

## *Vaccine Up-Date*

*51<sup>st</sup> Annual Course in Drug Therapy – May 6, 2021*




Norman Rockwell 'Before the Shot'

Brian J Ward  
McGill Division of Infectious Diseases  
Research Institute – MUHC

### ***LEARNING OBJECTIVES***

After this presentation, participants will be better able to:

- 1) Manage resistance to vaccination
- 2) Give appropriate vaccine advice to protect against pneumonia & herpes zoster
- 3) Decide which vaccines need boosters



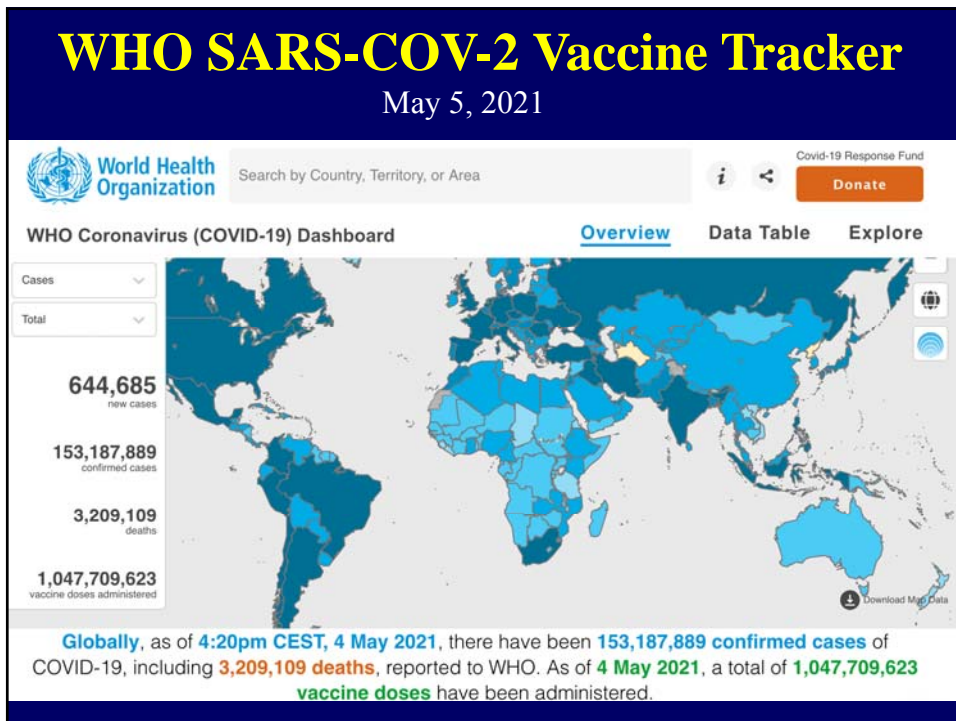
*Conflict of Interest Statement (Last 5 Years)*

Position in Pharma	Medical Officer for Medicago Inc. (Oct 2011 - present)
Consulting	Pfizer, Merck, Novartis, GSK, Sanofi Pasteur MSSS, US Dept of Justice (Vaccine Compensation Programs)
Contracts	Vaccine trials for virtually many companies
Shared Awards	Shared CIHR Team grant (Laval U, GSK) CIHR-Industry grant (Medicago) Shared CQDM grant (Medicago, Laval U, SNC Lavalin)
Occasional Speakers Honoraria	Pfizer, Sanofi Pasteur, Novartis
Investments	None



We're here  
to talk about  
**VACCINES**

[www.urbandojo.com](http://www.urbandojo.com)



## Vaccine Trackers ...

The screenshot shows the COVID19 Vaccine Tracker website. At the top, the logo reads "COVID19 VACCINE TRACKER". Below the logo is a navigation menu with links for "HOME", "ALL VACCINES", "BY COUNTRY", "ABOUT VACCINES & TESTING", and "ABOUT". A "Translate" button is located in the top right corner. The main content area features three large statistics: "111 VACCINE CANDIDATES", "326 TRIALS", and "14 APPROVED VACCINES". Each statistic is accompanied by a faint background icon: a hand holding a syringe for candidates, a document with a checklist for trials, and a document with a checkmark for approved vaccines. At the bottom of the statistics section, there are two red buttons: "View All Vaccines" and "Trials & Vaccines by Country".

<https://covid19.trackvaccines.org/>



With vaccines, we are building our boat  
and sailing it at the same time

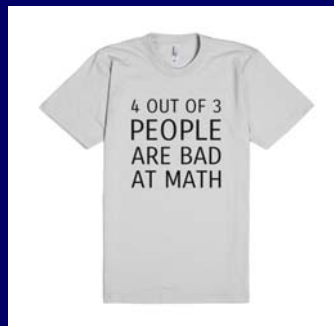
David Heymann, World Health Organization

One BILLION doses of vaccine sounds like a lot!

Most vaccines need 2 doses

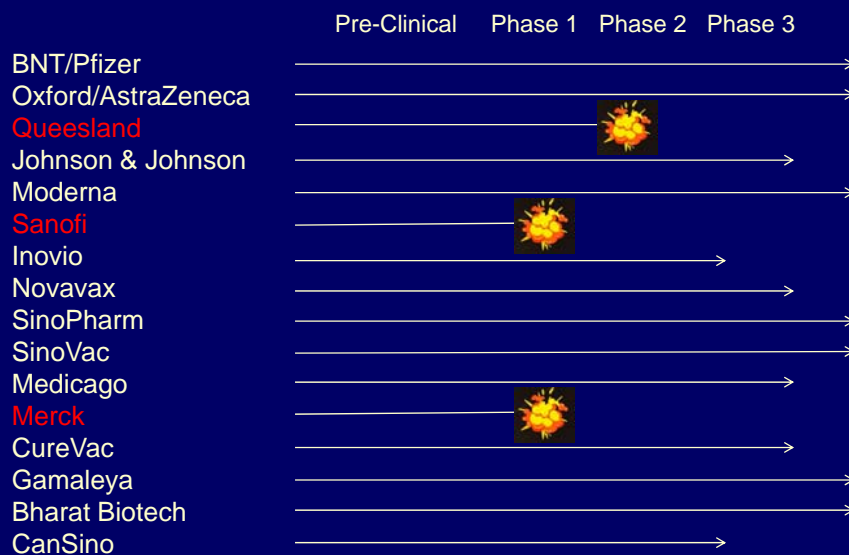
With 7.8 billion people in the world

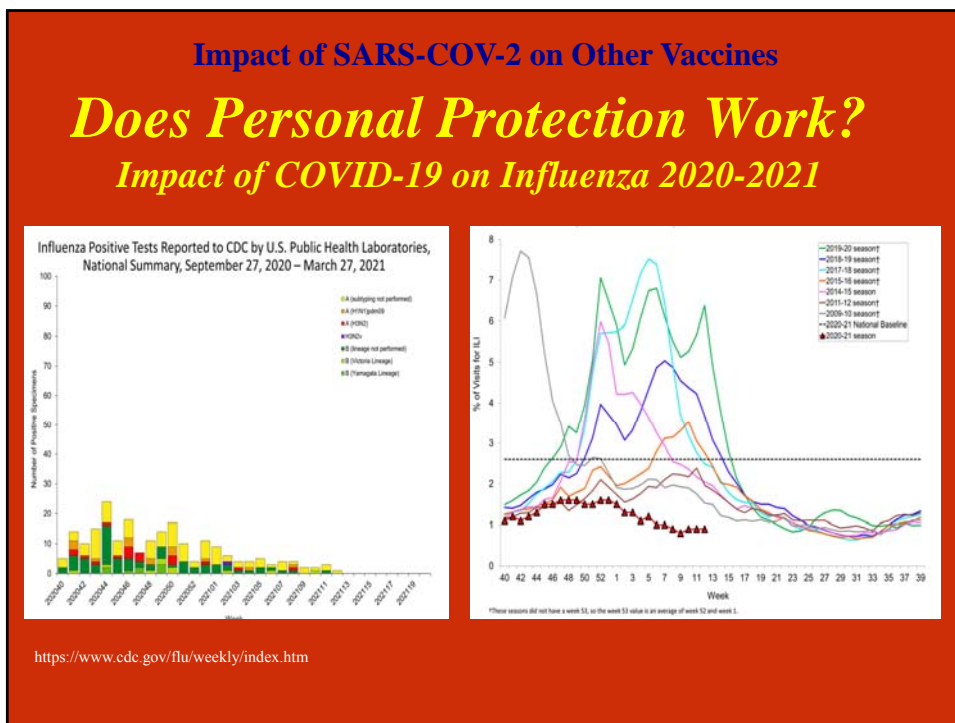
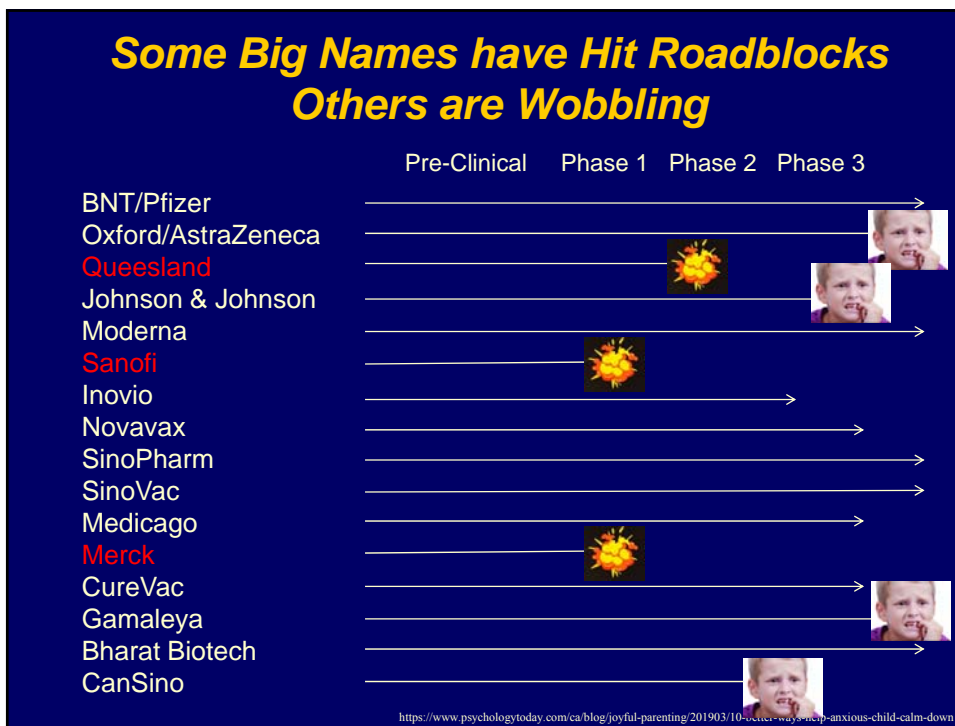
→ we will need 15.6 billion doses (not counting variants & boosters)



www.sodahead.com

### Some Big Names have Hit Roadblocks Others are Wobbling





## Impact of SARS-COV-2 on Other Vaccines

# Increases in other Vaccine-Preventable Diseases

HUMAN VACCINES & IMMUNOTHERAPEUTICS  
2021, VOL. 17, NO. 2, 400-407  
<https://doi.org/10.1080/21645515.2020.1804776>

Taylor & Francis  
Taylor & Francis Group

### Vaccines and routine immunization strategies during the COVID-19 pandemic

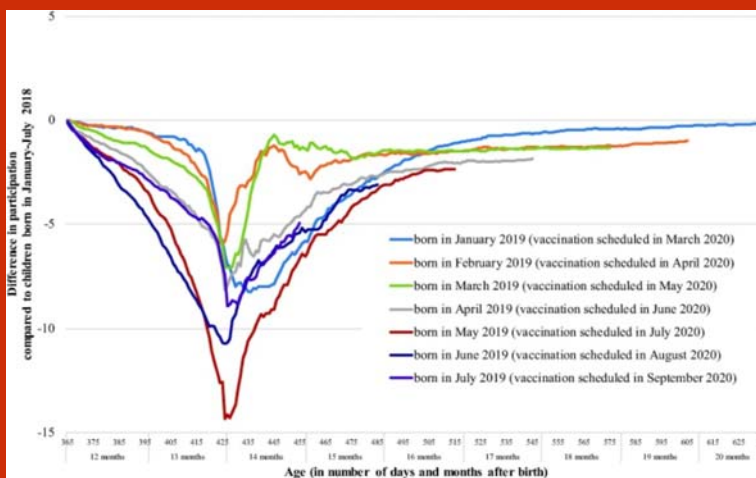
Ener Cagri Dinleyici , Ray Borrow, Marco Aurélio Palazzi Safadi , Pierre van Damme, and Flor M. Munoz

Department of Pediatrics, Eskisehir Osmangazi University Faculty of Medicine, Eskisehir, Turkey Vaccine Evaluation Unit, Public Health England, Manchester, UK Department of Pediatrics, Santa Casa De São Paulo, School of Pediatrics, São Paulo, Brazil Centre for the Evaluation of Vaccination, Vaccine & Infectious Disease Institute, University of Antwerp, Antwerp, Belgium Departments of Pediatrics and Molecular Virology and Microbiology, Baylor College of Medicine, Houston, TX, USA

**ABSTRACT**  
Severe acute respiratory syndrome coronavirus 2 related disease (COVID-19) is now responsible for one of the most challenging and concerning pandemics. By August 2020, there were almost 20 million confirmed cases worldwide and well over half-million deaths. Since there is still no effective treatment or vaccine, non-pharmaceutical interventions have been implemented in an attempt to contain the spread of the virus. During times of quarantine, immunization practices in all age groups, especially routine childhood vaccines, have also been interrupted, delayed, re-organized, or completely suspended. Numerous high-income as well as low- and middle-income countries are now experiencing a rapid decline in childhood immunization coverage rates. We will, inevitably, see serious consequences related to suboptimal control of vaccine-preventable diseases (VPDs) in children concurrent with or following the pandemic. Routine pediatric immunizations of individual children at clinics, mass vaccination campaigns, and surveillance for VPDs must continue as much as possible during pandemic.

## Impact of SARS-COV-2 on Other Vaccines

# What Price Will the World Pay?



Short term impact of the COVID-19 pandemic on incidence of vaccine preventable diseases and participation in routine infant vaccinations in the Netherlands in the period March-September 2020. Middeldorp M, et al. Vaccine. 2021. PMID: 33478793





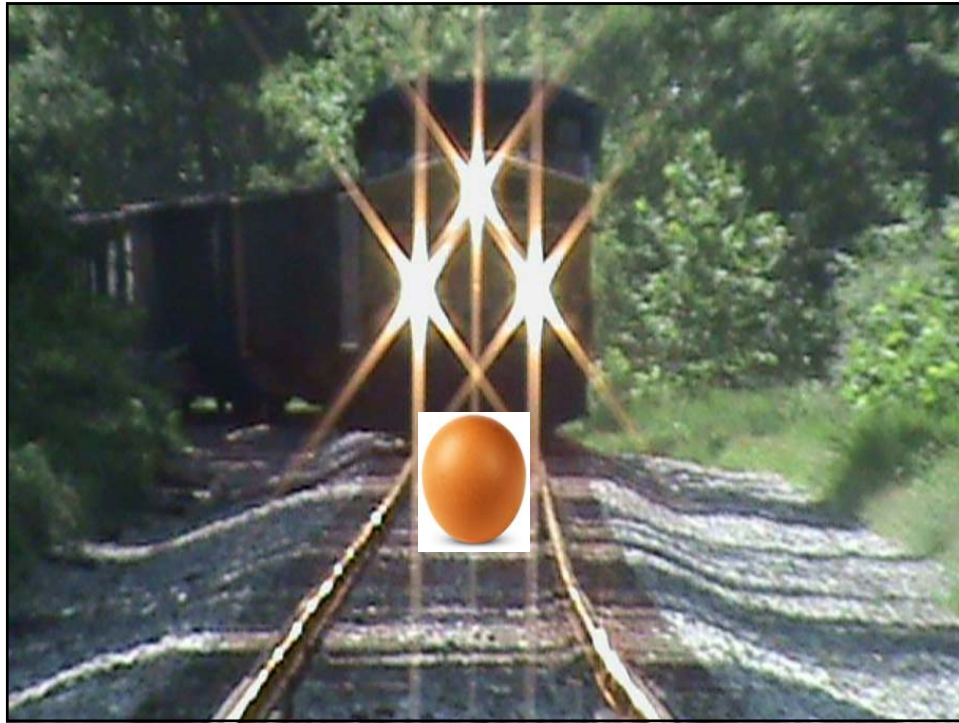
## *Influenza*



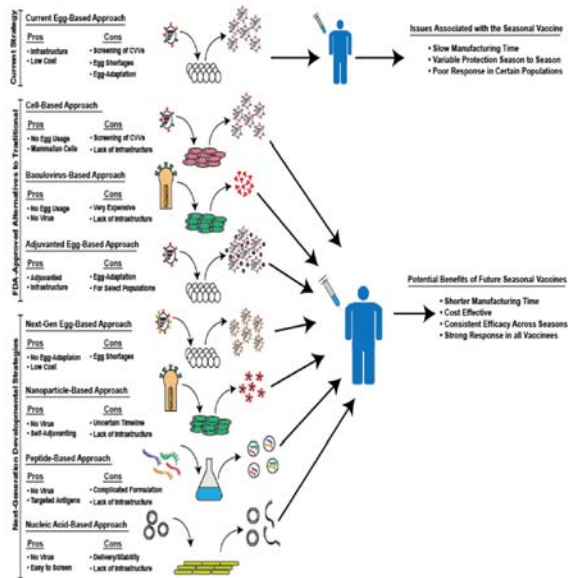
### **“Even at 38% Efficacy ...”**

Episodes of Illness	715,073
Medical Visits	400,441
Hospitalizations	65,007
Deaths	6,796

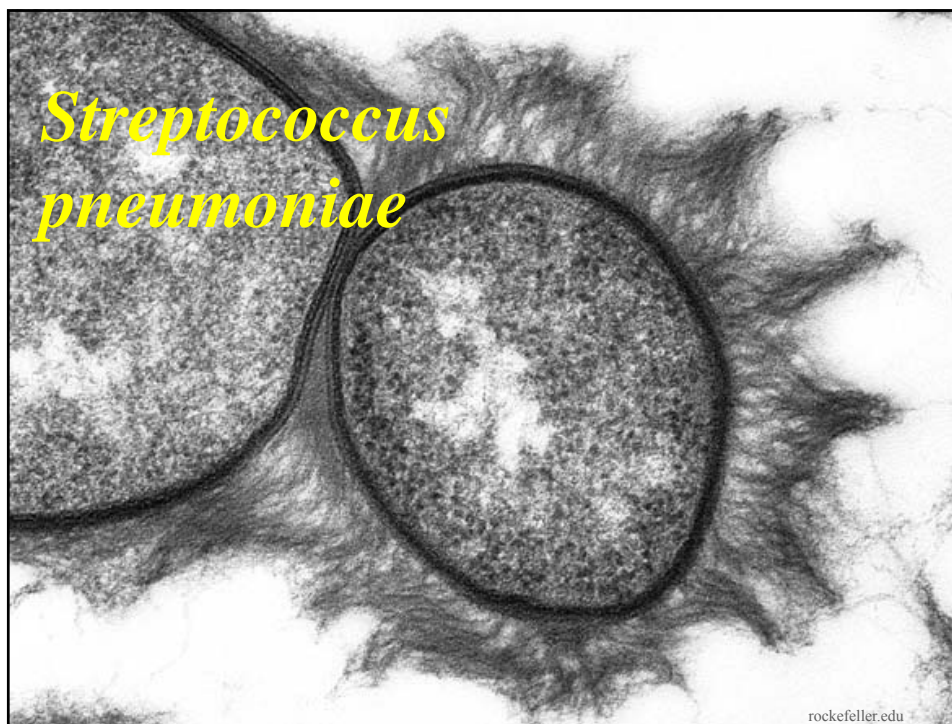
Effects of Influenza Vaccination in the United States During the 2017-2018 Influenza Season.  
 Rolfes MA, Flannery B, Chung JR, O'Halloran A, Garg S, Belongia EA, Gaglani M, Zimmerman RK, Jackson ML, Monto AS, Alden NB, Anderson E, Bennett NM, Billing L, Eckel S, Kirley PD, Lynfield R, Monroe ML, Spencer M, Spina N, Talbot HK, Thomas A, Torres SM, Yousey-Hindes K, Singleton JA, Patel M, Reed C, Fry AM; US Influenza Vaccine Effectiveness (Flu VE) Network, the Influenza Hospitalization Surveillance Network, and the Assessment Branch, Immunization Services Division, Centers for Disease Control and Prevention. Clin Infect Dis. 2019 Nov 13;69(11):1845-1853.



## Expanding Technologies for Seasonal Influenza Vaccines



Harding AT, Heaton NS. Efforts to Improve the Seasonal Influenza Vaccine. Vaccines (Basel). 2018 Mar 30;6(2). pii: E19. doi: 10.3390/vaccines6020019.



## *Pneumococcal Conjugate Vaccines*

Wyeth (Licensed)	Pfizer (13-Valent)	GSK (10-Valent)
4	1	1
6b	3	4
9v	4	5
14	5	6b
19f	6a	7f
18c	6b	9v
23f	7f	14
	9v	19f
	14	18c
	19a	23f
	19f	
	18c	
	23f	

PPV (23 Valent)	
1	17f
2	18c
3	19a
4	19f
5	20
6b	22f
7f	23f
8	33f
9n	
9v	
10a	
11a	
12f	
14	
15b	

## *Pneumococcal Conjugate Vaccines*

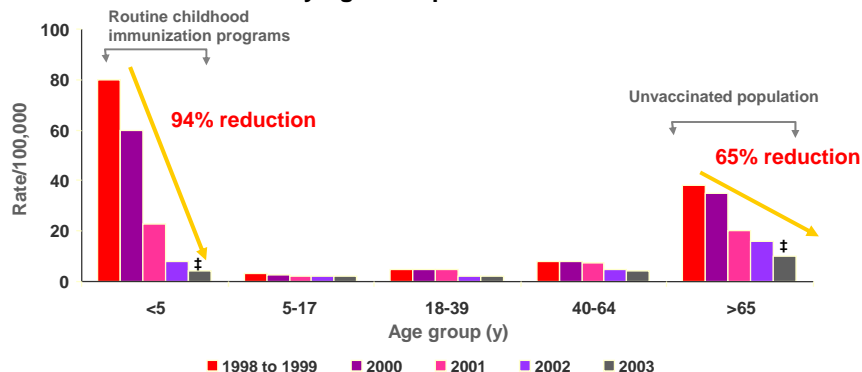
Wyeth (Licensed)	Pfizer (13-Valent)	GSK (10-Valent)	Who's Next (15 Valent)	PPV (23 Valent)
4	1	1	1	1 17f
6b	3	4	3	2 18c
9v	4	5	4	3 19a
14	5	6b	5	4 19f
19f	6a	7f	6a	5 20
18c	6b	9v	6b	6b 22f
23f	7f	14	7f	7f 23f
	9v	19f	9v	8 33f
	14	18c	14	9n
	19a	23f	18c	9v
	19f		19a	10a
	18c		19f	11a
	23f		22f	12f
			23f	14
			33f	15b

## *Pneumococcal Conjugate Vaccines*

Wyeth (Licensed)	Pfizer (13-Valent)	GSK (10-Valent)	Who's Next (15 Valent)	Pfizer (20-Valent)	PPV (23 Valent)
4	1	1	1	1 8	1 17f
6b	3	4	3	3 10A	2 18c
9v	4	5	4	4 11A	3 19a
14	5	6b	5	5 12F	4 19f
19f	6a	7f	6a	6a 15B	5 20
18c	6b	9v	6b	6b 22F	6b 22f
23f	7f	14	7f	7f 33F	7f 23f
	9v	19f	9v	9v	8 33f
	14	18c	14	14	9n
	19a	23f	18c	19a	9v
	19f		19a	19f	10a
	18c		19f	18c	11a
	23f		22f	23f	12f
			23f		14
			33f		15b

## Conjugate Vaccine Indirect Effect—IPD (U.S.)

Rate of Vaccine-type (VT) IPD Before and After Introduction of PREVNAR, by Age Group and Year†



†Active Bacterial Core surveillance, United States, 1998 to 2003

‡p<0.05, 2003 vs 1998-1999

**PREVNAR vaccination was associated with a reduction in IPD in vaccinated and unvaccinated populations**

Adapted from CDC. *Morb Mortal Wkly Rep.* 2005;54:893-897.

## 'Best' Strategy for Adults

Identify high risk ( $\geq 65$ yo, co-morbidities)

Start with conjugate vaccine

- Highest valency available
- Prevnar 13™ for the moment

8-12 months later – polysaccharide vaccine

- Pneumo23™ for the moment
- minimum of 8 weeks if urgent

## *VZV & Shingles*



hardinmd.lib.uiowa.edu

## *Shingrix™ is a Great Vaccine*

- Targets VZV glycoprotein E (gE) and ASO1<sub>B</sub> adjuvant
- Adjuvant MPL + QS21 (oil-in-water + TLR4 agonist)
- Need 2 doses 2-6 months apart
- Works in very old and the immunocompromised
- Recommended for >50 yo and can give to those who have had Zostavax™
- Recommended for those >50 yo who have had an episode of zoster



**>90% efficacy**  
**Safe**  
**Replaces Zostavax**

## Adult Boosters?

**dTap** → all adults should get at least 1 dose  
 → NACI still recommends dT every 10yrs

**Influenza** → yes ... every year  
 → travellers to Southern Hemisphere

**Herpes zoster** → need for booster unknown

**S. pneumonia** → Polysaccharide vaccine soon obsolete  
 → need for conjugate vaccine boost unknown

**MMR & IPV** → given routinely to travellers

## Vaccine Hesitancy

Who do you consider to be 'authorities'?



Paul Offit



Noni Macdonald

### Top 20 Questions about Vaccination | History of Vaccines

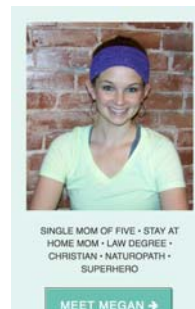
<https://www.historyofvaccines.org/content/articles/top-20-questions-about-vaccination>

Can you get a disease from the vaccine that's supposed to prevent it? ... People say that vaccines are linked to long-term health problems such as multiple sclerosis, ... If you're exposed to the same pathogen in the future, the antibodies will ... these trade-offs in deciding which approach to use against a particular disease.

### Vaccines don't work. Here are the facts. - Living Whole

[www.livingwhole.org/vaccines-dont-work-here-are-the-facts/](http://www.livingwhole.org/vaccines-dont-work-here-are-the-facts/)




Jan 5, 2015 - I hope nobody rushed out and vaccinated their kids or used that ... If you are going to vaccinate your child though, you deserve the (real) facts. ... the disease, but people with asthma (for example) need all they can get to ...




## Long & Winding Info-graphic

### Vaccines Don't Work Here are the Facts


www.LivingWhole.org


**Medical technology has improved in the last 100 years.**  
So have our living conditions.



**Yet, we have never been sicker.**  
This is the first generation who will not outlive their parents.




**We owe so much of this to vaccines.**  
...which are not proven safe or effective.



**Edward Jenner noticed that milkmaids who contracted cowpox didn't get smallpox.**  
So he slit the arm of a little boy and smeared it with pus from an infected maid. This was called inoculation.


**It all began with smallpox - an infectious disease that thrived in the crowded, unhygienic, conditions of poverty.**

**Despite the overwhelming evidence, people still have questions.**  
Measles? Chicken pox? No adequate safety studies?




People who rely on mainstream media for their information will tell you that Wakefield and his colleagues fudged data, had undisclosed interests, and did not obtain test subjects properly. They are not telling you the TRUTH.

Hundreds of thousands of vaccine adverse reactions are reported each year. That's only 1-10% of the actual numbers.




Brain encephalitis, AIDS, chicken pox, fever, rheumatoid arthritis, eczema, seizures, meningitis, diabetes, food allergies, pneumonia, multiple sclerosis, asthma, Immune system, lymphatic, skin, blood, and nervous system disorders.




So what are the risks of vaccinating?

The risk/benefit ratio of vaccines is the worst of any medical intervention out there and they are never without risk.




Vaccinating a child is like taking a child out of their perfectly functioning carseat and strapping them into a seat with dental floss.



## Is There a Debate?

This depends upon how you define the word 'debate' ...



searchID: 316100227  
2-27  
NARE  
cartoonstock.com





bitchlifestyle.com

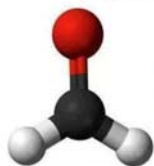


shrinknextdoor.com

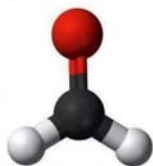
## Vaccine Hesitancy

## Fighting Back ....

Is one of these things *not* like the other?



This is the formaldehyde in a vaccine



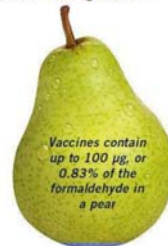
This is the formaldehyde which your own body makes

One carbon atom, two hydrogen atoms and one oxygen atom. Formaldehyde is formaldehyde.

Concerned about formaldehyde in vaccines? Consider the pear...



A 200 g pear contains up to 12,000 µg of formaldehyde, naturally



Vaccines contain up to 100 µg, or 0.83% of the formaldehyde in a pear

The amount of formaldehyde in a vaccine is so tiny that it doesn't even affect the naturally occurring levels of formaldehyde in a child's blood.

Source: <http://tinyurl.com/foodCH20>



Refutations to Anti-Vaccine Memes (@RtAVM)  
Northern Rivers Vaccine Support Group

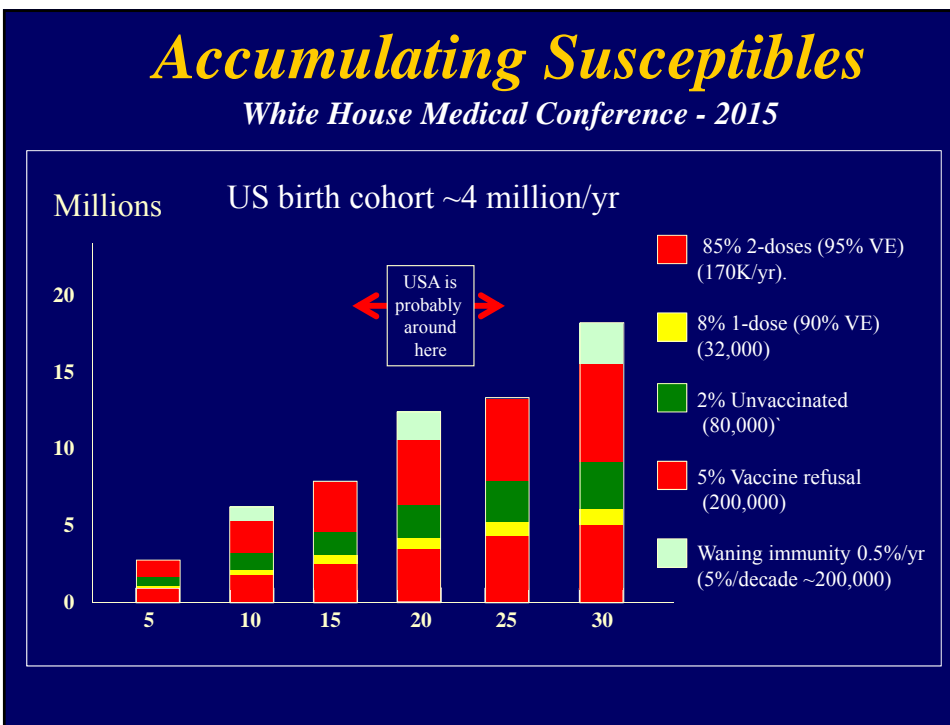
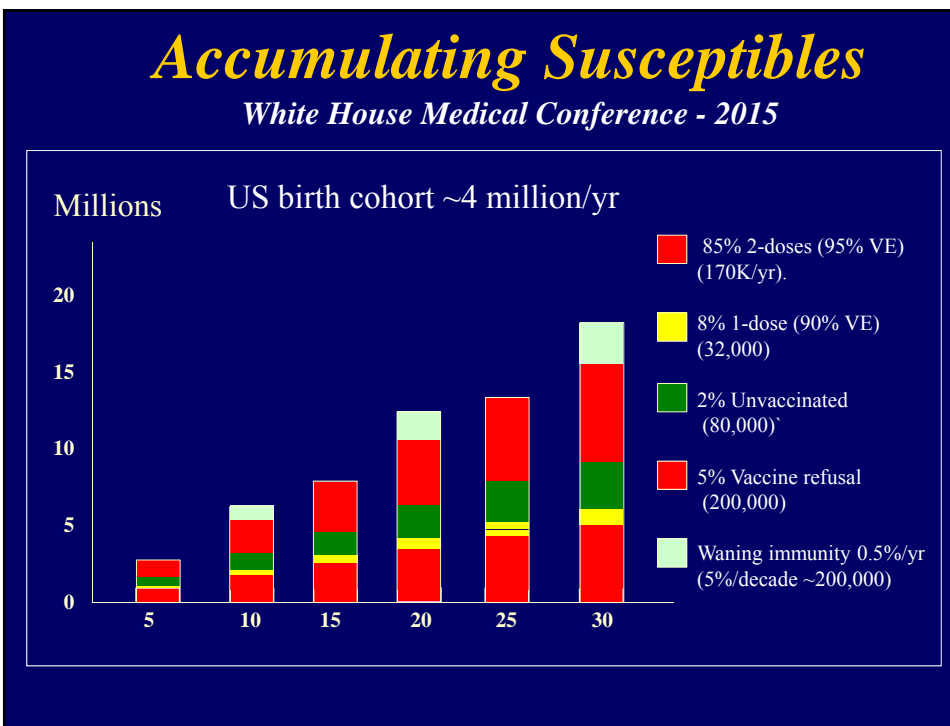
## *For Jude ...*



<https://www.youtube.com/watch?v=bpkuuVNF1AI>

## *Measles*







www.nerdwallet.com

## *Extrapolations are Dangerous but ...*

If 15 million people are susceptible in the USA, and measles exposure is inevitable ... then the country can expect:

- 2,250,000-3,000,000 hospitalizations
- 37,000 deaths
- 20,000-30,000 cases of encephalitis
  - 50% with permanent neurologic deficits
- 600-1650 cases of SSPE

## Risk in Perspective

‘Measles is not that dangerous ...’



Natasha Crowcroft

“If you were going to Canada’s Wonderland, and they said, ‘It’s a really safe ride but every 3,000-5,000 rides, someone is going to die,’ nobody would get on that ride.”



Thank you for your attention

<https://institute.global/policy/light-end-tunnel>