

CMI, vaccines and vaccination

Dr Jonathan Sarfati¹

Introduction

As a biblical, scientific organization, we often get asked by inquirers about our position on a range of related issues. One such issue is vaccinations. We realize that for some this is a highly charged issue that can engender strong emotions. Unfortunately, there is much confusion and even emotion, even in Christian circles, as a result of misinformation that is proliferated on the Internet. Often, with Christians, much of the thinking is driven by well-meaning, but misapplied biblical statements and, in some cases, even conspiratorial (antigovernment or antiestablishment) constructs—an area outside of CMI's purview.

CMI takes a generally pro-vaccination position, as the best trade-off (supernatural healing to one side) in this fallen world, because the benefits overall greatly outweigh the harms.² This is consistent with a Christian ministry, because disease and suffering are the results of the Curse at the Fall, and Jesus himself alleviated the effects of the Curse.

It is a scientific fact that vaccines have saved millions of lives. Thus as a part of our duty of care for our staff and supporters, we should support medical treatments with a proven record of high safety and effectiveness. And at my suggestion, the CMI-US office, following the biblical principle of proper care for workers (Colossians 4:1, Ephesians 6:9), pays for 'flu (influenza, not the common cold; the two are often confused) shots for all employees and their dependent family members, if they choose to obtain them. (Our speakers when on ministry are at greater risk than otherwise through shaking dozens of hands of well-wishers at ministry events. We think we have a duty of care to protect our families and also not to bring the 'flu back to the office to the rest of the staff, etc.³ Note that the influenza virus kills tens of thousands of people in the US alone every year, and statistics show that most of these victims are unvaccinated.

Theological and philosophical preamble

Because of Adam's sin, God cursed the entire creation. This is why humans and animals are now afflicted with death and disease. This curse is still in effect, as shown by the obvious fact that Christians still die. While we also believe that God can heal the

-
1. With help and input from numerous colleagues
 2. Of course, this is a generalization and relative risk tradeoff assessments will depend on the individual situation. For example, early batches of the swine flu vaccine in the US in the 70s caused significant numbers of cases of the nerve-paralysing autoimmune Guillain-Barré syndrome, which would have to be weighed against the damage the virus could do.
 3. Actually, even apart from the principle of care, it has a sound economic basis: just one or two employees off work for a week would cost the ministry (and thus its supporters) many times more than the cost of flu shots for all.

sick, this curse that has affected the whole of creation won't be completely undone until the final resurrection bodies, as per the closing chapters of Revelation with their Edenic allusions.

However, the Bible also teaches, especially by the example of Christ, that ameliorating the effects of the Curse is a blessing—He healed many diseases and disabilities. Any medical advance, backed by rigorous scientific testing, that can prevent or cure infectious diseases is thus following the example of Christ.⁴

CMI is also not anti-establishment, anti-government or anti-majority for its own sake, but pro-Bible. We would oppose the establishment or the majority view of scientists only when it conflicts with the Bible (as we do with evolution theory). To do otherwise would, for one thing, involve needlessly trying to fight a battle on multiple fronts. Thus, for example, CMI does not oppose the majority view of physicists in favour of relativity and quantum mechanics, since neither of these views conflicts with Scripture. Most creationist physicists support these well-established theories, too.⁵ The same goes with vaccination, supported by the vast majority of medical doctors and scientists—including creationists in those fields.

What is vaccination?

God has given us an immune system. This would have had a pre-Fall role in differentiating self and non-self, but in this fallen world, it also fights against invading microbes. However, because we are fallen creatures, this system doesn't work perfectly, as shown by the millions of deaths from infectious diseases throughout history (the 1918 Spanish flu epidemic is thought to have killed up to 100 million people or 3% of the world's population at the time—including great numbers of Christians).

-
4. As of course is self-evidently true of praying for God to heal the sick, as James 5:14–15 indicates. Christ's healings were examples of supernatural divine power. All biblical Christians believe that God is capable of miraculous healing at any point in history. That is distinct from the more controversial issues of whether individual healing gifts are still operative, or whether Christians have a right to be healed in proportion to their degree of faith, something which is outside of CMI's ministry mandate. However, regardless where one stands on those issues, CMI would firmly hold, along with the vast majority of believers from many different denominational backgrounds, that it would be totally wrong to fail to get medical attention in favour of trusting God to heal. Consider that God is also capable of miraculous means of feeding people (manna for the Israelites) but in the Bible God makes it plain that we are to feed the hungry, and to obtain our own food by normal means. There have been cases where people have rejected advice to remove a life-threatening ruptured appendix by non-supernatural surgical means, in the belief that this rejection was a meritorious act of 'faith'. As well as this obviously being foolish and irresponsible to the extreme (which is by definition unbiblical), The response of Jesus in Luke 4:9–12 speaks strongly against any action that abandons common sense and wisdom in the face of risk of death and injury in favour of reliance on supernatural intervention.
 5. J. Sarfati, Should creationists accept quantum mechanics? *J. Creation* **26**(1):116–123, 2012.

This immune system has long known to be ‘trainable’—in many cases, survivors of a disease become immune to further attacks of this disease. For example, although smallpox had a mortality rate of about a third, survivors never got it again. From this, many researched ways of acquiring this immunity without the dreadful ‘side-effect’ of the full-blown disease. First, this was via crude inoculations of powdered smallpox scabs, with much weakened but still live smallpox germs. This had a much lower mortality rate than full-blown smallpox, but still the famous American theologian and preacher Jonathan Edwards (1703–1758), a supporter of inoculation, died from this.

Smallpox prevention was much improved when doctors observed that maids who suffered from the mild disease cowpox were likewise immune to smallpox. So Edward Jenner (1749–1823) in 1798 used material from cowpox blisters to inoculate patients successfully against smallpox.

With the development of the germ theory of disease, and the rejection of spontaneous generation, by creationist Louis Pasteur (1822–1895), the methods could be further improved by using dead microbes, which cause no disease at all. He demonstrated this by showing that rabies vaccine would prevent the development of this almost always fatal disease—he gave it to Joseph Meister, a 9-year-old boy bitten severely by a rabid dog (1876–1940). No amount of nutritional measures or hygiene had ever prevented the development of rabies in people who had been mauled by rabid dogs.

Thus the main principle of vaccination is to train the immune system with dead or highly weakened germs, to give the immune system ‘target practice’. So if and when it encounters the live pathogen, it is ready for it. Because the germ has little chance to multiply to dangerous levels, a vaccinated person usually doesn’t develop an illness at all, or gets it much less severely. So vaccination has saved millions of lives, and prevented severe injuries in millions more. One of our own senior staff was a practising medical doctor for many years and has seen firsthand the baneful effects and damage caused by people contracting such preventable diseases, including brain damage, in unvaccinated children.

Vaccines are very effective

There is no doubt that we have far lower rates of many nasty diseases today. Smallpox has been completely eradicated, iron lung wards of hospitals that kept polio victims alive have largely disappeared, and rabies and tetanus are completely preventable. Also, debilitating diseases of childhood like measles, mumps, rubella, and whooping cough are no longer unpleasant rites of passage for most children. It’s notable that most anti-vaxers and even lots of doctors today are not old enough to remember when these diseases were widespread. Because they are not common, many often see no need to be vaccinated.

Many anti-vaxers claim that these diseases were eradicated not by vaccination but by improvements in hygiene and nutrition. No one doubts their important roles. However, if they were the main causes of infectious disease reduction, then we would have seen these diseases disappear almost simultaneously. But the contrary is true: the diseases disappeared at different times, which correlated strongly with the introduction of specific

vaccines for these diseases in both the USA^{6,7} and Australia⁸—many in modern times where there was negligible further improvement in hygiene and nutrition.

This is further supported by modern outbreaks of infectious diseases in the western world which correlate with areas of widespread vaccination refusal. This has often been linked with wealthier communities where there would obviously be no drop in sanitation or nutrition, in the USA and Japan.⁹

Furthermore, the hygiene explanation fails particularly badly in the case of polio. There were still outbreaks in the hygienic 1950s, because sanitation actually made the disease *more* prevalent, because it reduced contact with the disease germ in the environment that sometimes conferred natural immunity—so the dirty environment was acting like a crude vaccine! So polio mainly hit the prosperous and clean places.¹⁰

Anti-vaxers might point out ‘correlation is not causation’, but this correlation is combined with a known mechanism for vaccines to work, and controls of the other plausible variables.

Bottom line: if vaccination is not effective, then our immune system is not trainable!

Vaccines are very safe

It is true that vaccination, even with dead germs, is not 100% safe. But then, nothing is 100% safe! That includes activities we regularly choose to undertake, judging their benefits to be worth the risks, such as driving a car. In a fallen world, there are *no* perfect solutions, only trade-offs. So it is folly to compare vaccination safety with a perfect standard that doesn’t exist; rather, it should be compared with the safety of *non*-vaccination. (A.k.a. a ‘relative risk assessment’.) The latter (non-vaccination) is manifestly unsafe. Even on the face of it, the logic seems obvious: “If you think your child’s immune system is strong enough to fight off vaccine-preventable diseases, then

-
6. See the graphs by YEC nuclear chemist Dr Jay Wile, For some diseases, it was vaccination, not sanitation, drwile.com/?p=12101, 3 February 2014.
 7. Dr Jay L. Wile and Erica A. Sommerville, Vaccines are incredibly effective at preventing disease, drwile.com/lnkpages/render.asp?vac_effective, 2009.
 8. Dr Rachael Dunlop, 9 vaccination myths busted. With science! mamamia.com.au/news/vaccination-myths-busted-by-science-cheat-sheet-on-immunisation, 12 November 2011.
 9. Paul A. Offit, The Anti-Vaccination Epidemic: Whooping cough, mumps and measles are making an alarming comeback, thanks to seriously misguided parents, online.wsj.com/articles/paul-a-offit-the-anti-vaccination-epidemic-1411598408, 24 September 2014. Dr Offit is a top paediatrician and vaccine expert.
 10. Patrick Cockburn, Polio: The deadly summer of 1956, *The Independent*, 1999, republished as independent.co.uk/life-style/health-and-families/features/polio-the-deadly-summer-of-1956-2117253.html, 27 October 2010.

it's strong enough to fight off the tiny amounts of dead or weakened pathogens present in any of the vaccines.”¹¹

Also, a child's immune system must fight several thousand ‘new’ antigens every day from the environment. This is far larger than all the vaccinations in the entire vaccination schedule (about 150).⁸

The blatant **unsafety** of non-vaccination should be obvious with well-known killers like smallpox and tetanus, but even ‘childhood illnesses’ are badly underestimated. For example:

- **Influenza.** Too many people refer to a bad cold as ‘the flu’, but actual influenza is much worse. Thousands die in the USA every year from influenza complications:
 - Centers for Disease Control (CDC) estimate an average of 23,607 deaths per year from 1976 to 2007.¹²
 - The figures are more certain about the number of children who die from flu, because it has been a nationally notifiable condition since 2004: from the 2003–4 to the 2013–14 seasons, the average is about 113 pediatric flu deaths per season.¹³
 - The CDC estimated that 90% of the children who died from influenza last season were not vaccinated. Further, about 40% of the deaths were in previously healthy children.
 - Pregnant women who receive the influenza vaccination are much less likely to deliver premature, underweight,¹⁴ or stillborn¹⁵ babies. So influenza is dangerous to unborn babies, so vaccination is a very pro-life policy.¹⁶

11. Amy Parker, Growing Up Unvaccinated: I had the healthiest childhood imaginable. And yet I was sick all the time. slate.com/articles/life/family/2014/01/growing_up_unvaccinated_a_healthy_lifestyle_couldn_t_prevent_many_childhood.html, 6 January 2014.

12. This was variable: low of 3,349 deaths during the 1986-87 flu season to a high of 48,614 in 2003-04, Estimates of deaths associated with seasonal influenza—United States, 1976–2007, cdc.gov, 27 August 2010.

13. Ianelli, V., Deaths from flu, 2013–2014 flu season, pediatrics.about.com, 14 October 2014.

14. Alexandra Legge *et al.*, Rates and determinants of seasonal influenza vaccination in pregnancy and association with neonatal outcomes, *Canadian Medical Association Journal*, 6 January 2014, doi:10.1503/cmaj.130499.

15. Deshayne B. Fell *et al.*, H1N1 Influenza Vaccination During Pregnancy and Fetal and Neonatal Outcomes, *American Journal of Public Health* **102**(6):e33-e40, 2012, doi:10.2105/AJPH.2011.300606.

16. Jay Wile, Flu shot during pregnancy produces unexpected benefits, blog.drwile.com/?p=12645, 3 July 2014.

- **Chickenpox.** At best, it's still a nasty disease with itchy blisters that often leave scars, plus a high fever and headache, resulting in a week missed from school. Further:
 - A person who has had chickenpox can get a painful and scarring rash called shingles years later, because the virus lies dormant in nerve cell bodies for years, but for some reason is re-activated and travels down the nerves to infect the skin near the nerve endings. In some people, it can lead to lifelong chronic pain.¹⁷ It's even worse when it affects nerves of the ear or eye.
 - Before the vaccine, about 11,000 people were hospitalized for chickenpox each year in the United States.
 - Before the vaccine, about 100 people died each year as a result of chickenpox in the United States.¹⁸ They were usually healthy before contracting the disease.¹⁹
- **Whooping cough or pertussis.** This is not just a bad cough, but can have severe complications of pneumonia, brain damage, and the coughing fits are often so severe as to cause cracked ribs, and turn children blue from oxygen deprivation. It was known as the 100-day cough.⁸ It used to kill 8,000 babies per year.⁹
- **Measles.** At best, it's a nasty itchy pox accompanied by high fever, cough, runny nose, and inflamed red eyes. Worse:
 - Ear infections occur in about one out of every 10 children with measles and can result in permanent hearing loss.
 - As many as one out of every 20 children with measles gets pneumonia, the most common cause of death from measles in young children.
 - About one child out of every 1,000 who get measles will develop encephalitis (swelling of the brain) that can lead to convulsions and can leave the child deaf or mentally retarded. 1 in 10,000 children will get Subacute Sclerosing Pan-Encephalitis (SSPE), a progressive brain-eroding condition that inevitably leads to a slow, distressing death.
 - For every 1,000 children who get measles, one or two will die from it.²⁰

Overall, if vaccination were so unsafe, then it's hard to explain why sharp increases in vaccination correlate so strongly with increases in general health as well as sharp drops in child mortality.²¹

For another example of such trade-offs, 350 people die annually in the USA taking baths,²² but this would not justify refusing to wash, because that would increase the risk

17. Known as post-herpetic neuralgia, more common in older patients.

18. Vaccine Information Statements: Chickenpox, cdc.gov/vaccines/hcp/vis/vis-statements/varicella.html.

19. Chickenpox (Varicella) Vaccine, WebMD, webmd.com/children/vaccines/chickenpox-varicella-vaccine.

20. Complications of Measles, cdc.gov/measles/about/complications.html.

21. Jay Wile, Vaccines are very safe, drwile.com/lnkpages/render.asp?vac_safe#r1, 2009,

of acquiring diseases. Similarly, most wouldn't refuse to wear seatbelts just because in rare freak situations, being thrown out of a vehicle could enhance the chance of survival.²³ This is because they realize that overall, the chances of being killed or injured by *not* being restrained are far greater.

The impossible demand for 100% safety is similar to the claim that vaccination violates the faux-Hippocratic maxim *Primum non nocere* ("First do no harm").²⁴ But it should be clear that *withholding* such a life-saving measure is inflicting considerable *harm by omission*.

Of course, if someone has been harmed by vaccination, however rare, great compassion is in order; one can scarcely expect a parent to be consoled by the statistical fact that the child's chance of being harmed by the disease was greater. (From the parent's perspective, the child, if unvaccinated, may have survived the illness with no lasting harm.) This is part of what makes it such an emotive issue.

For example, say that a parent chose to vaccinate for a particular illness where the chance of serious complications from the vaccine was 1 in 100,000, and the chance of serious complications from being unvaccinated was 1 in 10,000. And the child suffered complications from the vaccine. Without the benefit of foresight, as only God has, one can still say that at the time the decision was made, the parent's decision to vaccinate was the wisest and most responsible one in discharging their duties as a parent—even though in hindsight the picture looks different.

Objections

Vaccines contain deadly poisons

This is a meaningless claim, because the first rule of toxicology is: 'the dose *makes* the toxin'. Many poisons have benefits in small amounts, e.g. the potent digitalis toxin in foxglove plants in tiny amounts can benefit heart arrhythmias and congestive cardiac failure. The 'deadliest toxins' known, the botulinum toxins, have a median lethal dose, LD₅₀²⁵ of around a nanogram per kilogram (ng/kg) of body weight.²⁶ Yet it is used

22. L.D. Budnick and D.A. Ross, Bathtub-related drownings in the United States, 1979–1981, *American Journal of Public Health* **75**:630–633, 1985.

23. When Western governments first began to introduce seatbelt legislation, some 'anti' campaigners pointed to situations in which people had even been trapped inside a burning vehicle from a malfunctioning belt. But the risk-reward tradeoff was and is overwhelmingly in favour of seat belt usage, i.e. while seat belts will kill/injure some people, they will save far more lives than that. The analogy to vaccination is clear. Airbags have also been known to injure some people in certain circumstances, but on the evidence one would much rather have them than not.

24. It is actually a mid-19th-century invention. Cedric M. Smith, Origin and Uses of *Primum Non Nocere* — Above All, Do No Harm! *Journal of Clinical Pharmacology* **45**(4): 371–377, April 2005 | doi:10.1177/0091270004273680.

25. The dose required to kill half the members of a tested population in a given duration.

26. Environmental Health & Safety, Safety In The Workplace, University of Florida, ehs.ufl.edu/programs/bio/toxins/toxin-table.

to control squinting and wrinkles in minuscule doses (commonly given as ‘botox’ injections). Conversely, even ‘good’ things like oxygen and water can act as poisons in large amounts.²⁷

Another important issue is that poison molecules cannot reproduce; disease germs are so dangerous precisely because they can make many more of themselves.

Mercury

For many decades, many vaccines have included a strong preservative, a compound of mercury with an ethyl and thiosalicylate²⁸ group called thiomersal (from ethyl**mercury thiosalicylate**) or merthiolate.²⁹

Back in 1931, it was shown that thiomersal is 40–50 times more effective against *Staphylococcus aureus* (golden staph) than phenol (carbolic acid), the classic antiseptic used by the pioneer Joseph Lister (1827–1912). Indeed, a concentration of only 1 part in 10,000 (0.01%) would stop bacterial growth in vaccines,³⁰ but not destroy the vaccine itself as phenol does.³¹ Since this concentration was used as a vaccine preservative, this amounts to 50 µg (µg = microgram = one millionth of a gram) of thiomersal in a 0.5 mL dose, or 25 µg of mercury.³² To put this into perspective, a typical serving of tuna would have an average of 30 µg of mercury.³³ Vaccinations are a single dose—people frequently eat tuna.

However, quite large amounts didn’t harm test animals: “up to 20 mg per kg body weight in rabbits and still higher in rats—without apparent injury.”^{34,35} For humans, it

27. Bergman, J., Understanding poisons from a creationist perspective, *J. Creation* **11**(3):353–360, 1997; creation.com/poison.

28. ‘Thio’ means that a sulphur atom has been substituted for an oxygen.

29. In some countries like the US this is called ‘thimerosal’, the result of *metathesis* or switching of sounds in the word: the ‘o’ and ‘mer’ ;)

30. Hence the term *oligodynamic effect*, from Greek *oligos* = few. It seems to be common among chalcophile metals like mercury, silver and copper, i.e. with an affinity for sulfur, so they disrupt vital sulfur-containing bacterial enzymes.

31. Jamieson W.A. and H.M. Powell, Merthiolate as a preservative for biological products, *American Journal of Hygiene* **14**:218–224, 1931.

32. Thiomersal (C₉H₉HgNaO₂S) has a relative molecular mass of 404.81, and mercury’s relative atomic mass is 200.592 or about 50%.

33. This assumes a 2.5 ounce (71 gram) serving, and tuna has an average of 0.427 parts per million of mercury. Mercury in canned tuna still a concern: New tests reinforce a need for some people to limit consumption, Consumer Reports, January 2011; consumerreports.org/cro/magazine-archive/2011/january/food/mercury-in-tuna/overview/index.htm

34. Note in original: Powell H.M. and W.A. Jamieson, Merthiolate as a germicide, *American Journal of Hygiene* **13**:296–310, 1931.

seems to require 3 to a few hundred mg/kg of thiomersal to produce acute mercury toxicity. So if we take the most cautious figure of 3 mg/kg, a 50-kg person would need to receive over a thousand thiomersal-containing vaccinations to receive a toxic dose. So not surprisingly, one review revealed no evidence of harm caused by doses of thimerosal in vaccines, except for local hypersensitivity reactions,³⁶ although it was used for many decades.

However, from the 1960s to the 1990s, mercury-containing effluent poured into the sea was shown to have highly toxic effects. And it accumulated in the food chain, so it became concentrated in fish. Several thousand people in the fishing community of Minamata Bay, Japan, had serious mercury poisoning with often fatal results. In particular, bacteria converted the inorganic mercury into *methylmercury* CH_3Hg^+ .³⁵

However, there is an important difference between this and thiomersal—the latter is metabolized into *ethylmercury* $\text{CH}_3\text{CH}_2\text{Hg}^+$. Even though there is only a CH_2 group difference, this makes *all* the difference—compare ethanol or ethyl alcohol ($\text{CH}_3\text{CH}_2\text{OH}$) that makes you “merry” (Ecclesiastes 10:19) with methanol/methyl alcohol (CH_3OH) that makes you blind or dead. Ethyl mercury does *not* accumulate. Rather, it is removed quite quickly from the blood and excreted via feces. Indeed, even giving thiomersal-containing vaccines to infants did not raise their blood mercury level above safe levels, and the half-life of mercury in the blood was about a week.³⁷

Unfortunately, in a typical panic-reaction by bureaucracies,^{38,39} on 9 July 1999, the Centers for Disease Control and Prevention (CDC) and the American Academy of

35. Jeffrey P. Baker, Mercury, Vaccines, and Autism: One Controversy, Three Histories, *American Journal of Public Health* **98**(2):244–53, 2008 | doi:10.2105/AJPH.2007.113159.

36. Ball, L.K., Ball, R., Pratt, R.D. An assessment of thimerosal use in childhood vaccines, *Pediatrics* **107**(5):1147–54, May 2001.

37. Pichichero M.E. *et al.*, Mercury concentrations and metabolism in infants receiving vaccines containing thiomersal: a descriptive study, *Lancet* **360**(937):1737–1741, 30 November 2002.

38. This undesirable outcome arises from the perverse incentives involved. If something is not banned and it can be even remotely connected to harmful effects, the bureaucrats can be hauled before Congress and character-assassinated by the media. But if they ban this product that might have saved many lives, very few will link the lost lives to the absence of this product. So bureaucracies always tend towards banning over approval. See Milton Friedman, [FDA =] “Frustrating Drug Advancement”, *Newsweek*, 8 January 1973, p. 49. Also, when they do finally approve something while bragging it will save 100,000 lives per year, no one bothers to ask about the million lives lost while they held this product up for 10 years.

39. ‘Firing the rascals’ will make no difference, because the same incentives will apply. Expecting a change in outcomes without changes in incentives is like expecting a cat to bark. See Milton Friedman, Barking Cats, *Newsweek*, 19 February 1973, p. 70. The only way to change things is to make it profitable for even the wrong people to do the right things.

Pediatrics (AAP) asked the vaccine makers to remove thiomersal from their vaccines. The absurd double-speak of the AAP press release just confused matters:

Parents should not worry about the safety of vaccines. The current levels of thimerosal will not hurt children, but reducing those levels will make safe vaccines even safer. While our current immunization strategies are safe, we have an opportunity to increase the margin of safety.

Of course, if the amounts are safe already, then how could the safety be improved by removing it? And it sent the mixed message to parents: “if they are removing thiomersal, it must really have been harmful after all—and they must have been hiding this in the past.”

This caused immediate harm: after about 10% of hospitals suspended their hepatitis B vaccines that contained thiomersal, a 3-month-old baby born to a mother infected with the disease died of this. And the ban enabled concerned parents and associated ambulance-chasers to blame thiomersal for their children’s autism (see below).⁴⁰ It has also increased the costs of vaccination, because they must be in single-dose vials without a preservative.

However, now, this issue is a red herring, because so few vaccines still contain thiomersal. In the USA, only some influenza, tetanus, and meningococcal vaccines have as much as 25 µg of mercury; the vast majority have *none*.⁴¹

Formaldehyde

Formaldehyde or methanal (HCHO) is the simplest aldehyde (RCHO), and has the ability to cross-link proteins. This makes it toxic to microbes, so it is used as a preservative. For vaccines, it is important to have dead microbes, so formaldehyde is used to inactivate viruses. It also denatures the deadly toxin proteins of the tetanus and diphtheria bacteria, so they can no longer do their damage, but can still provoke the desired immune response.⁴²

So how much formaldehyde is in vaccines? Some vaccines have about 100 µg per dose, as per this table.⁴³ Note that the table lists different versions of the same vaccine, whereas a patient would receive only one of these. This means that the typical

40. Paul A. Offit, Thimerosal and Vaccines — A Cautionary Tale, *New England Journal of Medicine* **357**:1278–1279, 27 September 2007 | doi:10.1056/NEJMp078187.

41. Thimerosal in Vaccines, *FDA: U.S. Food and Drug Administration*, fda.gov/BiologicsBloodVaccines/SafetyAvailability/VaccineSafety/ucm096228#t1, 18 June 2014.

42. Description of how diphtheria and tetanus toxoids are prepared, fda.gov/downloads/BiologicsBloodVaccines/Vaccines/ApprovedProducts/UCM142732.pdf

43. Do vaccines contain formaldehyde? Vaccine Information Center, *The Children's Hospital of Philadelphia*, vec.chop.edu/service/vaccine-education-center/vaccine-safety/vaccine-ingredients/formaldehyde.html, April 2013.

vaccination schedule for infants would result in about 120 µg.⁴⁴ So let's put that into proper perspective.

Actually, our bodies produce formaldehyde in small amounts. Metabolism of some amino acids produces formaldehyde as a byproduct. And it is even essential as a metabolic intermediate in manufacturing purines (essential components of DNA and RNA) and some amino acids. So the naturally occurring concentration of formaldehyde in our blood is 2–3 µg/g⁴⁵ or about 2–3 mg/L. So even a 2-month-old infant with half a litre of blood would have 1–1.5 mg in the whole bloodstream. It means that the total recommended vaccination schedule would add about a tenth to the infant's natural level, which is below the natural variability.

We can't escape formaldehyde from outside, because it is contained in many foods, especially pears, which have about 60 µg/g (mg/kg), and cod, apples, and pork have about 20 µg/g.⁴⁶ Thus a 200-g pear would have 12,000 µg, 100 times as much as the total infant vaccination schedule.

Aluminium

Aluminium is an adjuvant, that is, it enhances the immune response, so that less of the deactivated infectious agent is needed. Aluminium is in any case abundant in nature, e.g. clay minerals are aluminosilicate sheets (called *phyllosilicates*).

Egg protein

Albumin, the protein from eggs, is used as a vaccine stabilizer. This is what's responsible for many of the reported allergic reactions to vaccines. This is a non-issue for those who can eat eggs or egg products.

"I got influenza from the flu shot"

No, you didn't. Dead viruses simply can't cause infection. The impression is a good example of the fallacy, unfortunately widely used by anti-vaxers, of *post hoc ergo propter hoc* ("after this therefore because of this"). That is, some people became ill after a flu shot, so think that the flu shot caused the disease. In reality, it takes about two weeks for the body's immune system to respond fully, and these unfortunates caught the live flu virus (if in fact the illness was influenza, see below) before the immune system was fully protective. Also, no system is totally effective, and sometimes the vaccine doesn't contain the right match for the live virus in the current 'flu season'.⁴⁷ Finally, again, too

44. The Toxin Gambit Part 1: Formaldehyde, *Just the Vax Blog*, justthevax.blogspot.com.au/2009/05/toxin-gambit-part-1-formaldehyde.html, 11 May 2009.

45. Report on Carcinogens, Thirteenth Edition: Formaldehyde, National Toxicology Program, *U.S. Department of Health and Human Services*,

46. Formaldehyde, International Programme on Chemical Safety, *World Health Organization*, incem.org/documents/ehc/ehc/ehc89.htm#SubSectionNumber:5.1.4 1989.

47. What about people who get a seasonal flu vaccine and still get sick with flu-like symptoms? in: *Misconceptions about Seasonal Flu and Flu Vaccines*, cdc.gov/flu/about/qa/misconceptions.htm.

many people call a bad cold ‘the flu’, and an influenza shot won’t protect against non-influenza illnesses.

“Vaccines cause autism”

This is a very common claim, and as above, the bureaucratic bungling about thiomersal just fed into the scaremongering about vaccines. However, study after study has shown no link between vaccination and autism.⁴⁸ The U.S. National Academy of Science’s (NAS) Institute of Medicine published a study in 2004 which summarized:

Thus, based on this body of evidence, the committee concludes that the evidence favors rejection of a causal relationship between thimerosal-containing vaccines and autism.⁴⁹

But like the whack-a-mole game, this charge keeps raising its head after being refuted repeatedly. In particular, the originator of the claim, Andrew Wakefield, has been thoroughly discredited for fraudulent research⁵⁰ and was stripped of his medical licence in 2010 for showing “callous disregard” for children’s welfare.

Also, and very importantly, if the autism really were due to thiomersal in vaccines, then removal of that from most vaccines should have caused reduction in autism rates. But they are rising instead.

Leaving aside the possibility that some of this may be due to overdiagnosis, focusing on one cause that has been so thoroughly investigated (as is proper) and discredited⁵¹ risks distracting from the task of finding and addressing the real causes. Whether these turn out to be wholly environmental, or at least partly genetic (as a result of the Fall, some 100 new mutations per generation are added to the human genome⁵²), this is the most compassionate thing we can do as a society in the face of those families afflicted with this condition.⁵³

48. See the recent overview by Jay Wile, Vaccines DO NOT Cause Autism, drwile.com/lnkpages/render.asp?vac_autism, 2009.

49. Immunization Safety Review: Vaccines and Autism, Institute of Medicine of the National Academies, 14 May 2004; iom.edu/Reports/2004/Immunization-Safety-Review-Vaccines-and-Autism.aspx

50. Godlee, F., Smith, J., Marcovitch, H. ‘Wakefield’s article linking MMR vaccine and autism was fraudulent’, *British Medical Journal* **342**:c7452, 2011 | doi:10.1136/bmj.c7452.

51. Not of course in the minds of those who propose a monstrous (and highly implausible) conspiracy involving government, industry, and the health professions.

52. Known as genetic entropy, this is an important issue that creationist Cornell Professor Dr John Sanford has researched and written about at length.

53. Because we are so used to ‘cause and effect in time’ in our everyday experience, it is difficult for a parent whose child’s symptoms of autism first became apparent, say, a few days or weeks after vaccination, to accept the overwhelming statistical evidence that indicates absence of such a link. Especially once the notion has been implanted by certain websites. Of course, if the fearmongering were around the idea that, say,

One can't help but comment on the gross inconsistency in common anti-vax claims. On the one hand, they reject the strong, repeated correlation between introduction of vaccines and decrease in disease (and between rise of anti-vax practices and rise of those diseases). But on the other, they accept a correlation between vaccines and autism that's so weak as to be non-existent.

“More vaccinated kids become sick than unvaccinated kids”

This claim is a clear demonstration of the misunderstanding/misuse of statistics. The important thing is the percentages of sicknesses in the vaccinated and unvaccinated kids, not the absolute numbers, simply because (fortunately) many more kids are vaccinated. One anti-vaxer claimed, “We have mumps outbreaks in the UK where 92% of the affected were fully vaccinated ...”⁵⁴ Now I have learned not to trust unsourced claims from anti-vaxers (and this is so for even most sourced claims because of their propensity to misrepresent the sources), but even if we take this claim as factual, this is insufficient.

To illustrate: suppose that in an outbreak, there were 100 cases of mumps, and 92 of them were vaccinated and 8 were not, to match the claimed figures. But what was not said was, say, this was from a sample of 10,000, of whom 98% were vaccinated, i.e. 9800 people were vaccinated and 200 were not. So in reality, the *properly weighted* percentages were $92/9800 = 0.94\%$ incidence of mumps in the vaccinated people, and $8/200 = 4\%$ in non-vaccinated people. So these statistics, *when properly understood*, show that there is *over four times the likelihood of getting mumps* when non-vaccinated.

However, real-world stats show that the chance is far higher than that. E.g. with measles, “[vaccine] exemptors were 35 times more likely to contract measles than were vaccinated persons (95% confidence interval ...)”⁵⁵

Theological/moral objections

“God made a perfect immune system and doesn't need our help”

Yes He did, but we are now in a fallen world. So the immune system demonstrably doesn't protect us from every disease, as shown by the millions who have died from such diseases over history. The same applies to those who think ‘natural is good’, a form of the naturalistic fallacy, since nature is cursed (plagues are also ‘natural’).

We should also note that if people were consistent with such claims, then they wouldn't take care of any broken skin, because why does God need our help to wash and dress wounds given that the immune system He designed can manage without our help? Nor should we apply plasters or stitches to bleeding wounds, because God created Adam with a perfect blood-clotting system that doesn't need our clever help. Maybe we should

tooth extraction caused autism, it would be easy to find many sufferers whose symptoms became apparent within days or weeks of such a procedure, without in any way providing evidence of such a link.

54. Andrew B., comment on Jonathan Sarfati, Ebola disease: the result of the Fall, creation.com/ebola-fall, 25 October 2014.

55. Salmon, D.A., Health consequences of religious and philosophical exemptions from immunization laws: individual and societal risk of measles, *Journal of the American Medical Association* **282**(1):47–53, 7 July 1999.

also refuse to wear seatbelts, because we have faith that God will keep us safe on the road. (But see Jesus' reaction when Satan made a similar suggestion to Him—Matthew 4:6–7.)

Also, since God gave Adam perfect eyesight, then we shouldn't wear glasses, since why does God need our help with His (now broken) design of the eyes with our 'clever' refractive aids?

Such a claim is also an affront to God's sovereignty. God not only ordains the ends, but the means. If God chooses to bless someone with freedom from diseases, the means by which He bestows this blessing could certainly include vaccination. I'm reminded of this old tale:

A very religious man was once caught in rising floodwaters. He climbed onto the roof of his house and trusted God to rescue him. A neighbour came by in a canoe and said, "The waters will soon be above your house. Hop in and we'll paddle to safety."

"No thanks," replied the religious man. "I've prayed to God and I'm sure he will save me."

A short time later the police came by in a boat. "The waters will soon be above your house. Hop in and we'll take you to safety."

"No thanks," replied the religious man. "I've prayed to God and I'm sure he will save me."

A little time later a rescue services helicopter hovered overhead, let down a rope ladder and said. "The waters will soon be above your house. Climb the ladder and we'll fly you to safety."

"No thanks," replied the religious man. "I've prayed to God and I'm sure he will save me."

All this time the floodwaters continued to rise, until soon they reached above the roof and the religious man drowned. When he arrived at heaven he demanded an audience with God. Ushered into God's throne room he said, "Lord, why am I here in heaven? I prayed for you to save me, I trusted you to save me from that flood."

"Yes you did my child," replied the Lord. "And I sent you a canoe, a boat and a helicopter. But you never got in."

Of course, God could have rescued him supernaturally, and it is biblical to seek healing first from Him. The point is that unless one believes that God is no longer the sovereign of even this fallen world, He is also worthy of praise for the development of such things as surgical advances, antibiotics and vaccines. If, as seems likely, an effective vaccine is developed for the Ebola that is currently wiping out many thousands (written in January 2015), such outbreaks amid fears of worldwide epidemics will be consigned to history books. We will then have a right to also see this as part of His divine blessing—just as when He supernaturally heals without any mediate cause.

Vaccination supporters are Big Pharma shills

Of course, this is an abusive *ad hominem* argument that's far too common among anti-vaxers. A similar argument that is at least not a personal attack is to complain about the large profits of pharmaceutical companies.

I *prefer* vaccines to be made from profit-oriented companies, because they will earn profits only if buyers are confident that they will work. And probably even more importantly, they will suffer bad losses if they make something that hurts someone. Conversely, non-profit also means non-loss, and I can see little worse than decisions made by people who don't stand to lose if they hurt people. As Adam Smith, actually a moral philosopher before he turned to economics, said about 200 years ago: "It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest." In this fallen world, selfishness is a ubiquitous human condition.

Also, the polio vaccine pioneer Jonas Salk famously refused to profit from his work, which probably could have made him \$7 billion if he had patented it. Another thing, the flu shot is under \$30, while there would be much more pharmaceutical profit if a person had to be hospitalized from influenza, or in days gone by, be maintained in an iron lung from polio.

Finally, many of the anti-vax sites complaining about pharmaceutical profits have huge web stores for their own products. It's not clear from biblical, or even economic, principles why 'Big Pharma' is evil while 'Big Supplement' (or 'Big Placebo') is good.

Every supermarket has rows of shelves full of natural supplements, and many of these supplements contain heavy metals such as iron, copper, and so on. But because these are apparently a natural cure they are ok, but dangerous when minute doses are put into life-saving vaccines.

Vaccines contain parts of aborted babies

As it stands, this claim is false. There are no baby parts in vaccines. There is a most tenuous connection between abortion and vaccines, as follows:

Bacteria are genuinely living organisms, so can be cultured on nutrients. Viruses are not living, so require some living cells to be cultured on. Pasteur's pioneering vaccination against rabies, caused by lyssaviruses, was obtained from the nerves of rabbits that had died from the disease. Pasteur weakened the virus by drying the nerve tissue for 5–10 days. Now most rabies is cultured on embryonic eggs—but those of chickens, not humans.

Unfortunately, some vaccines have been cultured on cell lines that came originally from aborted babies: one (MRC-5) from an abortion that was performed in September 1966 and one (WI-38) that was performed in July 1962. There is no question that these abortions were sinful. CMI takes a strongly pro-life position, that the human individual life begins at conception/fertilization, thus abortion is totally wrong, even for rape and incest (do children of rapists deserve the death penalty?).

The above is the tenuous connection between vaccines and abortion. However, no new embryos are being generated for the purpose of culturing vaccines—this would be immoral. Rather, these vaccines use the cell lines from a baby *already killed* decades ago, and that not for the purpose of creating vaccines. That deed was unfortunately done,

and cannot be undone. There is also no evidence of any ‘moral hazard’⁵⁶—that it would lead to more abortions.

A similar comparison would be organ donation. Would we refuse a life-saving organ that was from a victim of a drunk driver for example who listed “Organ Donor” on the driver’s license, because he was killed in a sinful way? Accepting this organ is in no way condoning drunk driving.⁵⁷ Another example: it would be totally immoral to murder someone to harvest his organs, even if it would save another person’s life. However, if someone you loved was murdered during an armed robbery, would it be immoral to consent to organ donation, so that even though a terrible sin had been committed, something good came from it, one silver lining on a very dark cloud? And would acceptance of such an organ mean condoning the murder? Similarly, should we refuse a life-saving treatment that is the one good thing that came from the abomination of murdering those two babies?⁵⁸

The general principle here is that *the beneficiary of the organ must not have been complicit in the crime in the slightest* (called ‘formal cooperation in evil’). Actually the biblical ethical principles were deduced centuries ago. First, there is the *Principle of Double Effect*. That is, if a contemplated action has both good and bad effects, then it is permissible only if it is not wrong in itself and if it does not require that one *directly intend* the bad result. Second, there is “remote mediate material cooperation”, meaning that the moral object of the co-operator (in this case, the one being vaccinated) and that of the wrong-doer (the abortionist who aimed for a dead baby) are distinct. Under this principle, vaccination can be allowed if necessary to prevent severe illness and death (which it does), and if we also clearly condemn both the two abortions from which cell lines were derived and any future abortion to create more cell lines (which incidentally was not the purpose of the two abortions in question).⁵⁹

An official statement from the Roman Catholic Church, which for all its flaws, has been among the staunchest defenders of the unborn, is notable here. The Pontifical

56. Economists use the term ‘moral hazard’ when a particular policy provides an incentive for wrong or counter-productive behaviour. For example, if welfare policies mean that a woman is better off financially being a single mother than marrying the working father of her child, then they will incentivize single motherhood and discourage the biblical ideal of a family with a married mother and father. Economists Thomas Sowell (1930–) and Walter Williams (1936–), themselves ‘African-American’, argue that such policies have done what slavery, overt racism, Jim Crow laws, and segregation could not: destroy the black family in America.

57. Jonathan Sarfati, Vaccines and abortion? creation.com/abortion-vaccine, 24 March 2012.

58. Jay Wile makes a similar argument in his article Vaccines DO NOT Contain Fetal Tissue, drwile.com/lnkpages/render.asp?vac_abortion, 2009, which independently came to the same conclusions as mine.

59. J.D. Grabenstein, Moral considerations with certain viral vaccines, *Christianity and Pharmacy* 2(2):3–6, 1999; immunizationinfo.org/files/nnii/files/Moral_Considerations_With_Certain_Viral_Vaccines.pdf

Academy for Life, the Vatican's official voice in the area of abortion/right-to-life, wrote a considered statement on this issue, at the request of the then Cardinal Joseph Ratzinger, the future (and now former) Pope Benedict XVI.

This statement would certainly prefer that no vaccines were made on cell lines from aborted babies. It further strongly urges its flock to demand alternatives without any ethical taint, such as using chicken eggs. But *until these alternatives exist*, the statement states that it is permissible to use these vaccines. Indeed, if we did not, we would allow the further evil of endangering one's own children and the whole community:

As regards the diseases against which there are no alternative vaccines which are available and ethically acceptable, it is right to abstain from using these vaccines if it can be done without causing children, and indirectly the population as a whole, to undergo significant risks to their health. However, if the latter are exposed to considerable dangers to their health, vaccines with moral problems pertaining to them may also be used on a temporary basis. The moral reason is that the duty to avoid *passive material cooperation* is not obligatory if there is grave inconvenience. Moreover, we find, in such a case, a *proportional reason*, in order to accept the use of these vaccines in the presence of the danger of favouring the spread of the pathological agent, due to the lack of vaccination of children. This is particularly true in the case of vaccination against German measles.⁶⁰

In any case, there remains a moral duty to continue to fight and to employ every lawful means in order to make life difficult for the pharmaceutical industries which act unscrupulously and unethically. However, the burden of this important battle cannot and must not fall on innocent children and on the health situation of the population—especially with regard to pregnant women.⁶¹

Summing up

- Vaccination is one of the most important advances that God has allowed us to discover to alleviate the effects of the Curse.
- Vaccines train our immune system with dead or weakened germs, so it is ready to destroy invading live germs.
- Many diseases have been eliminated or drastically reduced by vaccines. There is no plausible alternative explanation for why particular diseases decreased so drastically at different times that correlate to when the particular vaccines became widespread.

60. Note in original: "This is particularly true in the case of vaccination against German measles, because of the danger of Congenital Rubella Syndrome. This could occur, causing grave congenital malformations in the foetus, when a pregnant woman enters into contact, even if it is brief, with children who have not been immunized and are carriers of the virus. In this case, the parents who did not accept the vaccination of their own children become responsible for the malformations in question, and for the subsequent abortion of foetuses, when they have been discovered to be malformed."

61. Moral reflections on vaccines prepared from cells derived from aborted human foetuses, *Pontifical Academy for Life*, for the Congregation for the Doctrine of Faith, 9 June 2005; immunize.org/concerns/vaticandocument.htm; italics in original.

Further, the same diseases flare up in places with low vaccination rates. And such results are totally expected given what we know of how immunity works.

- Nothing is 100% safe. However, the safety of vaccination should not be compared with an impossible perfection, but with the (un)safety of non-vaccination.
- Vaccines are accused of containing dangerous poisons. But whether anything is poisonous depends on the amount. The ‘toxic substances’ in vaccines are many times lower than the toxic dose. Some of the ‘toxins’ exist naturally in the body in far greater amounts than the vaccines. Others occur in much higher amounts in well known foods.
- Vaccines cannot cause the disease, since they are made from dead germs. Some people get sick with the illness being vaccinated against just after vaccination, but before their immune system has been trained, so falsely think that the vaccination caused the illness. This is the *post hoc ergo propter hoc* fallacy. In other cases it is because it is a different illness (common cold rather than influenza, e.g.).
- There is no statistically significant evidence that vaccines cause autism, and much evidence to indicate that they do not.
- A claim that “We should trust God to heal us” fails for two reasons. First, such claimants would generally bandage wounds and wear seatbelts, rather than trust God to protect them from harm regardless. Second, given the doctrine of the Sovereignty of God, He is healing us through the wisdom He gave to the vaccine’s discoverers and prescribers.
- Vaccines do not have parts of aborted babies. True, some vaccines against viral diseases are cultured on cell lines from two babies aborted over 40 years ago, but no babies are being aborted today to make vaccines. Morally, it would be better to use an alternative, if it is available, but if not, it would be no different from using the organs of a person killed by sinful means—as long as the beneficiary played no part in the killing.

Overall summary statement (representing the position of CMI ministries generally)

Vaccination of minors, in most jurisdictions, remains a parent’s choice. While there are real and immediate risks associated with vaccination, these are small overall, and the long-term risks of non-vaccination are much greater. Therefore, it is our opinion at this point in time that people should not forego vaccinations unless there is a sound medical reason for this following discussion with their own professional medical adviser. In fact, we urge people to consult their own doctors regarding any decision involving their own or their family’s health; none of this article should be construed as individual-specific medical advice.