

Vaccine Q&A

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Introduction

When it comes to child health, prevention is better than treatment. Nowhere is this more evident than with routine childhood immunizations.

There is zero doubt that childhood immunizations are one of the great inventions and public health triumphs of the 20th century, perhaps even in the history of mankind. When one weighs the benefit/cost ratio of current vaccines, they, along with clean water, remain the greatest health boon for children in the proud history of medical science.

Their stunning success, however, has spoiled us. Because vaccines have done their job, and vaccine-preventable diseases are no longer as prevalent as they once were, many parents do not see these diseases as a threat. The rarity of once-common disease is a victory so complete as to create complacency – which in turn creates conditions allowing the victory to be reversed.

Vaccines are so much the victims of their own success that, in the seeming absence of vaccine-preventable diseases, many parents now fear vaccines more than the diseases known to them only vaguely. Some even now imagine and argue that children would be safer without vaccines, because of their rare or entirely fictional side effects.

Yet perceiving the risk of vaccines as greater than the risk of the diseases they prevent is a terrible misperception. Withholding vaccinations as a result of this misperception is a profound miscalculation, with potentially devastating consequences.

Vaccines have worked so well that we suffer from a cultural mass amnesia – we've forgotten what these diseases can do and did to our children. Before the development of many of today's vaccines, hundreds of thousands of U.S. children annually became infected with viruses and bacteria that too often resulted in lifelong disabilities or death.

More than a half century of successful mass immunization programs have vastly decreased these vaccine-preventable illnesses to the degree that many American parents are unaware that most of these disease-causing germs still exist, and in our everyday environments. They do, they can be passed on to people who are not protected by vaccines, and they can be just as deadly.

Worldwide, tens of millions of lives have been saved by vaccination. Millions of premature deaths have been prevented, and countless more children have been saved from disfiguring and permanently disabling illness. Vaccines have saved more lives than any other single medical advance. UNICEF has estimated that more than one-third of children of the 10m children who die worldwide every year would live were they properly vaccinated.

While most modern parents have little or no experience with vaccine-preventable diseases, medical professionals regrettably do have that experience. Every doctor has seen no small number of unvaccinated children die or become disabled from one or more of these diseases. None of us want to see these infections again, especially when they are preventable.

We must not fail to appreciate our societal good fortune to be free from diseases that have been eliminated – smallpox – and to be largely free of diseases once terribly common – whooping cough, tetanus, mumps, measles, rubella (German measles) et al. Thanks to vaccines, polio and diphtheria are now confined to the world's medical backwaters.

But tetanus lives everywhere, in soil and rusty nails, and as many as 6 million Americans are exposed to whooping cough each year.

That is why we must continue to be diligent about vaccinating our children. That we rarely, if ever, see vaccine-preventable illness is owed to the fact that vaccines are working. And they will continue to work only so long as we continue to immunize our children.

So What If I Don't Choose To Vaccinate My Children. What's The Harm?

Misinformation about vaccine safety has become so commonplace it is now affecting the judgment of parents at levels that could spark an outbreak of diseases previously eliminated from the United States by vaccination. Pockets of families resistant to vaccination are potential hotbeds for the spread of a vaccine-preventable infectious disease that could sweep through children at school where exemption rates are high.

Vaccine-preventable diseases are still widespread in much of the world. International travel is continually reintroducing these diseases into the United States. We are an immigrant nation. Our own citizens travel abroad with ease and in larger numbers than even before. Neither our borders nor our airport security checkpoints protect us from the import of diseases once common here and still common elsewhere.

For example, every year, measles, mumps, and other vaccine-preventable diseases enter the country through foreign visitors, or U.S. residents returning from abroad. In years past, a typical year would bring one outbreak, infecting ten to twenty people. In Third World countries with no measles vaccination, the disease killed nearly a quarter-million children in 2006.

But recent years have seen at least a dozen outbreaks in the U.S., the majority of those infected being American citizens who were unvaccinated, most by choice. As a result, measles cases in the U.S. are at the highest level in a decade, with nearly half of cases involving children whose parents rejected vaccination. Nearly one-quarter of cases have required hospitalization.

The benefits provided by most vaccines extend beyond benefit to the individual who is immunized. They are not just personal but societal.

Vaccines offer significant public health benefit. Those who refuse to vaccinate not only risk the personal well-being of their children, but the society in which they choose to live. As the old saying goes, **when you take up space within a community, you must also pay rent.**

By choosing not to immunize, parents not only actively accept a health risk to their infants and young children that is greater by far than any risk posed by vaccines. A recent study from Colorado demonstrated that children with non-medical deferral of pertussis vaccine had a 23-fold increased risk of pertussis illness compared with children up to date on their immunizations. If the child is an infant, and contracts pertussis (whooping cough), the risk of death is as high as 1 in 10.

Our youngest children, who are our most vulnerable to disease, cannot make decisions for themselves as to whether to vaccinate.

By choosing not to immunize, parents also create situations in which their children may pose a serious risk to other children, and to our friends, family, and neighbors who are medically fragile. An unimmunized child living in a well-immunized community derives significant indirect protections from "herd immunity".

But when the same protections are not offered in return, that is an unfairness that borders on selfishness.

Widespread vaccination creates **herd immunity**, which means the disease has fewer hosts. If you are vaccinated, you won't pass a disease on to someone else, who won't pass it on to six more people, and on and on. As Clarence, the angel from "It's A Wonderful Life", said, "Strange, isn't it? Each man's life touches so many other lives."

As the percentage of people who are immunized rises, the transmissibility of diseases declines. Each person who is immunized becomes a firewall against the spread of disease. Each person who is not immunized is not only personally unprotected, but weakens the firewall that can stop or slow the spread of disease.

However, when the presence of clusters of intentionally unvaccinated children allows a vaccine-preventable disease to gain a toehold in an area, medically-fragile children and adults are much more likely to get sick and to die from vaccine-preventable diseases unless they are protected by herd immunity.

Thanks to advances in medicine, we now live alongside premature infants; children with congenital heart, lung and metabolic diseases; children and adults with immune systems weakened by HIV, cancer, medications or chemotherapy; or people who have received organ transplants.

The medically fragile also include infants too young to have yet been immunized, and elderly persons who may not be immune or whose immunity has waned over the decades. For them, herd immunity is the only defense.

Additionally, a chronic illness such as leukemia can develop in any child – perhaps someday including one's own. Children who cannot receive vaccines for medical reasons can only be protected by herd immunity. Such children are more likely to suffer serious consequences or even death should they contract a vaccine-preventable illness.

Who would not feel for the kid with leukemia who, after fighting off the cancer, might die from measles, or chickenpox, while her immune system is still recovering? Who would not feel for the person living with HIV/AIDS, doing everything he can to keep himself healthy, only to have his life cut short because his neighbor decided to turn her child into a disease vector at a "measles party" or "chickenpox party".

In short, who would not feel for those whose lives are at stake?

The point of vaccinations, therefore, is to protect not merely ourselves, but our community. Vaccines are not just a means of preventing individual children from contracting disease. They are also a means of protecting entire populations.

As long as the majority is vaccinated, a few can decline without courting harm. But when vaccination rates fall below a certain level this protection quickly begins to vanish. At that point, someone who refuses a vaccine imperils not only his own health but that of everyone he encounters.

Herd immunity is threatened as more and more parents free-ride off of the community's dwindling immunity, and outbreaks of disease thought to have been conquered are occurring with greater frequency. We assist the infirm, pay our taxes, and donate to charity. Getting vaccinated – for the flu, for adult whooping cough, for pneumonia – is just another important societal responsibility. After all, we're in the same herd.

In an ideal world, a parent might want every child immunized except for their own – that way they get all the benefit and none of the risk. But this is a selfish concept, one that doesn't work.

It doesn't work because diseases that have been eliminated or greatly reduced in the U.S. still exist in the world. They are a threat to any unvaccinated child. The danger is also magnified as the population of unvaccinated children grows, and it is magnified still further when these children are in close contact – such as in school.

Parents who refuse immunization on behalf of their children are, in a sense, free riders who take advantage of the benefit created by the participation and assumption of immunization risk or burden by others while refusing to participate in the program themselves. These individuals place family ahead of civic responsibility.

While parents' concerns about vaccinations need to be respected, understood, and addressed, so too must these same parents respect and understand that society has a right to expect them to join in the collective responsibility towards reducing illness within a population, a responsibility that extends beyond our own children.

How Can I Know That Vaccines Are Safe?

Public trust in the safety and efficacy of vaccines is one key to the remarkable successes of immunization programs within the U.S. and globally. Allegations of harm from vaccines have become so loud and widespread that they pose a threat to immunization programs, and to trust in recommendations from our public health authorities and the medical community.

The painful irony to these allegations, and the resultant decrease in childhood vaccination rates, is that the United States has the safest, most effective vaccine supply in history. Many years of testing are required by law before a vaccine can be licensed.

Once licensed and in use, vaccines are monitored by a comprehensive safety and effectiveness monitoring system that is run jointly by the FDA and CDC. Adverse events (10,000 are reported annually) possibly associated with vaccines are investigated and studied, and action is taken when vaccine recommendations need to be changed.

There is little in this world for which we have more scientific data about risk and benefit than vaccines. Billions of people have received them – name another medical intervention received by so many.

But the risk is not, and never will be zero. Although vaccines are among the most thoroughly tested substances that are put into people's bodies for medical purposes, they are not 100% safe. Nothing is absolutely, positively 100% safe – not vaccines, not antibiotics, not Tylenol™, not Pepcid™, not even so-called “natural” or herbal remedies.

However, vaccines are certainly far safer than allowing children to be vulnerable to the diseases they prevent.

On the basis of evidence from the billions of immunizations given worldwide over the past half-century, we know many things for certain: Vaccines do not cause autism. They do not cause diabetes. They do not weaken the immune system. And they do not cause unexpected death in infancy.

Yes, vaccines do have minor side effects. Some children experience soreness, a slight fever, or a local allergic reaction to the antibiotic in some vaccines. Serious side effects, however, are extremely rare. When weighed against the risk of serious complications and death from the disease themselves, such side effects seem pretty minor.

Again, no one claims “zero risk” for the vaccines against 16 diseases that are currently recommended to protect children in the U.S. We all want our vaccines to be as safe as humanly possible, but no matter what we do they will never, ever be absolutely, 100% safe. That's an impossible standard.

The reasonable and obtainable standard to which we strive is that vaccines should be far, far safer than the diseases against which they protect us, and they already meet that standard admirably. But by any measure, vaccines are incredibly safe, with a very low risk of complications. That is not to say that there isn't always room for improvement. There is.

But the demand for 100% safety is a utopian ideal whose real, albeit unacknowledged, purpose is an excuse for not vaccinating at all. If we are to avoid a return to the bad old days when epidemics of vaccine-preventable diseases wreaked suffering and death upon our populace, the misinformation and exaggerated claims of toxicity and harm due to vaccines must be countered with science-based information of the true benefits and risks of vaccination.

Giving up the known benefits of vaccines because of a vague, hypothetical possibility of risk is a poor trade-off.

Do Vaccines Cause Autism?

In a word, no. The notion that vaccines cause autism has been clearly and soundly disproved. Still, the issue is reported in the media and across the Internet as a controversy.

It is understandable why parents might think vaccines create autism. Autism symptoms are usually first noticed between the ages of 12 months and 3 years. Of course, these are about the same ages when children receive a number of vaccines, though most are received before the first birthday.

In addition, we give many more vaccines to infants and toddlers now than we did in the past, though the number of **antigenic particles** – germ particles stimulating an antibody response – is a *tiny fraction* of the number of even three decades ago.

In 2004, the Institutes of Medicine – a branch of the non-partisan and non-governmental National Academy of Sciences – released a report concluding that no evidence exist linking vaccines with the development of autism. Since 2004, the evidence against such a link has become even more overwhelming.

Therefore the continuing public “controversy”, in the face of overwhelming scientific evidence from over 200 scientific, peer-reviewed, reproducible studies from more than a dozen different countries, must be considered an intentional misinformation campaign. There is no controversy. The evidence is in. The scientific community has reached a clear consensus that vaccines do not cause autism.

There is, however, a *manufactured* controversy, created by junk science, dishonest researchers, professional misconduct, misrepresentations, outright fraud, irresponsible reporting, and narcissistic celebrities who believe themselves wiser than the whole medical establishment and a century of medical research.

Scientists have been urged to “listen to the parents”. They did.

All over the world, medical and public health researchers from many different research groups have churned out study after study to test parents’ hypotheses of a vaccine-autism connection. The results have been consistent: more than a dozen studies have failed to discover a link between MMR and autism, and at least six studies have shown that thimerosal doesn’t cause autism.

On the other hand, not a single scientifically-legitimate study has shown that a link exists. There are no facts, no scientifically-proven and re-proven evidence for the claims of naysayers who blame vaccines for autism, among other diseases.

While questioning authority is healthy, facts are facts, and evidence is evidence. And lack of evidence is lack of evidence; despite that a Mt. Everest of evidence exists against the claim that vaccines cause autism, now it’s some parents who won’t listen to the scientists.

Moreover, the facts regarding the potential dangerous consequences of diphtheria, polio, mumps, measles, haemophilus, and other diseases are beyond dispute. They cause meningitis, paralysis, sterility, mental disabilities, and even death.

Don’t All Those Vaccines Overwhelm The Immune System? Aren’t There Too Many, Too Soon?

Viruses are made of proteins. Larger viruses contain more proteins than do smaller viruses. Smallpox, one of humankind’s largest viruses, contains about 200 proteins. Children a century ago who received inoculations against smallpox therefore received 200 challenges to their immune systems.

By contrast, the measles, mumps, and rubella viruses are quite small, containing ten, nine, and five proteins, respectively, for a total of 24 challenges. Small potatoes compared to smallpox.

Today, thanks to better vaccine design, upon completion of a series of fourteen different vaccines children have been exposed to a sum total of 177 germ proteins, less than if they were exposed to a single smallpox virus! Even as recently as the 1960s, when vaccines were not nearly as purified as they are today, there were over 3200 germ proteins given children between just five vaccines (smallpox, diphtheria, tetanus, pertussis, and polio).

If immune system overload were the cause of autism, with far fewer immunologic challenges in modern vaccines, shouldn't we be seeing the rates of autism decreasing, not increasing? Autism should have peaked back in the 1970s, and should have been rapidly declining ever since. **The notion of "immune overload" simply is not valid scientifically.**

One more surprising fact: the human body's immune system fights off an average of 10,000 germs **every day**. With each of those germs having many proteins, the total number of daily immunologic challenges likely exceeds 100,000!

Rest assured that your child's body is up to the challenge of handling the sum total of 177 germ proteins spread out over the first twelve years of life. Vaccines given in the first two years of life are a raindrop in the ocean of what infants' immune systems successfully encounter in their environment every day.

"Too many, too soon" is a clever moving of the goalposts, another conveniently vague but oh-so-reasonable sounding slogan invented by vaccine resistance groups. However, again, the number of antigens in modern vaccines is considerably less than previously, thus giving the lie to the "too many, too soon" accusation.

"Too many, too soon" is a contrived and deliberately emotive strategy to view infants as tiny, perfect creatures with vulnerable immune systems that need protected from the evils of the wider world, most especially those unscrupulous doctors injecting them with toxins all for the payout of profit.

Again, infants are exposed to hundreds of different bacteria, viruses, and fungi from the moment of birth. Tens of thousands of different immunologic proteins and polysaccharides assail the neonate weekly, even daily. The immune "load" of the natural world young babies inhabit is substantial.

And it doesn't get any better as they get older. Soon, these babies will crawl on the carpet, play in the yard, stuff dirt and worse in their mouths, get intimate with all manner of family pets, and put their tongue on all manner of communal surfaces...the list is almost endless. But the infant immune system is designed to respond to these challenges, and usually it does so exceedingly well.

However, should an unusual and especially virulent organism come along, the unvaccinated child may sicken and die before they have had a chance to generate immunological recovery and protective immunity against future attacks. These are precisely what vaccines can protect them against.

What About Thimerosal?

Thimerosal (sodium ethylmercury thiosalicylate; a.k.a. Methiolate) is an organic mercury-containing preservative that was used from the 1940s until 2001 as an additive to vaccines. It was very effective at preventing bacterial and fungal contamination, which was especially important for multi-dose vials entered and re-entered by medical professionals.

It is still found today in many other medications and products, including some throat and nose sprays, and some brands of contact lens solution.

Interestingly, before the reduction of thimerosal in the United States, the maximum allowable exposure for infants, as set by the FDA, was 187.5 micrograms; the most thimerosal that children would receive in getting their *entire* complement of childhood vaccinations was 137.5 micrograms.

Many routinely recommended childhood vaccines have never contained thimerosal, including the MMR (measles-mumps-rubella) vaccine, IPV (inactivated polio vaccine), the varicella (chickenpox) vaccine, and the pneumococcal (Prevnar™) vaccine. Some brands of Haemophilus influenzae type b (Hib) and diphtheria-tetanus-pertussis (DTaP) vaccines also have never contained thimerosal as a preservative.

Despite years of study in the U.S. and in countries from around the globe, there has been found no evidence of a link between thimerosal in vaccines, and autistic spectrum disorders. Even still, as a precautionary measure thimerosal was removed in 2001 from all routinely recommended vaccines manufactured for administration to infants in the U.S.

The last batches of thimerosal-containing vaccines expired in January 2003.

Despite that thimerosal has disappeared, autism remains. Since 2003 the number of cases of children with autistic spectrum disorders has continued to rise. No better proof of the lack of a link between thimerosal and autism could indeed exist.

Consider this: If cars are an important cause of auto-related deaths, removing them from the highway ought to significantly decrease them. If thimerosal was a strong driver of autism rates, removing it from vaccines ought similarly to result in a significant decrease in autistic spectrum disorders. It has not.

As it was, the thimerosal-autism link never made much sense to scientists. Thimerosal contains ethyl mercury, which is different from the *methyl* mercury that we all think of when we think of “mercury”.

If the addition of a single consonant seems to matter little, consider the headaches and hangovers caused by the ethyl alcohol contained in beer and wine, and the blindness and death caused by methyl alcohol, otherwise known as wood alcohol.

These two forms of natural mercury differ greatly. Ethyl mercury decomposes much more quickly than methyl mercury. It is cleared from the body seven times faster. And it is too large a molecule to easily pass into the brain, whereas methyl mercury passes with much less difficulty.

In (methyl) mercury poisoning, the characteristic motor findings are *ataxia* (inability to walk) and *dysarthria* (difficulty with speech), along with *tremors*, *muscle spasms* and *pain*, and *weakness*. Autism has no motor findings in common with mercury poisoning; in fact, no motor findings are common among autistic spectrum disorders, excepting occasional clumsiness and low muscle tone.

Methyl mercury poisoning also causes a classic constriction of the victim’s vision. Victims also suffer from *peripheral neuropathy*, causing pain and numbness in the hands and feet. Skin eruptions are common, as is a very low platelet count. The victim’s kidneys and the immune system can also be damaged.

None of these symptoms are known in autistics, and none of these organ systems are affected.

We are right to worry about mercury. Methyl mercury exists in too high an amount in some types of fish, and ingesting too much mercury can cause permanent brain and organ damage. But parents should be reassured that autism was not caused by exposure to the low amounts of ethyl mercury in vaccinations. All children, including siblings of autistic children, should be vaccinated, as there is absolutely no evidence of mercury poisoning in children.

What About The MMR Vaccine?

In 1998, a British physician by the name of Andrew Wakefield joined twelve co-authors in publishing a report in the British medical journal The Lancet describing twelve children with an ASD and gastrointestinal symptoms. In eight cases, parents reported that the symptoms began within two weeks after the children received the MMR vaccine.

Wakefield and his colleagues hypothesized that this might be a *new type* of autism, characterized by gastrointestinal symptoms and developmental regression caused by the MMR vaccine. No proof was offered of a link, and the study group was so small as to be almost meaningless.

Nevertheless, the news media picked up the title of the report (“Vaccine may trigger disease linked to autism”), and the rest, as they say, is history.

Many have heard some version of this basic storyline: Hero physician finds that autism is linked to a vaccination, and is blacklisted by the medical profession for daring to report it. Most, however, do not know what happened next.

In 2004, ten of Wakefield’s co-authors formally retracted their hypothesis, assuring the public that no link between MMR and autism was established.

In January 2010, the General Medical Council (GMC), which oversees doctors in Britain, found that Wakefield “showed a callous disregard” for the “distress and pain” of children, and found that in regards to his study his “conduct...was dishonest and irresponsible.

Wakefield’s sins: 1) falsification of data; 2) fraudulent methodology; 3) did not get his study approved by an ethics committee before carrying it out; 4) cherry-picked his child subjects, from a birthday party, paying them to participate, and 5) did not disclose his relationship with attorneys involved in suing on vaccine-based claims.

The GMC found Dr. Wakefield “guilty of serious professional misconduct”. In total, he was found guilty of more than 30 charges, and was stripped of his medical license on May 24, 2010.

In February 2010, The Lancet formally retracted Wakefield’s controversial paper. Dr. Richard Horton, editor of The Lancet, said in retracting the paper that “it’s the most appalling catalog and litany of some of the most terrible behavior in any research and is therefore very clear that it has to be retracted.”

Dr. Paul Offit, a world-renowned authority on the science of vaccines, and author of *Autism’s False Prophets*, said it best after The Lancet’s retraction: “[The Lancet retraction] was too little, too late. Wakefield’s study gave birth to the notion that vaccines causes autism. And it was wrong. But it’s hard to close Pandora’s Box once you’ve opened it. It’s hard to unscare people once they’re scared. The paper should never have been published. It has causes people to refuse vaccines, to be hospitalized for vaccine-preventable diseases, to die from those diseases. They’ve retracted it because the information was fraudulent, but the retraction won’t bring those children back.”

Harsh, but true words.

To make matters worse, Wakefield was found prior to his “study” to have taken *over \$1 million* from a personal-injury lawyer representing parents with children diagnosed with an ASD. Wakefield has since joined a fringe religious group in the United States that pushes scientifically ridiculous therapies for autism.

Yet as a result of Wakefield’s claim, the MMR scare attracted so much media attention that MMR immunization rates fell in a number of countries, leading to subsequent outbreaks of mumps and measles in Great Britain, Germany, Switzerland, and the U.S. In the United Kingdom alone, MMR vaccination rates dramatically fell to 81% in the years after Wakefield’s fraudulent “study” was published, and are only now beginning to increase. Rates need to be consistently above 95% to create “herd immunity”.

Meanwhile, measles cases in England and Wales rose steadily through 2008, affecting as many as 1400 children annually, before slightly falling in 2009. Hundreds have been hospitalized, and as many as several dozen children whose parents elected not to immunize them against measles have died as a result.

As with the claim against thimerosal, Wakefield's claim against the MMR vaccine made little intuitive sense to scientists and doctors. After all, autism rates in the United Kingdom had already been on the rise prior to the introduction of the MMR vaccine in 1988.

His claim that the virus in the vaccine caused injury to the gut, allowing proteins to pass into the bloodstream that then harmed the brain, could never be demonstrated, despite many tests on the brain and spinal fluid of autistic children.

And study upon study – from locales as diverse as the UK, Finland, California, Georgia, Denmark, and Japan – has confirmed that the rate of autism is the same in populations of children having received and having not received the MMR vaccine.

Besides, if the administration of the MMR vaccine led to the development of an ASD, why is it that in not one of the very many countries where MMR is given to children are we seeing an epidemic of autism occurring in four and five year-olds after receiving their second MMR vaccination?

Study after study has exonerated MMR. The notion that MMR causes autism has had its day in scientific court. More than 20 subsequent studies from around the globe have been conducted since Wakefield's paper – ALL consistently found no link. There is no "controversy".

For more information, read online the excellent articles by Brian Deer published in the British Medical Journal (5 January 2011) and by Susan Dominus published in the New York Times Magazine (20 April 2011).

What If There Is A Conspiracy To Hide The Truth?

There exists no vast international conspiracy to hide the "truth" about vaccines.

Ponder the ridiculousness of it: *hundreds of thousands* of public health scientists, academic researchers, medical journal editors, pediatricians, and family physicians the world over in league with vaccine manufacturers foreign and domestic, not to mention agencies of the United States government (the CDC, and FDA), to hide from parents and the public at large evidence of having collectively inflicted a devastating disease upon millions of children, children whose welfare these professionals have otherwise devoted their lives to protect.

For the sake of what, exactly?

Ponder further the ludicrous notion that of a vast, secret, corrupt international cabal of hundreds of thousands of individuals joined year upon year in absolute solidarity, maintaining a leak-free silence over the terrible secret they share. These same conspirators are even so devious as to knowingly give these dangerous vaccines to their own children and grandchildren, as part of a grand scheme to convince the public of their safety.

Preposterous, wouldn't you agree?

If the link between vaccines and autism were not necessarily proven, but at least strongly suggested, there would be reason to reconsider how and when we vaccinate children. No true advocate for children would think otherwise. But the science simply is not there.

Look at it from another perspective: the business perspective. Vaccine administration is not always cost-effective for pediatricians, especially those who are in smaller practices. In fact, from a purely business standpoint, vaccines don't make much sense at all – administration is often poorly reimbursed, and vaccines *prevent* infections and the resulting income-generating outpatient visits and hospitalizations that would go along with them!

Why Do Fears About Vaccines Causing Autism Persist?

Despite the singular, consistent, reproducible, and clear results of hundreds of studies from around the globe, many parents remain fearful of vaccines. Even as science the world over has dismissed it, the idea of a vaccine-autism link continues to gain cultural currency.

Why? The first answer: **the media**, which has as its primary motivation to sell advertising to earn profit, which happens most lucratively when media entertains, and creates controversy to heighten interest in its products.

It doesn't hurt that ours is a culture dominated by cynicism and hungry for scandal.

What makes an interesting television program may not, of course, be the same as what makes good science. Media reporting often highlights the fantastical, making it seem commonplace when in fact it may be rare, or even nonexistent. The media are experts at distorting the ability of viewers to engage in accurate risk assessment.

The media also keeps the vaccine-autism myth alive by following the journalistic mantra of "balance", by perpetually presenting two sides of an issue even when only one side is supported by the science, and even long after one side has been discredited.

Even then, the media does not often achieve the balance it supposedly desires, as evidenced by programs that feature vaccine opponents without equally featuring scientific experts.

We must avoid the false balancing that derails much of what passes for reporting these days. Truth is not a matter of popular vote, and it is disingenuous to offer so-called "balance" reporting by virtue of presenting "he-said, she-said" summaries.

The next answer to the question of why vaccine fears persist: **the alliance of fringe scientists, personal-injury lawyers, and well-intentioned but ill-informed advocacy groups, politicians, and celebrities.**

All are given a platform by the media, and by talk-shows and prime-time "news" programs in particular. Scientists, on the other hand, are not.

Due to the vocal nature of this alliance, parents are being coerced and confused into questioning the safety of vaccines based on flimsy, irreproducible science. The incessant scaremongering is to some degree intentional, launched and maintained by media-relations firms hired by personal-injury lawyers as well as some advocacy groups.

They know that it is much easier to scare someone than to unscare them.

Personal-injury lawyers, in particular, are out to dent public confidence in immunizations. After all, it's good for their business. An illustration in fact: most reports of "autism" to the government's voluntary vaccine side-effect reporting system (VAERS) haven't come from doctors, nurses, or nurse practitioners; most have come from personal-injury lawyers! Lawyers are manipulating this system to show "increases" in autism that are based on litigation, not on health research.

To the vast majority of non-medical people who are parents, the science of medicine and vaccines and the immune system is hard to understand, and the anti-vaccine movement has, more or less successfully, framed the issue as "big pharma" protecting its interests, and a conflict between "brave maverick" doctors against government and the global medical community.

It is difficult communicating science to a public that is unfortunately more easily convinced by fear, and a desire to find a unifying cause for autism, than by science and reason. It is also difficult to reassure a public that has trouble distinguishing cause from coincidence, and understanding that temporal association alone does not imply causation.

We all hear stories, most of them twisted with the telling and re-telling, about an individual who developed some sort of medical problem just after vaccination. We almost never hear about the millions upon millions of children who were vaccinated but had nothing bad happen to them.

From the public perspective, these success stories are simply not newsworthy. From the scientific perspective, they are essential.

Science will ultimately uncover the causes of autism, and perhaps even find means for preventing some number of those causes, but in the meantime doctors and scientists will have to become better at explaining the science that excludes vaccines as one of these causes.

Simply relating the facts of science isn't enough, no matter the overwhelming weight of evidence that shows that vaccines don't cause autism. When scientists find themselves just one more voice in a sea of "opinions" about a complex scientific issue, misinformation takes on a life of its own.

And science alone will not convince some parents. Distrust of vaccines is part of a broader cultural trend that favors "**science by consensus**" – if many people make the same claim, it must be true.

Unfortunately, modern technology has made it difficult to determine exactly how many people are in the crowd. Near universal access to the Internet and other social media has made it surprisingly easy to find stories of children who were completely normal until they were vaccinated.

However, consider this: Given that most children in the U.S. are completely vaccinated, any adverse event that occurs in the first year to eighteen months of life is likely to occur within weeks of a vaccination.

But let's put this into perspective. For instance, if 10 million women are given a vaccine, 86 will develop optic neuritis in the next 6 weeks. If all 10 million are pregnant, 16684 will have a spontaneous abortion. All of this is true – even if the shot is a placebo.

This illustrates two things. First, as epidemiologists know but the public may not, **sequence does not mean consequence; temporal association does not prove causation**. Just because one event follows another does not mean that the first caused the second. Perhaps autism is caused by alphabet blocks? After all, it is at around 12-18 months when toddlers are exposed to these.

More importantly, as human beings, we have trouble grasping the big numerical picture – it is more natural to assume a relationship with the shot than to contemplate thousands of lost pregnancies caused by chance alone, or to something other than the shot.

Sharon Kaufman, a professor of medical anthropology at the University of California, San Francisco, makes a life's work out of studying trends related to health and aging. She has spent years examining the vaccine-autism controversy, interested in understanding how cultural factors shape issues of trust, risk, and responsibility as they relate to science.

Kaufman sees the persistence of the vaccine-autism theory as a consequence of how individuals manage risk in modern society. People must trust experts to protect them from risk, whether they're getting on an airplane or vaccinating their kids, she explains. When faith in experts erodes, personal responsibility prevails. "People think if you blindly follow experts, you're not taking personal responsibility," she says.

The final answer to the question of why vaccine fears persist: **the Internet**, where no view is too outrageous to masquerade as fact.

Parents who say they've "done their research" mean they've perused a number of web sites on the Internet. But that's not research. Information on the Internet is typically unfiltered – anyone can say anything, and health advice can be terribly misleading.

Because of the Internet, everyone is an expert, or no one is. As a consequence, there is no "truth" as defined by experts. Rather, there are many opinions misrepresented and misinterpreted as truth. It doesn't help that people are far more likely to be swayed by a personal, emotion experience they read on the Internet (or see on television) than by results of large epidemiological and scientifically reproducible studies.

Consider this: if you are having trouble with your car, you do not take to the Internet to study motor engineering. You take your car to a garage and ask a mechanic to repair it. In a similar way, we put our trust in numerous people we encounter in our everyday lives. If we did not, society would collapse.

Which is why it is all the more peculiar our selective withdrawal of trust from medical professionals. For many parents, the advice given by their child's pediatrician or family physician about vaccines is just one more opinion in a sea of opinions offered on the Internet. However, **a visit to the Internet cannot replace a visit to the doctor.**

The Omnibus Autism Proceeding

In the U.S., because of rising litigation that jeopardized the vaccine program and threatened to drive pharmaceutical companies out of the vaccine business, Congress passed the National Childhood Vaccine Injury Act of 1986 (Public Law 99-660), which created the National Vaccine Injury Compensation Program (VICP).

The idea was to create an alternative to the tort system through which people injured by vaccines could be efficiently compensated. Vaccine litigants, if denied compensation, could still sue in conventional courts, but all claims for compensation had to go first through the VICP.

Beginning in 2001, parents, with the assistance of a blooming cottage industry of personal-injury lawyers, began filing petitions with the Secretary of Health and Human Services under the Vaccine Injury Compensation Program (VICP), for compensation for harm to their children from vaccines. Parents were alleging that certain childhood vaccinations might be causing or contributing to autistic spectrum disorder.

Specifically, it was alleged that cases of autism, or neuro-developmental disorders similar to autism, may be caused by the MMR vaccination, by thimerosal, or by some combination of the two.

As the number of litigants claiming that vaccines caused their children's autism ballooned to close to 5000, threatening to bankrupt the VICP unless massive infusions of new money from Congress were provided, the Office of Special Masters (OSM) of the U.S. Court of Federal Claims held a series of meetings in mid-2002, resulting in its issuance of Autism General Order #1 in July 2002, in which the OSM established the procedure for addressing the Omnibus Autism Proceeding (OAP).

As part of this proceeding, litigants were to choose what they considered to be the best cases representing their hypothesis of causation by which vaccines could produce autism and other neurodevelopmental disorders. The court would hear these cases, make rulings, and then these rulings would be used as the basis for all similar cases that would follow.

In the end, over 5300 cases alleging a causal relationship between such vaccinations and autism disorders were filed in the Program. The first evidentiary hearing for test cases was held in June 2007, then again in October and November 2007. Final hearings were held in July 2008.

The first decision was rendered in February 2009. In all three test cases in which a link between the MMR vaccine and autism was accused, despite the "best" that the anti-vaccine litigants could throw at the courts the Special Masters decisively rejected all three hypotheses of causation.

In a 174-page decision, Special Master George Hastings rejected all of Petitioners' contentions, observing that "this case is not a close case. The overall weight of the evidence is overwhelmingly contrary to the petitioners' causation theories."

A more emphatic refutation is hard to imagine.

Regarding some 23 expert witnesses who testified or submitted reports, Special Master Hastings stated that "[t]he expert witnesses presented by the respondent were far better qualified, far more experienced, and far more persuasive than the petitioners' experts, concerning most of the key points." The Special Master concluded, "the petitioners have . . . failed to demonstrate that vaccinations played any role at all in causing problems."

A Federal Appeals Court upheld the rulings in August 2009, stating that "...Petitioners' arguments linking injuries to thimerosal and the MMR vaccine are without merit. Accordingly, the Court affirms the Special Master's February 12, 2009 decision."

And then, in a further blow to the anti-vaccine movement, the three Special Masters ruled in March 2010 in three separate cases that thimerosal does not cause autism. Groups of organizations that believe vaccines cause autism expectedly dismissed the rulings, believing the Special Masters, as government judges, to not be impartial.