent, Limited Use of Mandates

**Criteria for immunization mandates should be established which ensure that:**

- **Mandates are limited to diseases of indisputable public health importance**
- **Mandates have strong support from the medical community**
- **The rationale for a mandate is clearly stated**
- **Mandate process engages the public and is transparent**

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Opel D, Diekema D, Marcuse E.  
*Pediatrics* 2008, 122(2);e504-510

# Ensure Informed Decision Making

- **Exemption rates should be monitored**
- **Reasons for exemptions should be explored**
- **The exemption process should be thoughtful:**
  - Discourage “convenience” exemptions
  - Eliminate schools’ financial incentive for using exemptions
  - Avoid irrelevant or onerous hurdles to exemption
  - Require periodic reconsideration of immunization
- **Widely held erroneous perceptions should be addressed**

# Example of a Widely Held Erroneous Belief

~~Multiple vaccines administered at a single visit can overwhelm a vulnerable infant's immune system~~

# Immunogenic Proteins & Polysaccharides in Vaccines

1900		1960		1980		2000	
<i>Vaccine</i>	<i>Proteins</i>	<i>Vaccine</i>	<i>Proteins</i>	<i>Vaccine</i>	<i>Proteins</i>	<i>Vaccine</i>	<i>Proteins</i>
smallpox	~200	smallpox	~200	diphtheria	1	diphtheria	1
		diphtheria	1	tetanus	1	tetanus	1
		tetanus	1	wc-pertussis	~3000	ac-pertussis	2-5
		wc-pertussis	~3000	polio	15	polio	15
		polio	15	measles	10	measles	10
				mumps	9	mumps	9
				rubella	5	rubella	5
						Hib conj.	2
						varicella	69
						pneumo conj.	8
						hepatitis B	1
<b>TOTALS:</b>							
<b>1</b>	<b>~200</b>	<b>5</b>	<b>~3217</b>	<b>7</b>	<b>~3041</b>	<b>11</b>	<b>123-126</b>

Modified from Offit PA, et al. *Pediatrics* 2002;109:124-129

# Problem with Selective & Alternative Schedules

- **Undervalue recommendations constructed to maximize benefit, minimize side effects for an individual child**
- **Give credence to erroneous beliefs, untested hypotheses, and reinforce unfounded fears**
- **Misinform by failing to distinguish between good and bad science**
- **Leave infants vulnerable to vaccine-preventable disease**
- **Encourage “hiding in the herd”**
- **Add to implementation costs**

# Invest in Safety Science

- **Increase funding for vaccine safety science**
- **Factors associated with adverse reactions**
- **Vaccine efficacy and safety in special populations**
- **Increase capacity for epidemiologic studies**
  - Scale: number of subjects, time windows
  - Duration of follow-up

# Sample Sizes Needed to Detect Rare Events

Rate (%)	Sample Size
<b>1 / 5,000 (0.05%)</b>	<b>19,200</b>
<b>1 / 10,000 (0.01%)</b>	<b>38,500</b>
<b>1 / 100,000 (0.001%)</b>	<b>384,250</b>

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Adapted from Ellenberg 1997, Davis 2000

# Some Challenges of Risk Communication

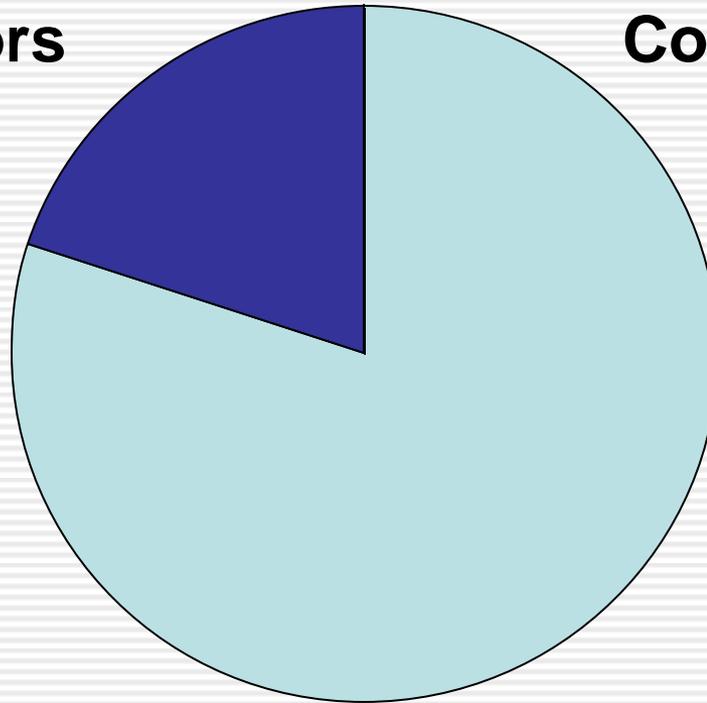
- ***Omission bias:***  
inaction acceptable, avoid discomfort of ambiguity
- ***Compression:***  
overestimate rare risks, underestimate common
- ***Credibility of information source***  
beliefs re disease causation  
controllability of risks

# Effective Public Health Communication

- **Good vaccine safety science is essential; but good science is NOT sufficient:**
  - Is complex, takes time
  - Junk science abounds
  - Safety concerns advanced as scientifically plausible
- **Because vaccine safety concerns are often fear or faith-based they are not easily refuted by science:**
  - Fear of environmental toxins
  - Fear of the machinations of the medical-industrial complex
  - Lack of trust in integrity of government science
  - Faith in trusted spokespersons
  - Faith in alternative health beliefs

# Credibility on Issues of Low Concern

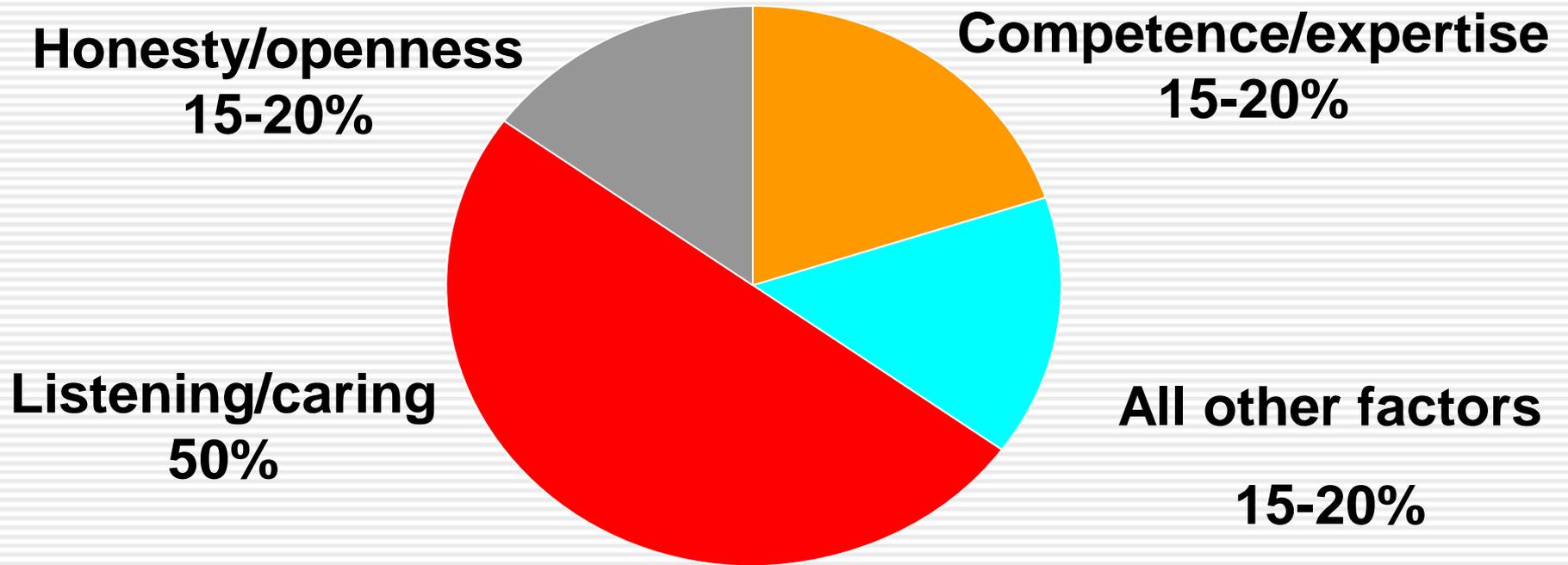
**All other factors**  
**15-20%**



**Competence/Expertise**  
**80-85%**

***Believe you if you are an expert***

# Credibility on Issues of High Concern



*When people are stressed... they want to know that you care before they care what you know!* Will Rogers

# Effect of Clinician Style on Motivation for Change

## Styles that Enhance

- Empathic
- Non-judgmental
- Respectful
- Collaborative spirit
- Emphasis on choice

## Styles that Promote Resistance

- Coercing, arguing,
- Shaming, criticizing
- Judging, labeling
- Commanding, threatening
- Moralizing, lecturing

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Adapted from: *Brief Negotiation: Behavior change Counseling in Brief Clinical Encounters, 2<sup>nd</sup> ed. The Permanente Medical Group, Inc., Northern California*

**CONCERNED  
PARENTS**



**INTENTIONAL  
MISINFORMERS**



***PLAY SOFTBALL...***

***PLAY HARDBALL!***

**Falsehood flies and the truth comes  
limping after; so that when men come  
to be undeceived it is too late; the jest  
is over and the tale has had its effect.**

**Jonathan Swift**

# National Campaign to Influence Immunization Behaviors

- **Primary care physician can no longer carry the full burden of immunization communication**
- **To address the concerns of the growing number of immunization-hesitant parents a national social marketing campaign is needed that is:**
  - Audience-centered, tailored for segments
  - Based on evidence
  - Focused on behavior
  - Maximizes benefits, minimizes barriers

# Expand Public Engagement in Immunization Policy

- **Need to engage non-aligned public in discussion of immunization policies & priorities**
- **There are well-developed models for engaging the public in decision-making:**
  - US Army Corps of Engineers,
  - Environmental Protection Agency
- **Beginning to be applied in public health**
  - Priorities for influenza vaccine in a pandemic

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<http://www.iap2.org/>

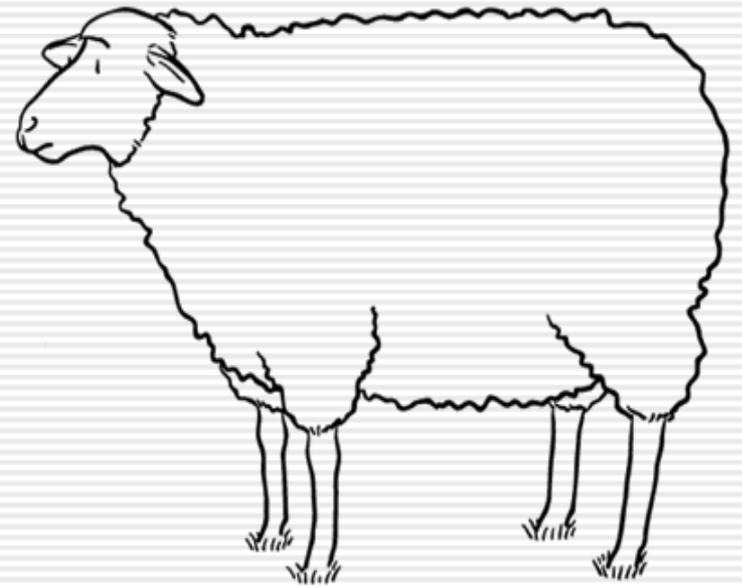
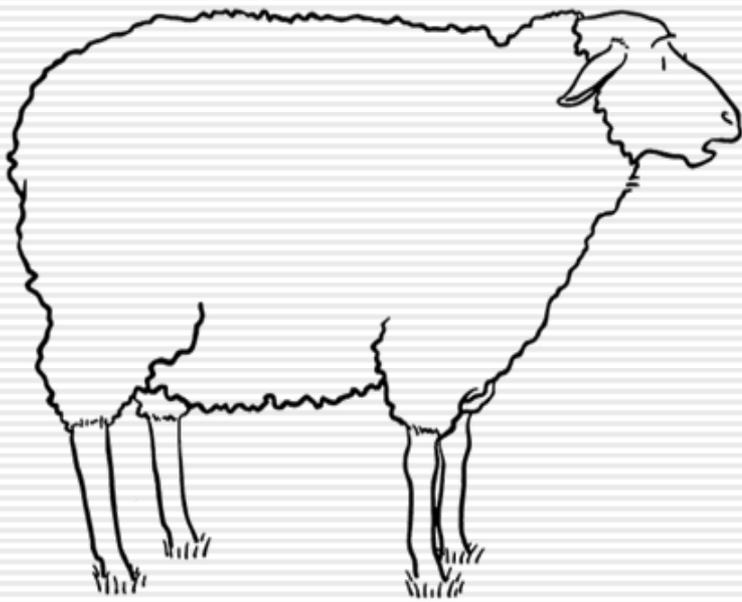
<http://www.keystone.org/spp/health-pandemic.html>



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# What Oprah and Larry King should be discussing...

- **Duties of families**
  - Protect individual child
- **Duties of society**
  - Protect individuals and the community of “healthy” children
  - Protect the community of vulnerable children
  - Protect future generations
- **Justice**
  - Protect due process
  - Equitable distribution of benefits; fair distribution of risks
- **Liberty**
  - Freedom to refuse or choose
  - Degree of coercion needed to enforce policy
  - Degree of societal consensus regarding policy



GREGORY

*“Sure, I follow the herd—not out of brainless obedience, mind you, but out of a deep and abiding respect for the concept of community.”*

# Newer Strategies for Vaccine Development

**Reverse vaccinology**

**Defective particles replication**

**Replicating vectors recombined with genes from pathogens**

**DNA plasmids**

**Gene delivery by invasive bacteria**

**Transcriptomics and proteomics**

**Induction of Innate immunity**

**Dendritic cell targeting**

**Therapeutic vaccines**

**Adjuvants, including cytokines**

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Adapted from S Plotkin, 2008



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# Major Uncontrolled Infectious Diseases

**Campylobacter**

**Chlamydia**

**Clostridium difficile**

**Cytomegalovirus**

**Dengue**

**Ebola**

**EBV**

**E. coli 0157**

**Helicobacter pylori**

**Hepatitis C**

**Herpes simplex**

**HIV**

**Hookworm**

**Influenza, Pandemic**

**Malaria**

**Meningococcus B**

**Norwalk**

**Parainfluenza**

**Parvovirus B19**

**RSV**

**SARS**

**Schistosomiasis**

**Shigella**

**Strep, GpA + B**

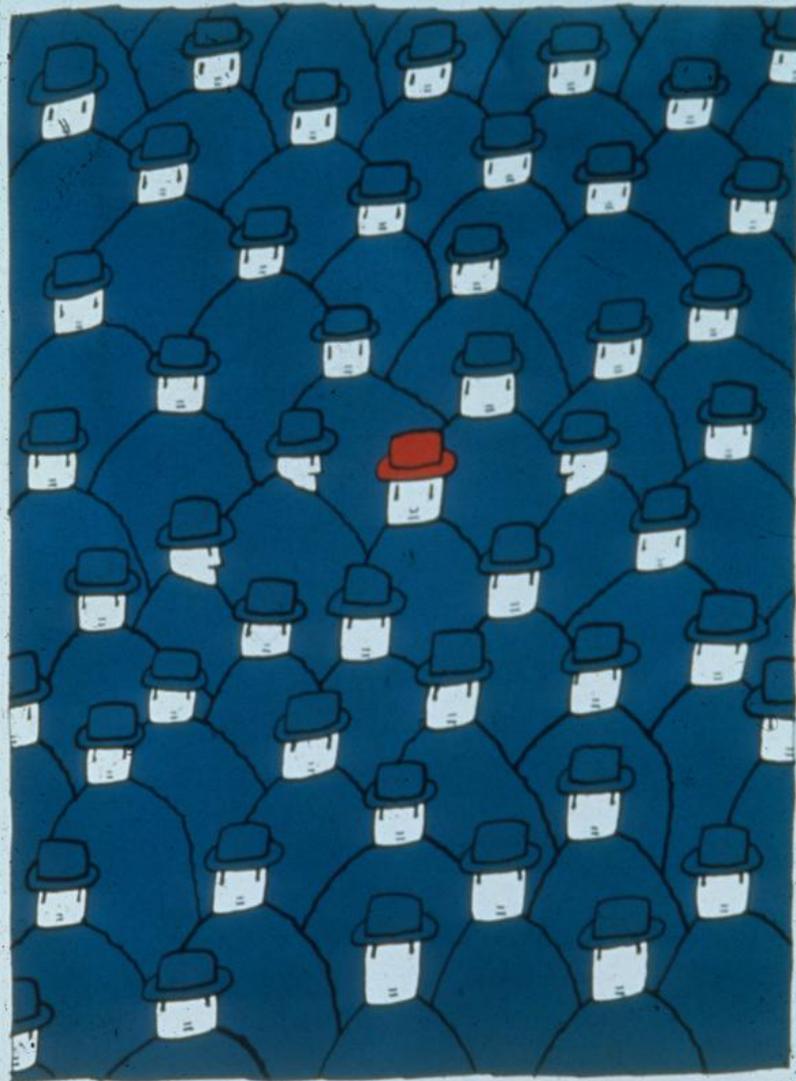
**Tuberculosis**

**Urinary tract infection**

**West Nile Virus**

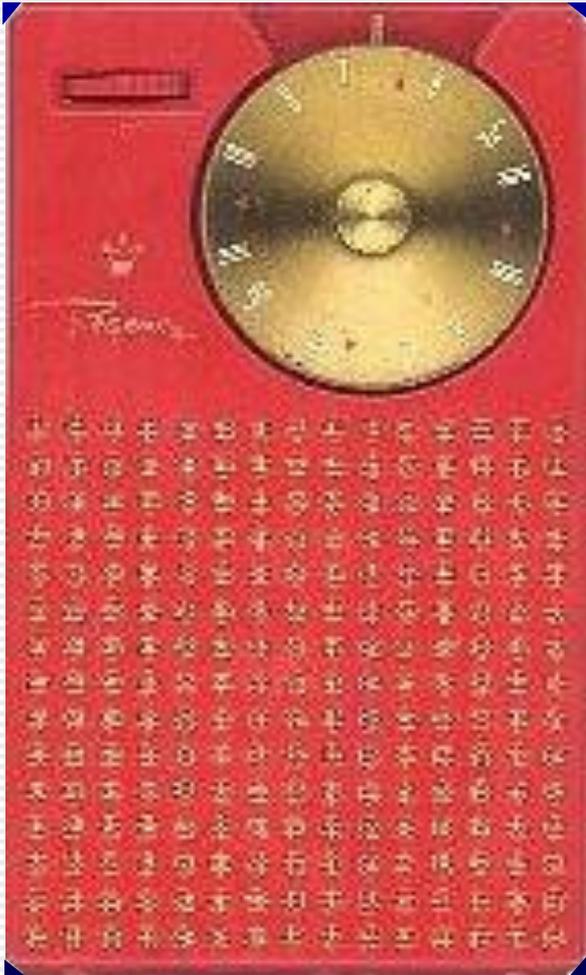
FOLON

GALERIE LIBRAIRIE DU FLEUVE



A PARTIR DU 8 DECEMBRE 1972

38 COURS DU CHAPEAU ROUGE BORDEAUX



**1954**

**World's First Pocket Radio**

**11 ounces \$49.95**

**2009**

**1 GB: \$49.00**



**iPod Shuffle**

**Era of modern vaccinology began in the 1990s.**

**Where could we be in 2064 if we fully exploit its potential to improve the public health?**



*US Public Health Service  
based on quarantine Q signal flag*



*First US Naval Jack, 1775*

**COMMENTS! QUESTIONS? DISCUSSION...**

**ADDITIONAL SLIDES**

# Key Messages for Infant's Parents

- **We understand that you want to do what is best for your son or daughter; so do we!**
- **We know you are bombarded with conflicting information and do not know whom to believe**
- **We recognize that science does not provide answers to all the questions that concern you...**
- **But science is the best tool we have to get reliable answers to important questions**

# Key Messages for Infant's Parents (Cont.)

- **We wish we could make the world completely safe for your child; we cannot**
- **There are important threats to your child's health and safety we cannot eliminate, but we can help you protect your child**
- **We can assist you to get the information you need to decide to take action to protect your child against serious diseases that can result in lifelong disability**
- **To help you make a fully informed decision about immunizations, here are some science-based information sources, unrelated to the government or to drug companies...**

# Wisdom of Mark Twain & Will Rogers

Attributed to Mark Twain

**The right word may be effective, but no word is as effective as a rightly timed pause to listen**

Attributed to Will Rogers

**When people are stressed and upset they want to know that you care before they care what you know**

# 2008 San Diego Measles Outbreak:

12 cases, ~70 people quarantined, ~ 980 exposures

- **Parent A:**

Vaccines are scary. You have no control over them like you do with the rest of what goes into your child's body...my child is injected with something, I have no idea what...

Hard to shake off the power of case reports.

Getting vaccinated is a leap of faith!

- **Parent B**

During the San Diego measles outbreak my son could not leave my property for 21 days! How does the family that put my son in the hospital feel? Should people be able to opt out? Yes...(long pause) but they should have to live on an island!

***The San Diego outbreak did not change anybody's mind!***

# Cedillo vs. Secretary HHS

## Case No. 98-916V

I have examined all of the...medical literature cited by petitioners, and those items do contain some evidence indicating that mercury in some forms and dosages can be toxic. **However, a thorough examination of the record makes it clear that there is *no* evidence...that *ethylmercury, in the very small amounts contained in thimerosal-containing vaccines, can damage infant immune systems, or otherwise contribute to autism in any way.*** For example, none of the medical articles, cited by petitioners...even suggest that thimerosal or ethylmercury, in the amounts contained in infant vaccines, can damage immune systems or cause other harm.

**George L. Hastings, Jr., Special Master**

# “Data” Slide from a 2008 Presentation by a WA State Legislator

**DATA:**

**Thimerosal 25 mcg**

**Hemagglutinin 15 mcg**

**25 > 15**

**More pesticide than medicine**

# Snyder vs. Secretary of HHS

## Case No. 01-162V, 2/12/2009

**To conclude that Colten's condition was the result of his MMR vaccine, an objective observer would have to emulate Lewis Carroll's White Queen and be able to believe six impossible (or, at least, highly improbable) things before breakfast.**

...Although I have the deepest sympathy for families like Colten's, struggling emotionally and financially to find answers about ASD's causes, and reliable therapies to treat ASD's symptoms, I must decide Colten's case based on the evidence before me.

That evidence does not establish an adequate factual basis from which to conclude that Colten's condition was caused by his vaccines.

**Denise K. Vowell, Special Master**

# Snyder vs. Secretary of HHS

## Case No. 01-162V, 2/12/2009

After studying the extensive evidence in this case for many months, I am convinced that the reports and advice given to the Cedillos by Dr. Kringsman and some other physicians, advising the Cedillos that there is a causal connection between Michelle's MMR vaccination and her chronic conditions, have been very *wrong*.

**Unfortunately, the Cedillos have been misled by physicians who are guilty, in my view, of gross medical misjudgment.**

**George L. Hastings, Jr., Special Master**

# Recommended Immunization Schedule for Persons Aged 0 Through 6 Years—United States • 2009

*For those who fall behind or start late, see the catch-up schedule*

Vaccine ▼	Age ►	Birth	1 month	2 months	4 months	6 months	12 months	15 months	18 months	19–23 months	2–3 years	4–6 years
Hepatitis B <sup>1</sup>	HepB		HepB		<i>see footnote 1</i>		HepB					
Rotavirus <sup>2</sup>				RV	RV	RV <sup>2</sup>						
Diphtheria, Tetanus, Pertussis <sup>3</sup>				DTaP	DTaP	DTaP	<i>see footnote 3</i>		DTaP			DTaP
<i>Haemophilus influenzae</i> type b <sup>4</sup>				Hib	Hib	Hib <sup>4</sup>		Hib				
Pneumococcal <sup>6</sup>				PCV	PCV	PCV		PCV			PPSV	
Inactivated Poliovirus				IPV	IPV			IPV				IPV
Influenza <sup>6</sup>								Influenza (Yearly)				
Measles, Mumps, Rubella <sup>7</sup>								MMR		<i>see footnote 7</i>		MMR
Varicella <sup>8</sup>								Varicella		<i>see footnote 8</i>		Varicella
Hepatitis A <sup>9</sup>								HepA (2 doses)				HepA Series
Meningococcal <sup>10</sup>												MCV

 Range of recommended ages

 Certain high-risk groups

This schedule indicates the recommended ages for routine administration of currently licensed vaccines, as of December 1, 2008, for children aged 0 through 6 years. Any dose not administered at the recommended age should be administered at a subsequent visit, when indicated and feasible. Licensed combination vaccines may be used whenever any component of the combination is indicated and other components are not contraindicated and if approved by the Food and Drug Administration for that dose of

the series. Providers should consult the relevant Advisory Committee on Immunization Practices statement for detailed recommendations, including high-risk conditions: <http://www.cdc.gov/vaccines/pubs/acip-list.htm>. Clinically significant adverse events that follow immunization should be reported to the Vaccine Adverse Event Reporting System (VAERS). Guidance about how to obtain and complete a VAERS form is available at <http://www.vaers.hhs.gov> or by telephone, 800-822-7967.

# Recommended Immunization Schedule for Persons Aged 7 Through 18 Years—United States • 2009

For those who fall behind or start late, see the schedule below and the catch-up schedule

Vaccine ▼	Age ►	7–10 years	11–12 years	13–18 years
Tetanus, Diphtheria, Pertussis <sup>1</sup>	<i>see footnote 1</i>		<b>Tdap</b>	<b>Tdap</b>
Human Papillomavirus <sup>2</sup>	<i>see footnote 2</i>		<b>HPV (3 doses)</b>	<b>HPV Series</b>
Meningococcal <sup>3</sup>		<b>MCV</b>	<b>MCV</b>	<b>MCV</b>
Influenza <sup>4</sup>		<b>Influenza (Yearly)</b>		
Pneumococcal <sup>5</sup>		<b>PPSV</b>		
Hepatitis A <sup>6</sup>		<b>HepA Series</b>		
Hepatitis B <sup>7</sup>			<b>HepB Series</b>	
Inactivated Poliovirus <sup>8</sup>			<b>IPV Series</b>	
Measles, Mumps, Rubella <sup>9</sup>			<b>MMR Series</b>	
Varicella <sup>10</sup>			<b>Varicella Series</b>	

Range of recommended ages

Catch-up immunization

Certain high-risk groups

This schedule indicates the recommended ages for routine administration of currently licensed vaccines, as of December 1, 2008, for children aged 7 through 18 years. Any dose not administered at the recommended age should be administered at a subsequent visit, when indicated and feasible. Licensed combination vaccines may be used whenever any component of the combination is indicated and other components are not contraindicated and if approved by the Food and Drug Administration for that dose of

the series. Providers should consult the relevant Advisory Committee on Immunization Practices statement for detailed recommendations, including high-risk conditions: <http://www.cdc.gov/vaccines/pubs/acip-list.htm>. Clinically significant adverse events that follow immunization should be reported to the Vaccine Adverse Event Reporting System (VAERS). Guidance about how to obtain and complete a VAERS form is available at <http://www.vaers.hhs.gov> or by telephone, 800-822-7967.