

Clear Answers & Smart Advice About Your Baby's Shots

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In response to the recent media attention given to vaccines, autism, and other controversies concerning vaccines, the Immunization Action Coalition (IAC) has reprinted a special excerpt from *Baby 411* that answers these questions and more. IAC is grateful to Dr. Brown for these clear answers and smart advice, but mostly, we are grateful for her continued advocacy for safe and effective vaccines.



Vaccines. Autism. Controversy. As a new parent (or parent-to-be), it's hard not to hear the great debate in parenting circles these days—do vaccines cause autism? If not, what causes autism? Why is it on the rise? And what is autism anyway?

Let's start at the beginning—just what is autism?

What is autism?

Autism Spectrum Disorder (ASD) is really a collection of several disorders that have three abnormal areas in common: social skills, communication skills, and repetitive or obsessive traits. There's a broad range from mildly to severely affected. Specialists use the terms ASD and Pervasive Developmental Disorders (PDD) interchangeably. And, to get even more confusing, Asperger's syndrome, and "pervasive developmental disorder, not otherwise specified" (PDD-NOS) are other categories that fall under the ASD heading. Here is a brief explanation of each:

Autism Spectrum Disorder (ASD) or Pervasive Developmental Disorder (PDD): These terms describe the entire group of conditions that include autism, Asperger's Syndrome, and PDD-NOS:

- **Autism:** These children are the most severely impaired. They have little or no social and communication skills and have repetitive, obsessive behaviors.
- **Asperger's Syndrome:** These children have normal intelligence and language development but have trouble reading social cues and making conversation. Asperger's kids often obsess about certain interests.
- **PDD-NOS** (Pervasive Developmental Disorder—Not Otherwise Specified) is the default diagnosis for a child who has problems with social and communication skills, but does not fit into either of the above categories.

Autism affects one in 150 children. It is four times more common in males, and seems to run in families.

I've heard autism is on the rise. Why?

The first question we have to ask is, do we really have an epidemic or are more children just being diagnosed? Is it better detection due to better awareness? Are we displacing one diagnosis for another? Here are some explanations for the large rise in autism:

1. Displacing one diagnosis for another. In previous generations, many children were diagnosed with mental retardation, schizophrenia, or some other psychiatric disorder. Today, many of these same kids are diagnosed with severe autism.

For example, in 1996, 1 in 63 kids were diagnosed with mental re-

tardation (measured by an IQ score of under 70). Yet, in 2000, that number DROPPED to 1 in 83. Why? Were there suddenly much fewer kids with mental retardation? No, many of these kids are now diagnosed with autism instead of mental retardation.¹ In other words, autistic kids were there in the 80's and 90's—we just didn't call them autistic.

In 1991, the Individuals with Disabilities Education Act (IDEA) required children with developmental disabilities to receive school services and be integrated into a mainstream classroom setting as much as possible. Autism was added as a new diagnosis for which a child could be eligible to receive educational services. In 1993, two years after this code was added, the Department of Education reported a 23% rise in autism. Prior to the coding change, kids with autism were often labeled with non-specific developmental delay, brain dysfunction, or mental retardation.

2. Changing criteria, broader diagnosis. The definition of autism has changed over the years. The Diagnostic and Statistical Manual of Mental Disorders (DSM) is the authoritative bible for psychiatric disorders in the U.S. The first two editions never even listed autism as a disorder.

Dr. Leo Kanner first diagnosed autism in the 1940's. Yet it was not until 1980 when psychologists recognized autism. That's when the DSM for the first time listed criteria for diagnosis of autism.

The autism diagnosis broadened again in 1994 when several more disorders were officially added to the DSM: Pervasive Developmental Disorder (PDD), PDD-NOS (not otherwise specified), Asperger's Syndrome, Childhood Disintegrative Disorder, and Rett's Disorder.

By expanding the definition of autism, suddenly many more kids were declared autistic. Case in point: looking at recent autism diagnoses, up to 75% of these kids are high-functioning children with PDD-NOS or Asperger's.

Unfortunately, many states don't break out where kids are on the autism spectrum. California's autism rate is often cited in the media as example of the "autism epidemic"—yet California doesn't specify where kids are on the autism spectrum, so it's hard to get solid numbers.

Not long ago, kids who were smart but socially awkward had no diagnosis. Today, those kids are often diagnosed with Asperger Syndrome.²

3. Better awareness, better and earlier diagnosis. Popular diagnoses rise and fall like skirt lengths. Think about it—ten years ago, had you ever heard of Restless Leg Syndrome?

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When it comes to autism, this newfound awareness is actually a positive step. More people—parents and doctors alike—are on the lookout for children with autism.

Making a diagnosis and starting therapy earlier in life improves kids' longterm outcomes. But it also looks like autism is on the rise. Why? Because kids were previously diagnosed with autism after age five or six. Today, kids are diagnosed as early as 18 months of age. This adds many more kids to the rolls . . . but is autism really increasing? Or is there just an earlier diagnosis?

- 4. Why does the U.S. have so many autism cases?** Autism is not just an American disease—it happens worldwide. But why do the U.S. and United Kingdom have such high autism rates? That's because the U.S. and U.K. have done the lion's share of research and studies into autism.

Other countries are just starting to look into autism. For instance, in South Korea, kids are diagnosed with Reactive Attachment Disorder (RAD) . . . which is really what we call Autism Spectrum Disorder (ASD) here in the U.S. We suspect that South Korea will report an alarming rise in autism when they figure out their RAD kids are the same as our ASD kids.

And counting autistic kids is a relatively recent phenomenon. Before recent legislation led to schools labeling more kids as autistic, researchers just looked at either medical or school records to determine autism rates. This was imprecise to say the least.³

- 5. Prevalence vs. Incidence.** If you've ever taken a statistics class (or tried hard to forget anything you learned if you did), here is a little review. Most of what we know about autism rates are based on prevalence studies: these are a sampling of a population at one point in time used to estimate overall rates. By contrast, incidence studies identify the ACTUAL number of autism cases over a period of time. The only way to know if autism is really an epidemic is to see a rise in the incidence of autism.

Unfortunately, there are very few incidence studies of autism. That's because it is extremely difficult to do this research. Only one incidence study on autism is available—that 2005 report found that rates of PDD in the 90's were unchanged. So even though PREVALANCE studies seem to show autism is increasing, the incidence proof is lacking.⁴

- 6. Social acceptance.** We've come a long way since autism was first identified as a disorder. Originally, experts thought autism was caused by poor parenting—namely, the mother. These “Refrigerator Moms” were blamed for rejecting their kids, causing the kids to have social problems.

Of course, this was WRONG. What we've learned over the past 70 years is that autism is not the mom's fault. But in the old days, no mother wanted their kid labeled autistic since that would imply HER guilt.

Today, we realize it is not mom's fault—and thus parents are more willing to accept an ASD diagnosis. And the diagnosis now allows for special education services, which many parents realize can help their child.

- 7. Over or misdiagnosis?** There is so much awareness now of Autism Spectrum Disorders, that perhaps clinicians are overdiagnosing it. One reputable study suggests that kids who actually have anxiety disorders, obsessive compulsive disorders, and personality disorders may be misdiagnosed now with ASD.⁵

These are possible explanations for the “autism epidemic”—but we don't have all the answers yet. The bottom line: in the 1980's, one in 10,000 kids were diagnosed with autism. Today, it's one in 150. The U.S. is not the only country seeing this trend. Australia, Canada,

Denmark, Finland, Iceland, Japan, and Sweden also report a disconcerting rise.

Okay, so what causes autism?

The million dollar question. There appear to be four chief suspects:

- 1. Genetics.** We know genetics plays a role. Studying twins is an obvious way to detect genetic disorders. If one identical twin has autism, up to 96% of the time, so will the other twin. And siblings of ASD kids have a 5% risk of having an autistic disorder.⁶ To date, the exact gene has not been identified, but it may reside on the X chromosome, which may explain the prevalence of autism in boys.⁷ In fact, there is a genetic syndrome (called Fragile X) that is one known cause of autism.

In 2008, researchers identified a specific gene in some kids with autism. This gene is involved in controlling brain cell communication.⁸ It appears that some kind of mutation in this gene causes a risk of autism within families.

Other researchers have found abnormalities on chromosomes of autistic kids. Hence it appears that autism is caused by several different genetic defects, although researchers haven't quite figured out the puzzle yet.⁹

One study has shown that dads over the age of 40 have SIX times greater risk of having a child with an autistic disorder than dads who are younger than 30.¹⁰ Hence, autism has eerie echoes of Down Syndrome, a genetic defect that is more common when a mother has “advanced maternal age” (over age 35).

All of these studies show that genetic defects are a strong suspect in autism.

- 2. Abnormal brain growth.** Although the cause is unknown, autistic children have problems with brain growth. Babies are born with immature brains that grow rapidly and make nerve connections called synapses...like an information superhighway. In the normally growing brain, some branches of this superhighway get “pruned.” In the autistic child's brain, the pruning process is defective. This may explain why babies with autism have abnormally rapid head growth under one year of age. Boys with ASD seem to have higher levels of hormones (insulin-like growth factors), which may contribute to the larger head size, weight, and body mass index.¹¹

- 3. Environmental trigger.** Is there some environmental exposure that sets off abnormal brain development in a genetically predisposed baby? Maybe. And that exposure may happen at or shortly after conception—before a mother even knows she is pregnant. There is a critical period of fetal brain development that occurs at 20-24 days after conception where the brain is most sensitive to injury.

Here are just a few theories that scientists are exploring as a cause for autism: flu exposure during pregnancy, and folic acid levels in Dad-to-be's sperm (possibly a too-high level can lead to problems). Studies done by the Environmental Working Group have found about 280 environmental toxins in umbilical cord blood—could one of these be a trigger?

There is also a growing body of evidence that newborns who are later diagnosed with ASD already have abnormal levels of certain proteins in their brains. So, having an environmental trigger in the womb during a critical period of brain development seems a plausible explanation for autism.

What about vaccines? There has been much talk about this theory, specifically that trace amounts of mercury used as a preservative in many vaccines prior to 2001 caused a spike in autism. We discussed this issue in depth in *Baby 411*, but just to sum up: the scientific evidence does not support this theory. Research during the past ten years

has taken a long hard look at vaccines and found conclusive evidence that vaccine exposure is NOT the turn-on switch for autism.¹² And no, despite what you might read online from fringe groups or plaintiff lawyers, there is no conspiracy among pharmaceutical companies to inflict autism on unsuspecting children.

The U.S. Centers for Disease Control and Prevention (CDC) has long-term studies underway to examine vaccines and autism. The most recent results, published in the *New England Journal of Medicine*, showed that the mercury preservative previously present in vaccines had no significant effect on either intelligence or developmental delays in kids ages seven to 10. The results of the CDC's study on mercury preservative and autism specifically will be published after this booklet goes to print. Stay tuned on our website for updates.

- 4. Premature birth.** A recent study in the journal *Pediatrics* found that premature babies born at 25 to 26 weeks gestation have a 25% chance of developing an autism spectrum disorder.

BOTTOM LINE: Researchers don't know what causes autism, although the above factors provide clues. The goal is to find a way to PREVENT autism . . . but we aren't there yet.

Is it possible that autism is actually mercury poisoning?

No. Mercury poisoning, also known as Mad Hatter's Disease, is very different from autism. Symptoms of mercury poisoning include excessive sweating, tremors and kidney problems. Sufferers also talk and walk like they have had a stroke.

How do we know this? The information known about mercury poisoning comes from unfortunate communities that have experienced it. There is a large amount of data from the Faroe Islands, near Iceland. The people there would eat whale blubber contaminated with toxic levels of methyl mercury and polychlorinated biphenyls (PCBs). Children, especially those exposed as fetuses during their mother's pregnancy, seemed to have lower scores on memory, attention, and language tests than their unexposed peers.

Here's the rub: despite all those problems, these children with mercury poisoning were NOT diagnosed with autism.

Another key point: mercury preservative was taken out of required vaccines SEVEN years ago. But autism rates are still going up.

Did the mercury in vaccines cause autism?

No. Here is the scientific evidence:

- The Institute of Medicine spent four years studying this issue. Their conclusion, issued in 2004: mercury preservatives in vaccines did NOT cause autism . . . and the Institute said it was time to move on to look at other possible causes. Several other leading medical organizations (both nationally and internationally) agree with this conclusion.
- Mercury preservative (thimerosal) was removed from vaccines commonly given to infants and young children in the U.S. in 2001, but the rates of children being diagnosed with autism are still skyrocketing. A survey of autism rates in California in 2008 confirms that mercury is out and autism rates are still going up.¹³ If thimerosal was the cause of autism, and it was taken out SEVEN years ago, autism rates should be going down by now. That's because autism spectrum disorders are usually diagnosed by three years of age.
- Mercury preservatives were removed from vaccines in Denmark in 1992. Canada and the European Union have followed suit. Their autism diagnosis rates are still going up, too.
- Mad Hatter's Disease (mercury poisoning) and autism are very different disorders, as discussed above.
- A study of 100,000 kids in England compared those receiving mer-

cury-containing vaccines to those who did not. The ones who had the mercury-free shots had HIGHER rates of autism.

- A study in 2007 showed that children between seven and ten years of age who got those mercury containing vaccines (before 2001) had no significant differences in tests of attention and processing information.¹⁴ Although the study did not look specifically at autism, it showed that mercury preservatives did not make much of an impact on brain functions in general.

Do vaccines still contain mercury? What about the flu vaccine?

In 2001, the FDA required manufacturers to discontinue using mercury preservative for ALL routine childhood vaccines. Period.

Many vaccines, like that for measles, mumps and rubella (MMR), have NEVER contained mercury preservatives. Nor is mercury used in the production process for MMR. However, there are four vaccines on the market that still use mercury preservative in the manufacturing process—the mercury is then REMOVED from the final vaccine.

Because the flu vaccine is reformulated each year for the upcoming season, manufacturers need to move as efficiently as possible to produce large quantities of vaccine. The best way to do this is to produce vaccine in multi-dose vials, which requires a preservative. There are, however, single-dose preparations that are FREE of mercury preservatives that can be given to young children and pregnant women, if available.

Let's do a reality check here: a tuna sandwich has FIVE TIMES more mercury than one dose of flu vaccine.

As a doctor, I am much more concerned about mercury exposure in the environment—particularly in food (like that tuna fish sandwich). So if you are worried about mercury exposure, consider this: there's mercury in breast milk.

A baby gets 25 times more mercury by breastfeeding for six months than in a single dose of flu vaccine. Breast milk contains between 1.4 and 1.7 micrograms of methyl mercury per liter. If you assume that a baby is breast-fed exclusively up until six months of age, that baby will consume about 360 micrograms of methyl mercury. That's twice the amount of mercury that was ever contained in vaccines and 25 times the quantity of mercury contained in the influenza vaccine.

A quick chemistry lesson: certain compounds have completely different properties even though they have similar sounding names. For instance, there are TWO types of mercury: methyl mercury and ethyl mercury. The type of mercury that has raised health concerns is methyl mercury. Methyl mercury is a small molecule that can get into the brain and takes almost TWO MONTHS to break down. High concentrations of methyl mercury can be found in tuna, swordfish and shark from contaminated waters.

Now, let's contrast that with ETHYL mercury, which is/was the type of mercury used in vaccine preservatives. Ethyl mercury (thimerosal is an example) is rapidly eliminated from the body within a WEEK. Compared to methyl mercury, ethyl mercury is a much larger molecule that cannot enter the brain.

Ideally, it would be nice to remove ALL mercury preservatives from flu vaccines—so we could put this controversy to rest. The problem: at this time, the only way to manufacture the huge quantity of flu vaccine needed each year requires using mercury preservatives. Hopefully, vaccine makers will figure out a way to eliminate mercury from all vaccines in the future—so any concerns can finally be put to rest.

What do you think of delaying vaccines or using an alternative vaccination schedule?

The CDC publishes a recommended vaccine schedule for all children

in the U.S.—this schedule wasn't created from thin air . . . doctors, scientists and researchers work together to decide what is the best time to give shots. The goal: protect as many babies as soon as possible from deadly disease.

Now, one of the popular myths about autism is that somehow kids are getting “too many shots, too soon.” Despite the scientific evidence that shows vaccines do NOT cause autism, some parents think that if they space out their kids' vaccines in an “alternative schedule” this is somehow safer.

Adding to this notion are blogs, books, and web sites that promote alternative vaccine schedules, delaying critical shots months or years after a child can safely receive them.

Here's a nasty little truth about alternative vaccination schedules: they are all fantasy. There is absolutely no research that says delaying certain shots is safer. Doctors who promote these schedules are simply guessing when to give which shots.

What we know for certain is that delaying your child's shots is playing Russian Roulette. The simple truth is you are leaving your child unprotected. Who knows what disease (preventable from a simple vaccine) will crop up next? Deadly diseases like measles are only a plane flight away.

Also: spreading out vaccinations creates new challenges. Live vaccines must be given at least four weeks apart to mount an active immune response. Take the MMR (measles, mumps, and rubella) vaccine—your child could get one combo shot and take care of all three deadly diseases at once. If you get three separate shots, however, it would take at least three months (because each is a live vaccine). That leaves kids unprotected until the series is completed.

When families demand a spaced out vaccination schedule, this is what I tell them as their doctor: “At the end of the day, I just want your child vaccinated. If you want to give two shots today and two next week, that's okay. Just come back. And promise me you will do it in a timely manner (that means you return in weeks, not months or years, to finish vaccination).” The goal: make sure the child is protected.

One important point to remember: despite all the media attention to this subject, very few parents actually choose to delay or opt out of vaccinations.

Are vaccines really necessary?

Yes. As a doctor, I am greatly worried when parents decide to delay or not to vaccinate their child. That's because vaccine-preventable diseases are real.

I have watched a child die from a vaccine-preventable disease while I helplessly stood by. I've cared for several babies gasping for breath with whooping cough. These diseases kill children. Respect them. Last year alone vaccines prevented 14 million infections and 33,000 deaths in the U.S.

Our grandparents remember diseases like polio. And how folks lined up to get vaccinated. Yet, you've probably never even heard of anyone with polio today. The great irony of vaccine success is that parents today are unfamiliar with the diseases they prevent.

In the past 10 years, I have seen two forms of bacterial meningitis basically disappear, thanks to vaccines. Before the HIB (*Haemophilus influenzae* type b) vaccine was developed, there were about 20,000 U.S. children a year who suffered or died from this infection. Now there are less than 200 cases per year. Before the pneumococcal conjugate vaccine, which protects against streptococcal meningitis, 17,000 American children per year had invasive infections with strep. And, about 200 kids died of this each year. Since vaccination, serious infections have been reduced by 90%. That's pretty amazing.

And no, you can't just let everyone else vaccinate their kids—and let

them protect your un-vaccinated child.

Just look at the recent measles outbreak in 2008 in San Diego. It all started with a child, who was unvaccinated by parent choice. He returned from a trip to Switzerland with measles. He went on to infect TEN other unvaccinated children—his siblings, school friends, and three babies who were too young to be vaccinated who were exposed to that child in a doctor's waiting room. Of the 11 cases, one baby was hospitalized.

And this outbreak may be a trend. During the period January through July of 2008, the highest year-to-date cases of measles were reported in the U.S. since 1996: 131 cases from 15 states and the District of Columbia. Over 90% were unvaccinated or had unknown vaccination status and two-thirds of these cases that were eligible for vaccination were not vaccinated because of philosophical or religious beliefs. There were also 16 babies who were too young to be vaccinated. Babies, who are the most vulnerable to serious infection, do rely on other vaccinated children in the community to protect them when they are not old enough to be immunized.

So, when people argue that kids get too many shots today, I ask them if they'd rather their child get meningitis. And what about vaccines in the pipeline? If we've already got too many shots, would you decide to skip a future vaccine to prevent HIV? Probably not. That's because you know that vaccine might be the one that saves your child's life.

Didn't the government recently concede that vaccines caused autism?

As you may have heard on the news, the government recently decided to compensate a child whose autism was allegedly triggered by a vaccine. Here's the background behind the headline:

The Vaccine Injury Compensation Program has been holding special hearings called the Omnibus Autism Proceedings. This “Vaccine Court” is looking at allegations that 4900 children developed autism from vaccines. The court is first looking at nine cases to form opinions about the evidence.

One child, Hannah Poling, was awarded a monetary settlement. Hannah was born with a rare genetic disorder (mitochondrial disorder, which is a dysfunction in basic cell metabolism). This is the equivalent of being born with an undetected heart defect—a ticking time bomb that could go off at any time.

For rare kids like Hannah, any stress could have caused her to develop autism. In fact, having a vaccine-preventable disease like the flu or chickenpox could have far worse health consequences—a disease like that could have killed her. Although she was not diagnosed prior to being vaccinated, experts recommend that even children with known mitochondrial disorders still be vaccinated.

So even though the headlines screamed that (in this case) a vaccine caused autism, the facts of the case show this isn't true. Hannah's underlying disease caused her deterioration and autism. The case was settled and determined that it did not represent a test case for the 4899 other children.

Experts on mitochondrial disorders do NOT think this disease is the “smoking gun” that triggers autism. That's because many folks have similar dysfunctional cells but never become autistic.

And there is no simple test for mitochondrial disorders. Instead, you must do a difficult and painful muscle biopsy and a spinal tap. As a result, testing all kids for mitochondrial disorders is not necessary, ethical or practical. And even if your child is diagnosed with a mitochondrial disorder, the recommendation is still to vaccinate.

Does the MMR vaccine cause autism?

One small study of only eight patients in 1998 led a British research

group to conclude that the combination MMR vaccine might cause autism.¹⁵ But in March 2004, after questions were raised about the study, ten of the 13 researchers of the study withdrew their claim of having found a possible connection between MMR and autism. They said, "In this paper, NO CAUSAL LINK was established between MMR vaccine and autism as the data were insufficient...now is the appropriate time that we should together formally retract the interpretation of the data suggesting a link."¹⁶

Numerous major studies (at least 17 so far) since 1998 also soundly refute this alleged link. The most prominent: the Institute of Medicine's 2004 report clearly dispelled any link between MMR and autism.

Perhaps the most compelling argument that the MMR vaccine does NOT cause autism is Japan—in 1993, that country stopped using the combination MMR vaccine. Instead, Japanese children were given three separate shots for these diseases. Despite this change, autism rates in Japan continue to rise.¹⁷

The hysteria surrounding the MMR vaccine and the false 1998 report did have one serious consequence in England: a sharp rise in measles, mumps, and rubella after parents stopped giving their kids the vaccine. In 2004, only 40% of children in the U.K. were vaccinated against MMR. And look at the rise in cases of mumps: 1995: 1936 cases; 2003: 4265 cases; 2004: 15,503 cases.

And remember, autism rates are rising in the U.K. as well. So, now they've got both autism AND vaccine-preventable diseases. It's a lose-lose battle—and the casualties are kids.

Here's the bottom line: as a doctor who sees a large volume of kids, I have never seen a perfectly normally developing kid walk into my office, get his MMR vaccine . . . and come back next week with autism. It doesn't happen.

Are we giving too many vaccines today, too soon?

More vaccines are actually a GOOD thing! Every new vaccine protects more kids from getting sick . . . expensive hospital stays . . . and perhaps death or permanent injury. More kids are prevented from getting devastating diseases than ever before, thanks to vaccines. What about getting several shots at once? Is that dangerous? Could you overload a child's immune system with these vaccine germs?

Look at it this way: your child is exposed to thousands of germs on a daily basis (even if he is not in daycare). Exposing your child to five or eight different germs in the form of vaccines is a spit in the bucket. And young kids have a better immune response to vaccines than older children and adults.

Before a vaccine is approved for use by the government, its safety is extensively studied. These studies look at how kids respond to the vaccine. And so-called "combo" vaccines that incorporate several shots at once also consider the combined effect. Even if your child got 11 shots at the same time, he would need to use only about 0.1% of his immune system to respond to the vaccines.

The goal is to protect your child as quickly as possible from diseases that are very dangerous to young children.

And even though the number of shots has gone up, the actual load on the immune system has gone down. That's because today's vaccines are "smarter" and better engineered than the shots from a few decades ago.

Case in point: whooping cough. Before 1991, the whooping cough vaccine had 3000 different germ particles (antigens). Today's whooping cough shot has just three to five particles—just as effective, but much better designed to be easy on your immune system.

Before 1996, the polio vaccine was "live"—this carried a small risk of actually getting polio. Today's polio vaccine is dead (inactivated) . . .

and carries NO chance of transmitting the disease.

So, here's the irony: YOUR parents took much greater risk when getting vaccinated back in the 50's, 60's, and 70's. Today, even though we have many more vaccines, the risk is much lower.

Our children are really getting smarter, safer vaccines today and better protection than we ever got as kids.

BOTTOM LINE: Vaccines do not weaken the immune system, they boost it.

Are there other toxins in vaccines that could cause autism?

Are there additives in the vaccines? Yes. And you should know about them.

Vaccines contain the active ingredients that provide immunity. However, there are inactive ingredients that improve potency and prevent contamination. Here is a list of additives and why they are there.

- 1. Preservatives**—prevent vaccine contamination with germs (bacteria, fungus): 2-phen-oxyethanol, phenol.
- 2. Adjuvants**—improve potency/immune response: aluminum salts.
- 3. Additives**—prevent vaccine deterioration and sticking to the side of the vial: gelatin, albumin, sucrose, lactose, MSG, glycine.
- 4. Residuals**—remains of vaccine production process: formaldehyde, antibiotics (neomycin), egg protein, yeast protein.

Now, after reading the above list, you might be freaking out—aluminum salts? MSG? Formaldehyde? We should point out that only TRACE amounts of most of these additives are in vaccines. None have been proven harmful in animals or humans in these amounts.¹⁸

Reality Check: Should vaccines be "greener"?

If vaccines contain ingredients like aluminum or formaldehyde, wouldn't it be better if vaccine makers got rid of these additives?

We agree that this sounds reasonable—but it doesn't mean that current vaccines are UNSAFE.

Here's the key point: additives like aluminum in vaccines are in EXTREMELY SMALL amounts (often, just a trace). We are all exposed to *significantly higher* levels of environmental toxins in our everyday activities.

Let's look at aluminum. Babies ingest 50 micrograms of aluminum per liter of breast milk . . . and 500 micrograms of aluminum per liter of formula. By contrast, the amount of aluminum in a vaccine is much smaller.

Do you wear antiperspirant? That's got aluminum in it too. And aluminum is found in most food, soil, and water. So, to avoid aluminum exposure, you'd have to stop wearing antiperspirant—and basically leave the planet.

And aluminum poisoning does not cause symptoms of autism, either.¹⁹ Trace amounts (far less than what your baby eats everyday) of aluminum improve the body's immune response to some vaccines. That's why it is in there.

Why is formaldehyde in vaccines? Well, small amounts sterilize the vaccine fluid so your child doesn't get something like the flesh-eating Strep bacteria when he gets his shots.

If you use paper towels or mascara, or have carpeting in your home, you've been exposed to formaldehyde. Obviously, exposure to large amounts of formaldehyde is not a good thing for anyone's health. But, again the amount in vaccines is extremely small.²⁰

BOTTOM LINE: Vaccine additives are there for a reason—to make them safer and more effective.

There's so much anti-vaccine stuff online—it's hard to know whom to believe. Can doctors be trusted on this issue?

Most pediatricians are ALSO parents—and docs dedicate their life to protecting kids. If I ever thought vaccines were harming kids, I'd change what I do. I vaccinated my own kids and would do it again in a heartbeat. If you have any doubt about vaccinations, just ask your pediatrician if she vaccinated her kids.

How do you explain the parents who claim their child was perfectly normal and then "something happened"?

It seems like just about everyone's heard one of these heart-wrenching stories—whether it be a child with autism that you know personally, or a celebrity's kid you hear about on TV. The parent reports that the child was developing just fine, until one day the lights just went out. Often, that phrase is accompanied by "after he got his shots."

And understandably, it's enough to make any other parent freak out and think twice when it's time to vaccinate his or her own child.

About 50% of parents with a child affected with autism spectrum disorder believe it was triggered by vaccination. However, the other 50% do not think vaccines had anything to do with it.

Here is what I think, based on what I see in my own practice. Autistic kids were never "typical" to begin with. Not one patient of mine who has ASD was perfectly normal, got a vaccination, and returned the next week with autism. In fact, all the parents in my practice whose children have ASD tell me that they either a) did not recognize the early differences in their child's development or that b) they always knew something was different about their child. The signs just became more apparent over time, the milestones stagnated, or the child seemed to lose skills. About one in five parents will report a loss of milestones. That's what brings it to the parent's attention.

An important fact: above, we noted that one in five parents report a loss in milestones. That means that a vast majority (80%) of kids diagnosed with autism spectrum disorder have no loss of milestones. They start out on a different developmental path and the symptoms become more apparent over time.

One of my ASD patient's moms, who is a medical professional, told me that she realized how clearly different her son's early development was after she watched her second child, without ASD, breeze through her developmental milestones. She had no frame of reference with her first child. And since just about every parent has a camcorder these days, the developmental differences early in a child's life are easily chronicled on videotape for developmental specialists to review. They say the same thing I do. The child was never perfectly normal and these, sometimes, subtle differences are seen before a year of age.

Heck, even the most vocal autism mom of all, Jenny McCarthy, who claimed on Oprah that her son was normal until receiving his combination measles-mumps-rubella vaccine, admits in her book that she missed the early signs of her child's ASD. Specifically, she said that it took her child until he was five months old to smile at her, when her friend's babies all smiled by two months.

One of the leading autism experts in the country has told me that there are, indeed, an extremely small number of ASD children who have completely normal milestones and then regress, which is known as "late onset autism." This type of autism likely represents a subset of children who have a distinct genetic abnormality that turns off spontaneously without any trigger at all. And this distinct group deserves genetic testing and more research.

I know, I know, who are you going to believe? Don't I trust parents and their instincts? Absolutely—you know your kids better than anyone else. But having a child diagnosed with autism is a highly emotional experience. And the diagnosis is usually made around the same time a child is going through his vaccination series. It's true . . . but unrelated. It's true that vaccinations are happening, and it's true that developmental differences become apparent. That doesn't mean they are related. Toddlers are also wearing diapers, drinking whole milk, and hanging out with parents who use cell phones. Do diapers cause autism? How about cell phones or milk? Obviously, no.

And let me be clear, parents aren't the only ones who miss the early signs of autism. Pediatricians do, too. Full developmental assessments are often three to four hours in a specialty referral center. We rely heavily on parents to point out their concerns. Parents and doctors can both miss early signs of autism spectrum disorders in the first year of life. This is one of the key reasons why the American Academy of Pediatrics created an Autism Toolkit in 2007 for its doctors to learn the signs, screen specifically for autism at every well child visit, and provide resources and educational materials for affected children.

BOTTOM LINE: Stoking parents fears about vaccines with false rumors about safety is irresponsible and creates a lose-lose situation for society—and the casualties are children.

Vaccines work. And they are safe. Rather than demonize vaccines, we (doctors, parents, researchers, the government) should put our time, effort, and money into researching the CAUSES of autism and the best possible treatments.

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