Fear and Loathing of Vaccines!
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Introduction and Outline

• What is vaccination and how does it work?
• Why do we vaccinate?
• What diseases are we targeting and why?
• Risk analysis of vaccination
• Why is there such a controversy?
• Some concerns and answers
• A trip to Crazyville
• Flu vaccines – a special case
• Conclusions, questions and discussion
What is vaccination?

• Originally referred to inoculation of cowpox virus to prevent infection by smallpox.
• Vacca = Latin for cow
• It now means introduction of a vaccine into the body to induce immunity to a disease.
• Vaccine - a suspension of attenuated (weakened) or killed micro-organisms, or an antigenic protein.
Cowpox!
How does vaccination work?

• Vaccination exposes the immune system to an antigen that provokes an antibody response. The vaccine is formulated to stimulate production of antibodies that protect the host against subsequent infection by a pathogenic organism, or to neutralize toxins produced by a pathogenic organism.

• Vaccination takes advantage of the ability of the humoral (antibody-mediated) immune system to recognize, remember and react to antigenic stimulus.
Types of Vaccines

• Live virus: a preparation of a living virus that is weakened so that it produces a minor or non-clinical infection, but still provokes an immune response that combats the natural disease-causing organism. Examples: smallpox vaccine, Sabin oral polio vaccine, rotavirus, MMR

• Inactivated vaccine (“killed”): a preparation of a non-living virus or bacterium that does not cause an infection, but still provokes an immune response that combats the living disease organism. Examples: Salk injected polio vaccine, influenza vaccines, pertussis.

• Toxoids: a preparation of an inactivated bacterial toxin that provokes an immune response that combats a natural active toxin produced by an infectious agent. Examples: tetanus, diphtheria

• Other types include conjugate and subunit, as well as some other experimental types in development.
Vaccines and the Immune system

• Exposure to a vaccine antigen causes proliferation of a clone of B-lymphocytes that produce the antibody active against that antigen. This “primes” the immune system to quickly recognize and produce that antibody upon subsequent exposure to the antigen, either through exposure to the disease organism carrying the antigen, or through “boosters”.
Vaccine Enhancement

- “Boosters” are repeat doses of the vaccine to build on and increase the antibody response during the initial immunization process, or to revive immunity after a period of time when the immune response may weaken.

- Adjuvants are non-antigens added to the vaccine to provoke a stronger response to the vaccine. Examples include squalene and aluminum.
Enhancement continued…

Will it make him a better listener?
What has vaccination accomplished?

- We now have effective vaccines against:
  - Anthrax
  - Cervical cancer (HPV)
  - Chicken pox
  - Cholera
  - Diphtheria
  - Meningococcal infections
  - Hib infections
  - Hepatitis A
  - Hepatitis B
  - Japanese encephalitis
  - Influenza
  - Measles
  - Mumps
  - Yellow fever
  - Pertussis
  - Pneumococcal infections
  - Poliomyelitis
  - Rabies
  - Rotavirus
  - Rubella
  - Shingles
  - Smallpox
  - Tetanus
  - Tuberculosis
  - Typhoid fever
What has vaccination accomplished?

• Complete or near-complete extinction of certain diseases. Examples: smallpox, rinderpest, polio
• Prevention of harmful endemic illnesses. Examples: measles, mumps, pertussis, hepatitis B, influenza
• Prevention of complications of otherwise mild illnesses: rubella, HPV
• Protection of those who are unable to respond to or receive vaccinations through herd immunity
What has vaccination accomplished?

• Estimated lives saved per year: 3 million
• Estimated lives lost that could be saved if vaccination were universal: at least 3 million
• Elimination of smallpox alone is estimated to have saved 5 million lives per year
• Prevention of millions of cases of paralysis, severe congenital anomalies, malignancies, neurologic complications, blindness, hearing loss, sterility, loss of work and education, social and family disruption.
What do we vaccinate against?

• Obviously nasty diseases – high mortality rate, severe morbidity. Examples: smallpox, rabies, tetanus, pertussis, polio

• Usually mild illnesses with serious complications – rubella, chicken pox, measles, mumps, HPV

• Diseases more harmful in certain populations: influenza in the elderly, rotavirus in infants, meningococcus in children and teens.
Risk Analysis

"We've considered every potential risk, except the risks of avoiding all risks."
Risk analysis of vaccines

• Risk analysis involves balancing the potential benefits against the potential harm. This is an integral part of evaluation of new vaccines.
• Vaccines in almost every case have a very high benefit compared to risk. Adverse reactions are rare, and most of them are mild.
• Smallpox vaccine had a relatively high risk of serious adverse effects (100 per 1 million primary vaccinations). However: Smallpox attack rate 85%, mortality rate 30%, therefore benefits outweighed the risks.
• Commonly used vaccines have a rate of serious reactions of about 1 per 1 million, mostly severe allergic reactions (anaphylaxis etc). These are preventable and treatable with effective procedures in place.
• Some vaccines with a higher risk profile may be reserved for those who are most vulnerable – travellers, military personnel etc.
Why the controversy?

Critics of vaccination include:

- Websites
- Some medical and alternative health advocates
- Celebrities
- Consumer groups
- Politicians
What are the results?

- Mistrust of vaccination and those who advocate vaccination
- Decreasing numbers of people getting vaccinations for themselves and their families
- Increasing incidence of vaccine-preventable diseases
- Increased risk to those who are unable to be vaccinated
For all the critics,
Mr. Darwin would like a word...
Autism

• In the last 30 years, the incidence of diagnosed autism has greatly increased, with a current prevalence of about 1 in 90 children.
• Also in the last 30 years, the number of recommended vaccines in children has increased, with new vaccines for measles, mumps, H. flu, rotavirus etc.
• Connection or Coincidence?
A Case of Fraud

• In 1998, a study published in The Lancet suggested a link between recent dosage of MMR vaccine, chronic enterocolitis and autism – a “smoking gun”?

• Problems included false descriptions of the study participants, alteration of pathology findings to fit the study conclusions, unethical recruitment of participants and obvious conflict of interest by the lead investigator and funding of the study.
A Case of Fraud II

• 10 of the 13 authors retracted the study in 2004, and The Lancet fully retracted the paper in 2010.

• The lead investigator, Dr Wakefield, was struck off the British Medical Registry for fraud and other unethical behaviour. The evidence was so overwhelming that Dr Wakefield did not attempt to defend himself.
A Case of Fraud III - consequences

• The Lancet suffered a severe blow to its reputation as a leading medical journal
• Dr Wakefield is now a leader in the anti-vaccination community
• Many people still believe that vaccines are responsible for autism
• The journalist, Brian Deer, who uncovered this scandal, is still dealing with lawsuits and death threats
A note for Mr Deer:

"No good deed goes unpunished."
- Clare Booth Luce
Vaccines and Autism

• There is NO EVIDENCE demonstrating a link between vaccination and autism
• Proposed biologic mechanisms have consistently failed on investigation
• Multiple studies have demonstrated no difference in autism incidence between vaccinated and unvaccinated populations
• Close study of new vaccine introduction demonstrate no increased incidence of autism attributable to the new vaccine
Why has autism increased?

• Answer: it probably hasn’t
• Autism is a clinical diagnosis for which the criteria have expanded and of which clinicians are much more aware.
• The incidence of “mental retardation” has diminished at about the same rate as “autism” has increased
• Several studies have discovered that the adult population born before the apparent increase has an incidence of autism very similar to the incidence in children today (using the same diagnostic criteria)
Some concerns and answers

• Vaccines are ineffective, other measures are responsible for less disease? – not true, they are very effective, whether or not other measures have made a difference
• Too many vaccines at once may overwhelm the immune system? – not true, the immune system is exposed to thousands of different antigens a day
• Vaccines contain dangerous substances? – not true, the adjuvants and preservatives have been thoroughly tested and no ill effects have been found
• Vaccines are no more effective than natural or homeopathic products? – not true, they are far more effective when rigorous testing is applied
• You don’t really need to get vaccinated because the diseases aren’t endemic any more? – not true, vaccination coverage has to be maintained in order for this to be true. Vaccine preventable diseases come back when vaccination coverage drops.
• There are scientists, doctors and famous people who are speaking against vaccines – sadly true, so let’s take a trip to...
Crazytown!!!
The main product of Crazytown is...
What is FUD?

• FUD stands for Fear, Uncertainty and Doubt.
• FUD is generally a strategic attempt to influence perception by disseminating negative and dubious or false information (from Wikipedia)
• Motives include marketing competing products, self-aggrandizement and prejudice
Citizens of Crazytown

- Robert Kennedy Jr – wrote a terrible antivax article that was dropped by its publisher, Salon, whose editor publicly apologized after finding out how dishonest it was
- Dr Mark Geier – treats autistic children for vaccine toxicity by using chemical castration agents. His testimony in court cases has been deemed judges have labeled his testimony "intellectually dishonest," "not reliable" and "wholly unqualified"
- “Dr” Gary Null – holder of a phony PhD and antivax promoter, who poisoned himself with his own supplements that he has made his fortune from.
- Dr Archie Kalikerinos – believes vaccines are used by the WHO to commit genocide
- Bill Maher – says on Twitter: “If u get a swine flu shot ur an idiot.”
- Sadly, there are many more citizens we could meet, but..
let’s get out of here!
A researcher’s lament

“Sometimes I wonder if there’s more to life than unlocking the mysteries of the universe”
Flu Vaccine – Recent Controversies

• New recommendation that health care workers with patient contact must either get vaccinated or wear surgical masks when working with patients during flu season
• A number of groups have objected to this policy
• Some studies have raised doubts about effectiveness and safety of flu vaccination
Mark Crislip wants you to protect yourself – and so do I

• “The vaccine gives me the flu” – no it doesn’t, it’s a killed virus vaccine. This is impossible
• “I never get the flu, so I don’t need the vaccine” – you also never get into head-on collisions, but I’ll bet you wear your seatbelt
• “Only old people get the flu” – no, anyone can get the flu, and pass it on to those most at risk of dying: not just old people, but infants, chronically ill of any age, pregnant, and many others.
• “I can prevent influenza or treat it with (your homeopathic or natural agent here)” – no, none of these agents work for prevention or treatment. Sorry, they just don’t.
• “Flu isn’t that bad a disease” – we’re not referring to “stomach flu” or “24 hour flu” or “26 oz flu”, we’re talking about influenza virus infection, which usually kills 20 000 people a year in the US
• “I’m not at risk for the flu” – if you breathe, you are at risk. This does exclude President Clinton, who doesn’t inhale.
“The vaccine is worse than the disease” – worse than two weeks of fever, bad cough, severe muscle pains, headache, exhaustion – and a small but real risk of hospitalization or death?

“I had the vaccine last year, so I don’t need it this year” – last year’s model only gives partial protection. Flu virus has a nasty ability to mutate rapidly.

“I received the vaccine last year and got the flu anyway” – you may have been unlucky and not responded to the vaccine sufficiently. More likely, you contracted another virus which caused what is termed “influenza-like illness”. This may make you feel like hell, but is not potentially lethal like true influenza.

“I’ll just stay home if I get the flu” – some of us are diehards and will drag ourselves to work unless we can’t stand up. We can also be infectious before symptoms develops. This doesn’t work.

“The flu vaccine is not safe and it hasn’t been evaluated for safety” – it is safe (very high benefit over risk) and has been rigourously evaluated for safety.
“Wait, this one’s a lawyer. We’d better wash our hands.”
Protect Yourself – and Others

• Nosocomial-acquired flu has a mortality rate of ~25%
• Flu vaccination of nursing home workers results in a reduction of all-cause mortality in the residents
• As health care workers, we have an obligation to put concern for those we care for first. We also have the knowledge to understand the benefits of flu vaccination.
• IMHO, there is no excuse for a health care worker to avoid the flu vaccine, apart from genuine medical contraindications.
• Also IMHO, anyone who feels differently is free to work elsewhere.
Questions? Comments?

The End