

A critique by the Immunisation Advisory Centre (IMAC) of the Immunisation Awareness Society pamphlet *“What’s all the fuss about?”*

“Everyone is entitled to their own opinions...but no one is entitled to their own facts.” James Schlessinger, Essays on Science and Society. Science 279: March 13 1998.

This critique is produced in response to concerns that the IAS pamphlet has been distributed at times as part of the informed consent process on immunisation. On reviewing the pamphlet we conclude that it is not evidence-based. It is both inaccurate and misleading.

It is very difficult for parents when opinion and anecdote are referenced as if they were of equal validity to scientific research. Evidence based health care involves the explicit and safe use of the currently available best evidence.

This critique responds to the themes raised in the pamphlet and is intended to assist health professionals in their use of good science to support parents in their decision-making processes.

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Key General Points

The “What’s all the fuss about” IAS pamphlet makes a series of claims about immunisation and vaccines which in combination present a seriously flawed interpretation of current evidence on childhood immunisations:

- References are not included in all versions of the pamphlet in circulation although numbers are shown after statements. They can be found in the electronic version but not paper versions, therefore checking or validating them can be difficult
- Statements of fact are made using any available literature regardless of its quality or source
- Conclusions have been drawn without relevant evidence being cited
- There is consistent misinterpretation and misrepresentation of scientific data to support the claims
- The facts have been determined a priori (made before or without examination; not supported by factual study) without any regard for the available evidence.

Primary themes identified in the IAS pamphlet have been responded to in sequence and are noted in quotation marks.

Decline in infectious diseases

“Vaccination has not been responsible for the major decline in infectious diseases”

There are no peer reviewed scientific references given for these claims. There is an enormous volume of scientific literature to support the major role of vaccination in disease control and eradication. “The impact of vaccination on the health of the world’s peoples is hard to exaggerate. With the exception of safe water, no other modality, not even antibiotics, has had such a major effect on mortality reduction and population growth”¹. Obviously better living conditions have a great impact on infectious disease, especially in terms of transmission. However the graphs depicted in support of these claims are somewhat misleading as they terminate at 1970 and are not sensitive enough to illustrate epidemics. When the time frames are extended to include the past 30 years a different pattern emerges. (See Tables 1-6)

The “Germ Theory of Disease”

This section emphasises the concept - well accepted in medicine - that a multitude of external factors affect the host response to infectious diseases. Well-nourished populations have lower rates of morbidity and mortality from infectious diseases and a good example of this is measles. In malnourished populations the mortality rate from measles is as high as 30/100 (30%), in well nourished populations such as in New Zealand the mortality rate is 1/1000 (.01%)²⁻⁵. However healthy people still contract vaccine-preventable diseases and die from them. Most (but not all) of this sickness and death can be prevented by immunisation with very low chance of harm. For this reason most health care professionals recommend immunisation.

How vaccination works

“Vaccines are commonly believed to work by producing antibodies”

The comments in this section illustrate a profound lack of knowledge in basic immunology. Vaccines stimulate both humoral (antibody) and cellular memory (via T and B cell functions) and these are not mutually exclusive events. In fact live viral vaccines are very effective stimulators of the cellular arm of the immune system. It is also well established that acellular pertussis vaccines stimulate both humoral and cellular immune responses⁶.

For example, MMR vaccine produces both humoral (antibody) and cell-mediated immune responses, both of which are similar to those induced via natural infection^{1 7}. The early production of T-cells is responsible for antibody production.

The laboratory measurement of whooping cough (pertussis) correlates of protection are indeed difficult as there is no single specific antibody response that can consistently be used for this purpose - several are needed.

Vaccines, like the natural infection, create specific memory to a pathogen. If the pathogen mutates (a good example is influenza), then immune memory to one strain will obviously not necessarily protect against another.

Vaccination and susceptibility to other diseases

“Two generations of vaccination has made today’s babies more vulnerable to disease”

This is incorrect⁸ and there is no scientific evidence supplied for this opinion.

Transmission of maternal antibodies

“Vaccinated women pass less antibodies on to their babies”

This is true in the case of measles, the protection a vaccinated mother imparts to her child, although present, does not last as long as a mother who has previously suffered and recovered from measles however this is not true for diseases such as whooping cough where babies do not gain protection from their mothers⁹. There is no evidence to suggest that vaccinated babies are more at risk of diseases than babies of unvaccinated mothers in the first year of life. The references used to support this claim only refer to measles^{10 11}.

Furthermore it is important to remember that a mother passes on antibodies that she has developed in response to vaccination to her baby and this can provide protection to the infant in early life¹²⁻¹⁵. It also worth noting that a mother who has a memory of a disease – whether vaccine induced or naturally acquired – will produce a strong and rapid response if she comes into contact with the disease and this can be passed onto her infant if she is breastfeeding.

Vaccination and unbalanced immune systems

“Vaccinated children tend to have an unbalanced immune system and develop autoimmune and allergic diseases.”

This is incorrect⁸ and there is no scientific evidence supplied for this opinion. There is no evidence that vaccines predispose children to other illnesses in fact quite the opposite. There is a large amount of data to show there is no causal association with allergy, autoimmunity or immune deficiencies –

summarised well by the USA Institute of Medicine⁸. There is also now data to show vaccination confers a small protective effect against asthma¹⁶ and a more significant protective effect against SIDS (Cot death)¹⁷⁻¹⁹.

Overloading the immune system

“Vaccines overload the immune system”

There is no evidence to support this claim. Vaccines do not “overload” the immune system, which is very capable of responding to a great many foreign organisms all at once, many times more than are found in vaccines^{20 21}. From the moment you are born you are exposed to thousands of organisms, and continue to be exposed on a daily basis. Vaccines are only used for a few potentially severe organisms.

The study quoted and used to claim that viral vaccines have been shown to depress cellular immunity has been misunderstood. The study discussed used a DNA vaccine to obtain optimal immune responses in mice. The responses generated by the DNA vaccine were better than those generated by the conventional vaccine. This is not surprising as DNA vaccines show great promise as optimal stimulators of the immune system. The results of this study do not however suggest that the conventional vaccines are responsible for “skewing” the immune system by “suppressing” the cellular arm of the immune system. It is important to remember that a specific immune response (its qualitative and quantitative profile) is generated against a particular challenge (hence specific). For example in this case the immune response was relevant to the particular vaccine antigens used (antigen specific). This particular immune response does not “skew” the entire immune system²². Also of importance is that this study used mice, not humans. Conventional viral vaccines do not suppress the cellular arm of the immune system⁷ further supported by a study using MMR vaccine which found Interferon-gamma was the principal cytokine produced after primary measles immunisation, suggesting primary measles immunisation induces predominantly a TH1 (cellular) type response²³.

Vaccine contents and manufacture

“Vaccines contain very toxic substances that are poisonous to our bodies”

As with any food or medication, there are residual substances in vaccines that are part of the manufacturing process. There are also components to stabilise the vaccine and to make delivery most effective. The substances in vaccines are required to be closely monitored in the design phases and the safety trials before they are approved. Formaldehyde is used in the manufacturing process of IPOL (inactivated polio vaccine given to 11 year olds). It is not part of vaccine contents, however there may be traces remaining in the final product at a level of 27 parts per million.

No infant vaccines in New Zealand now contain thiomersal. There is thiomersal in the ADT[®] adult diphtheria, tetanus vaccines given to 11 years olds and in the Fluarix[®] influenza vaccine. Thiomersal in vaccines has not been shown to be dangerous. It is used to protect against contamination of vaccines by bacteria. As thiomersal is a mercury product it was deemed appropriate to phase it out from childhood vaccines to remove any theoretical risk of toxicity, particularly for very

low birth weight babies. Following infant vaccination with thiomersal-containing vaccines the levels in blood are much lower than prescribed limits and most is excreted in the faeces²⁴. The levels present in vaccines are not considered dangerous and there is no evidence to suggest otherwise^{25 26}.

2-phenoxyethanol is used to preserve some vaccines. There is no evidence to suggest that it poses a risk to children. It is also commonly used in cosmetics, baby care products, eye and eardrops and aromatherapy products, protecting against contamination.

Aluminium is one of the most common elements on earth and a natural part of the environment and our bodies. The levels in vaccines are very low in comparison to the intake from food and other environmental factors, including breastmilk^{27 28}. Most injected aluminium is excreted over several hours²⁹. Contrary to some popular beliefs aluminium has not been shown to cause Alzheimer’s disease (AD) or dementia. AD is not related to aluminium levels. People once got a form of dementia on renal dialysis because there was too much aluminium in their blood; the use of purified water stopped that. The pathology in the brains of these people did not look anything like AD. Attempts to induce disease in animals that looks like AD by feeding them aluminium, have failed³⁰.

“Vaccines can contain foreign viruses, aborted fetuses or genetic material that was present in the host animal”

This is out of context. The only known incidence of vaccine contamination that affected New Zealanders is that of the polio vaccine used in the late 1950s and early 1960s. Some batches of this vaccine contained the SV40 virus, which with the technology available at the time could not have been detected. There have since been ongoing investigations into the long-term implications of this and there is still debate over whether or not there has been any impact on public health^{31 32}.

The vaccine strain of rubella was derived from a rubella-infected fetus in 1965. This was then cultured in a second cell line that was also developed from fetal tissue¹. The reason for using these cells is that rubella is a human disease and requires human cells to replicate. Early attempts to use animal cell lines were unsuccessful. There has never been any further foetal tissue used in the production of rubella vaccine.

Speculating about theoretical possibilities for potential contamination of vaccines and the possible outcomes is not evidence and should be weighed against what we do know. For example, hepatitis B – a vaccine preventable disease – causes more cancer than any substance other than tobacco. The hepatitis B vaccine is our first effective anti-cancer vaccine.

Transmission of vaccine viruses

“Live viral vaccines cause disease therefore contacts of vaccinees are at risk”

In the case of live polio vaccine this was true. Live polio vaccine could cause paralytic polio in rare cases, approximately 1 in 4.6 million doses³³. However, New Zealand no longer uses live polio vaccine.

In the case of MMR vaccine this is inaccurate. It is known that MMR vaccine can cause disease in immunocompromised children and therefore this vaccine is contraindicated in these children. There is no evidence to show that vaccine associated

disease has occurred as result of being transferred from a vaccinated individual to another. In fact it is used widely internationally in children who are contacts of the immunocompromised¹. Clearly this would not be possible if the disease was transmissible through the vaccine.

There is a risk of live varicella (chicken pox) vaccine being transferred to others. This has happened only very rarely. In the USA, where 15 million doses of varicella vaccine have been distributed, there have been three reports of transmission of the vaccine-type virus from a healthy vaccinee to a healthy contact. All cases have been mild. The risk of spread to contacts from immunosuppressed individuals is greater³⁴. Varicella vaccine is not on the New Zealand national childhood schedule.

Vaccine efficacy

“Vaccines are not very effective at preventing diseases and children who are immunised still get disease”

Vaccines are very effective at preventing disease (see point 1). Each vaccine licensed in New Zealand and used on the childhood schedule because of researched and peer-reviewed evidence of efficacy. For example, the efficacy of measles vaccine is 90-95% and the current pertussis vaccine used in New Zealand has an efficacy of 86% after 3 doses¹.

Vaccinated children can still get disease because no vaccine is 100% effective. As the proportion of children who are immunised increases, so the proportion of disease cases that are immunised will increase. Simple arithmetic shows that if 95% of children are immunised with a vaccine that is 95% effective, half the cases of disease will be among immunised children.

A recent New Zealand study has illustrated the importance of timely immunisation³⁵. It found that during the last whooping cough epidemic in 1995-7 delayed immunisation was a specific risk factor for admission to hospital with whooping cough, but not a risk factor for admission to hospital for other acute respiratory illness. Infants who were behind with their immunisations, or who were unimmunised, were 4-6 times more likely to be admitted with whooping cough.

Vaccine side effects

“No long-term studies of vaccine side effects have been done”

This is inaccurate. Licensure of vaccines around the world has been based on the research from randomised controlled trials. There are a large amount of these giving a huge body of evidence behind stage three preclicensure trials for vaccines¹. These trials are submitted for careful independent peer review including quality checks of the data and data analysis. Long-term reviews are surveyed using many different methodologies³⁶.

Other ways of looking for long-term consequences is to study possible vaccine reactions. There are a range of methodologies used for investigating a hypothesis and looking for long-term consequences. For example the recent question arose about whether there was a link between the MMR vaccine and autism. Around the USA, UK and Europe there have been a range of studies using different methodologies (cohort follow up, case control, retrospective analysis, linked database, etc) on

many thousands of children and together these have shown there is no link.

A particularly useful vaccine safety research methodology used in the USA is the linked databases where with the very large managed care organisations children's full medical history together with their vaccination history can be linked providing good epidemiological data very quickly on any unexpected possible adverse event that may be proposed³⁷.

Comparisons between vaccinated and non-vaccinated children

“There are no comparisons made between vaccinated and non-vaccinated children”

This is incorrect. There is a range of methodologies used around the world to compare disease incidence between vaccinated and unvaccinated children. For example, comparing a population for a disease incidence prior to and after the introduction of a vaccine; linked databases comparing a child's immunisation status with their primary health care contacts and hospital admissions; looking for temporal associations with diseases and vaccines to see if there is biological plausibility. By using a range of methodologies such as the above it was shown there was no link between the MMR vaccine and autism³⁸⁻⁴⁰.

Rates of vaccine side effects

“Vaccines have much higher rates of side effects than is officially recognised”

Vaccines are one of the most closely monitored substances in use (far more than food products or most pharmaceutical products) and safety profiles are well established through research^{1 36}. Passive monitoring underreports minor events but its purpose is to act as a warning system for potentially serious reactions. A good reporting system uses a range of different methodology and reporting mechanisms, which includes both passive and active monitoring³⁶. Currently New Zealand only has a passive reporting system and is reliant on data from other western countries for rates of rare reactions. This is mostly because our population size is small and rare events are difficult to pick up.

“Vaccines have been linked with or shown to cause autism, meningitis, diabetes, SIDS and degenerative brain diseases leading to death”

The references cited are not supported by the large body of literature in these areas and certainly do not support these claims.

There are known risks for vaccination which are well documented¹ and continue to be reviewed. Some are serious, however the incidence of serious adverse events overall with the current New Zealand schedule vaccines is extremely rare.

- Vaccines do not cause SIDS (Sudden Infant Death Syndrome) and in fact appear to have a protective effect⁴¹⁻⁴⁴.
- Vaccines do not cause asthma and in fact may have a protective effect^{16 21 45-47}.
- Vaccines do not increase the risk of autoimmune diseases²¹.

- Vaccines do not cause autism or other neurological disorders^{48 49}.

Ignoring the majority of the literature on a subject and selecting isolated examples that appear to favour one's cause is inappropriate to good medical practice, and extremely unscientific.

Using all the raw data from passive surveillance systems as a measure of vaccine reactions does not give an incidence of adverse events. It is important to note that any event following immunisation can be reported but this does not necessarily mean that the cause was a vaccine. Once each case has been assessed then the cause of the event can be attributed. **There have been no known deaths in New Zealand caused by vaccines.** For other serious reactions reported to New Zealand's Centre for Adverse Reaction Monitoring (CARM), in Dunedin, the incidents are assessed on a case-by-case basis and then cause attributed to vaccination is ranked on a scale from 'almost certain' to 'highly unlikely'.

It should also be noted that minor reactions to vaccines are not necessarily adverse in that a minor event such as a moderate temperature, site reaction, etc. shows that the body is mounting an immune response to the vaccine. A slightly feverish child 10 days following MMR vaccination shows an immune response to a weakened virus. The general aim of immunisation is to get the immune system to respond so it will have a memory of the disease and a minor reaction is evidence of this response.

Vaccine industry earnings

"The vaccine industry earns billions of dollars annually and is immune from being sued"

The USA has introduced a no fault compensation because of the litigious risk to vaccination manufacturers in the US (October 1st 1988), many of whom were going out of business, leading to a potential crisis in vaccine supply⁵⁰. Many pharmaceutical companies are choosing not to continue making vaccines due to the financial risks involved and potential for considerable loss⁵¹. The increasing cost of vaccine development and production, mergers of manufacturers and relatively low revenues from vaccine sales compared with other pharmaceutical products such as lipid lowering drugs, may have contributed to the reduction in vaccine manufacturers in the past 25 years⁵¹.

Doctors and health professionals against immunisation

"Doctors and health professionals against immunisation lose their funding for research"

Many scientists are employed in academic positions, and an important part of their responsibilities is to examine and critique the validity and accuracy of research findings. A recent example of appropriate scientific research leading to action is that of the withdrawal of a rotavirus vaccine. When the flag was raised by doctors and researchers showing a potential problem with the vaccine it was promptly withdrawn from the market⁵². There are plenty of examples of funded studies questioning the safety of vaccines being published and also a significant amount of active research in the area. However, one observation does not make a fact, one study does not prove anything, it only adds to the body of evidence – much as one building block adds to a wall.

Factors that increase the risk of adverse reactions

There are a number of conditions that are contraindications to vaccination. If one of these is present the person should not be vaccinated. Contraindications vary for different vaccines. Genuine contraindications include:

- Evolving neurological conditions
- Certain immune deficiencies such as leukaemia
- Chemotherapy

Precautions include:

- A high fever >38°C.
- An allergy to a component in the vaccine
- A previous serious reaction

Conditions that are not contraindications to immunisation:

- A cold
- A family history of reactions
- History of allergy such as asthma or eczema.

The comparative health of unvaccinated children

"Unvaccinated children are healthier than vaccinated children"

The evidence supplied suggesting that unvaccinated children have fewer health problems than vaccinated children is just plain silly. A survey conducted in the manner described has so much potential for bias that the results can only be described as nonsense. The survey by Mike Godfrey invited readers of *Healthy Options* magazine (unlikely to be a representative sample of the New Zealand population) to send in a completed survey asking parents if their children had been vaccinated and whether they suffered from a number of health problems. This is used as a teaching example to undergraduate medical students of how **not** to conduct meaningful research. Mike Godfrey has never published any research on vaccination in a peer-reviewed forum. A survey such as this would not meet the strict criterion for proper unbiased research.

There have been a number of properly designed, more rigorous studies carried out to investigate whether vaccination predisposes to more health problems. These studies use validated research methods and have been published in respected peer reviewed medical journals.

Neurological disorders: Vaccination has been repeatedly exonerated as a risk factor for neurological disorders such as epilepsy, autism and developmental delay^{48 53 54}. One of the most serious sequelae from vaccine preventable diseases is brain damage therefore the prevention of the diseases obviously results in fewer intellectually disabled people. For example following a comprehensive vaccination campaign in Finland against Measles Mumps and Rubella, the most common form of encephalitis (caused by mumps virus) disappeared from the country⁵⁵. There is a rare association between the MMR vaccine and encephalitis at around 1/1,000,000.

Asthma: There is no association between vaccination and allergy including asthma^{16 21 45-47}. Some studies have demonstrated a slight protective effect¹⁶.

Ear infections: Ear infections (otitis media) are caused by bacterial and viral organisms. These include streptococcal, pneumococcal and *Haemophilus influenzae b*, viruses such as

the respiratory syncytial virus and influenza. Vaccines against these agents can reduce the incidence of ear infections. Immunisation against influenza protects against some ear infections. New vaccines are under development which will act against more of the organisms that contribute to ear infections and have the potential to further reduce the problem⁵⁶⁻⁶².

Tonsillitis: While there is no present anti-tonsillitis vaccine, vaccines have the potential to be developed that could protect against this problem⁶³.

Apnoea: Vaccination decreases the incidence of apnoea (stopping breathing) in infants. As this condition is often caused by pertussis (whooping cough) this finding is not surprising. Monitoring babies following immunisation shows no increase in apnoea^{64 65}. However very preterm babies may be at risk of increased apnoea following vaccination⁶⁶.

Diabetes: Reviews of the evidence have concluded that vaccination is not a risk factor for diabetes^{21 67}.

Vaccine preventable diseases in healthy children

“Vaccine preventable diseases are not serious in healthy children, and confer lifelong immunity when contracted”

Vaccination is used in New Zealand only for selected diseases because these diseases have high morbidity and mortality. There is no evidence that experiencing the nine vaccine preventable diseases strengthens a child’s immune system. The references used to support this claim are not research papers addressing this issue. The first is an opinion published in the *The Homeopath*⁶⁸, the second is an opinion published in a *Scandinavian social medicine journal*⁶⁹ and the third is an article about Parkinsons disease (PD) and previous history of infection including measles published in the *American Journal of Epidemiology* It did not conclude that measles protects against PD⁷⁰. Here are four examples of the potential serious consequences in healthy people.

1. **Measles** infection causes death in 1/1000-1/4000 cases in healthy well-nourished children. A further 1/1000-1/4000 contract permanent brain damage⁵. Other complications are pneumonia (1/10 – 1/100), and otitis media (1/10- 1-100). Measles is extremely contagious.
2. **Pertussis (whooping cough)** infection does not confer life-long immunity, immunity lasts approximately 10 years at most^{71 72}. The highest risk for death from pertussis is among the under 1 year age group, which constitute 80% of all pertussis deaths⁷³. New Zealand infants who are behind in their immunisations or unimmunised have a 4-6 fold increased risk of being admitted to hospital with the disease³⁵.
3. **Haemophilus influenzae b** complications include a 7% risk of deafness, a 10-20% risk of permanent neurological impairment and a 5% risk of death⁴.
4. **Hepatitis B.** Babies have the highest risk of becoming chronic carriers of the hepatitis B virus (68%). Complications of this carrier state include cirrhosis of the liver (5-10%) and cancer of the liver (5-10%)⁴. The hepatitis B virus is extremely carcinogenic.

Well-nourished and well-loved children still get sick and die from vaccine-preventable diseases³.

As an aside, should people who are unfortunate enough to be a) too young to be vaccinated or b) have a compromised immune

system, suffer the consequences of an unimmunised population and high levels of circulating communicable diseases? A highly immunised community will protect these very vulnerable children.

Vaccine proponents

“Vaccine proponents sometimes use fear tactics and over – emphasis the risk of disease”

We (Immunisation Advisory Centre, IMAC) are surprised at the number of New Zealand parents who are unaware of the real side effects of these diseases, and who believe that healthy living will be enough to fully protect their children. So long as data presented on the side effects of the diseases is accurate it is not scare mongering. There have been two deaths from pertussis in babies who were too young to be fully vaccinated in the past 12 months. This data and other epidemiological data are freely available from the national surveillance figures (www.esr.cri.nz.) These diseases were only made notifiable in New Zealand in 1996.

Informed choice

Informed choice is central to making good health care decisions for our families and ourselves. By introducing flawed information the term “informed choice” becomes meaningless. The information presented by some sources is purely the opinion of the author and therefore does not contribute to informed decision making.

There is a vast amount of information available about immunisation. Some of it is dubious at best. Studies have shown that many anti-vaccination websites are not supported by scientific evidence and that they rely on emotional appeal to convey their message^{74 75}. For many people, the decision not to vaccinate may be a manifestation of wider philosophies that embrace individualism, new age lifestyles and ideals. For others it may represent an antiauthoritarian position. Facts are not always relevant. It is important that when evaluating the information that we are critical and retain an open mind. Science is the best tool we have for evaluating data and although it does make mistakes and is not perfect it can be extremely useful when navigating the perilous rivers of information.

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Tables 1-7. The decline of infectious diseases

Graphs depicting the impact of vaccination on rates of death in New Zealand 1931-1999 Source: New Zealand Health Information Services



