

Did Chinese scientists find autism's missing puzzle piece?

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Scientists appear to be far closer to explaining the mechanisms of action within the body that cause autism. Most of the research that has created this understanding has been published in the last 36 months, and largely from international scientists in Canada, France, Israel, and China. Four clear, replicable, and related discoveries explaining how autism is triggered are forming an undeniably clear picture of autism's causation, and possibly ways to alleviate the symptoms, too.

PASADENA, California—When Caltech scientist Dr. Paul Patterson passed away in 2014, I had little appreciation that he had triggered a chain of events over the course of his career that may now provide a clear and unambiguous explanation of how and why my son developed autism back in 2004. Knowing exactly how my son's autism was caused is incredibly important to my wife and I, because the more information we have about causation, the more chance we have to do something about it, and perhaps recover my son from an affliction now impacting 1 in 48 American kids.

What you're about to read is the product of more than two dozen very recent peer-reviewed published scientific studies, with really no original thought by me. I'm a businessman and a father, but what follows is a "grand theory of autism" so complete and well-supported that I think it deserves the attention of every member of the autism community. When the totality of this explanation became clear to me, not only did my jaw hit the floor, but I was immediately consumed with thoughts about how this clear explanation might impact the way we treat our son's autism, and I hope it does the same for you and perhaps your doctor as well. What I'm certain of is that this "grand theory" needs to be heavily debated, and I hope by putting it in the public realm I help move it along that path. (I'm indebted to an anonymous scientist who runs a website called [Vaccine Papers](#), where many of these insights came from. I will quote VP throughout this piece, referring to VP as "VP." I highly recommend you read the totality of his website, where the explanations are far more scientific than what you will read here.)

It shouldn't be a surprise that the final piece of this puzzle came from China. I've listened closely to the stories of American scientists wanting to study autism and complaining that any studies that are even remotely controversial are nearly impossible to fund or get approved. As you will see, Chinese scientists do not appear to have that same constraint. In a way, many American, Canadian, and French scientists have pioneered a pretty clear picture of how autism is caused, and the Chinese helped tie it all together. That's at least my interpretation, please make your own judgment.

Discovery #1: “Maternal Immune Activation” can cause autism



Caltech’s Dr. Paul Patterson

While Dr. Patterson’s passing wasn’t something I was aware of at the time, it was certainly recognized by the scientific community, of which his [obituary](#) from Caltech explains in great detail. Dr. Patterson’s “*research focused on interactions between the nervous and immune systems—a connection that was not universally acknowledged in the early days of neuroscience*” explains his obituary, “*he became intrigued by epidemiological studies that had linked a severe viral or bacterial infection during pregnancy with the increased risk of a woman giving birth to a child with a neurodevelopmental disorder such as schizophrenia or autism. Patterson and his coworkers [reproduced this human effect in mice](#) using a viral mimic that triggers an infection-like immune response in the mother, producing in the offspring the core behavioral symptoms associated with autism and schizophrenia.*”

In 2006, Dr. Patterson introduced his complex understanding of the interaction between the immune system and neurodevelopment through an excellent article in the *Engineering & Science* journal, titled [Pregnancy, Immunity, Schizophrenia, and Autism](#). I hope you’ll take the time to read this for yourself, Dr. Patterson does a great job of explaining his discovery to the uninitiated, it’s really a seminal work. Here’s a quote:

“As we learn more about the connections between the brain and the immune system, we find that these seemingly independent networks of cells are, in fact, continually talking to each other. As an adult, the activation of your immune system causes many striking changes in your behavior—increased sleep, loss of appetite, less social interaction—and, of course, headaches. Conversely, stress in your life (as perceived by your brain) can influence immune function—the brain regulates immune organs, such as the spleen, via the autonomic nervous system. Recent evidence shows that this brain-immune conversation actually starts during the development of the embryo, where the state of the mother’s immune system can alter the growth of cells in the fetal brain. As we shall see, such alterations can lead to an increased risk of schizophrenia or autism in the offspring.”

Are you with me so far? Basically, what Dr. Patterson is saying is that if a pregnant mother gets sick (virus, bacteria) while pregnant—an event that “activates” her immune system—that activation can impact the neurodevelopment (how exactly the brain is constructed) of her fetus, potentially leading to neurological problems after birth. Dr. Patterson took this explanation a step

further, explaining that the brains of people with autism reflect the immune system activation that took place, even decades later, as he cites valuable work being done at Johns Hopkins:

“There is also very striking evidence of immune dysregulation in the brain itself. Just last year, a group led by Carlos Pardo at Johns Hopkins found what they’re calling a “neural inflammation” in postmortem examination of brains of patients with autism who died between the ages of eight and 44 years. But these people weren’t infected—they died of such things as drowning or heart attacks. The study found that the microglial cells, which act as the brain’s own immune system, were activated. The study also found amazing increases of certain cytokines in the brain, and of others in the cerebro-spinal fluid. This is a landmark paper, in my opinion. It presents the first evidence that there’s an ongoing, permanent immune-system activation in the brains of autistic people. It’s a subclinical state, because there’s no overt infection. But it’s there.”

While [Dr. Pardo and colleagues](#) were the first to find this “microglial activation” in the brain of children with autism, this finding has now been replicated many times, here’s a study from [Japan in 2013](#) finding the same thing:

“In conclusion, the present PET measurements revealed marked activation of microglia in multiple brain regions of young adults with ASD. The results strongly support the contention that immune abnormalities contribute to the etiology of ASD.”

If you’re going to take one thing away from this section, I’d recommend an excerpt from Dr. Patterson’s quote worth memorizing:

“there’s an ongoing, permanent immune-system activation in the brains of autistic people.”

Is that what happened (and still is happening) to my son?

Further Refinement of Discovery #1: Immune Activation from the Cytokine Interleukin-6

If you’re an autism parent, you’ve probably heard the expression “cytokine storm” and half-understood what that might mean (anything with “storm” at the end of it can’t be good—what this really means is a chronic, slow burn inflammation in the brain). In 2006, Dr. Patterson and his colleagues were speculating that the immune system’s [cytokines](#) might be responsible for altering the brain development of the fetus during gestation:

“Cytokines are produced by the white blood cells, and their levels in the blood increase when we get an infection... We think that maternal immune activation alters brain circuits...there’s that permanent, subclinical, altered immune state in the autistic brain—those increased cytokine levels...are they [cytokines] actually interacting with the brain in an ongoing fashion, with consequences visible in the patients’ behavior? I favor [the cytokine] hypothesis.”

Maternal Immune Activation Alters Fetal Brain Development through Interleukin-6

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<http://vaccinepapers.org/wp-content/uploads/Maternal-Immune-Activation-Alters-Fetal-Brain-Development-through-Interleukin-6.pdf>

Just a year after Dr. Patterson’s excellent article about Maternal Immune Activation (“MIA”), he and his colleagues produced the [first study](#) that took their understanding of cytokines to a more detailed level. Knowing that MIA was producing offspring with neurological disorders (in their mouse model), they wanted to find out what—exactly WHAT—was causing the altered brain development. They figured it was a cytokine (of which there are many), but which one? As the Patterson and his colleagues noted, “however, the mechanism by which MIA causes long-term behavioral deficits in the offspring is unknown.” That is until they discovered it:

“Here we show that the cytokine interleukin-6 (IL-6) is critical for mediating the behavioral and transcriptional changes in the offspring. A single maternal injection of IL-6 on day 12.5 of mouse pregnancy causes prepulse inhibition (PPI) and latent inhibition (LI) deficits in the adult offspring.”

In the case of the 2007 experiment, Patterson and his colleagues injected pregnant mice with a specific cytokine—interleukin-6 (“IL-6”)— and saw changes in the neurology of their offspring.

Replication of Dr. Patterson’s discovery about MIA and IL-6

Dr. Patterson’s work was groundbreaking. He tied the immune system and brain together in ways previously not recognized. Like all great new discoveries in science, Dr. Patterson’s theories have since been replicated many times. In 2012, Dr. Patterson and his colleagues produced [this paper](#), which was more autism-specific and reached a similar conclusion:

“These results indicate that MIA yields male offspring with deficient social and communicative behavior, as well as high levels of repetitive behaviors, all of which are hallmarks of autism.”

ARCHIVAL REPORT

Activation of the Maternal Immune System During Pregnancy Alters Behavioral Development of Rhesus Monkey Offspring

Melissa D. Bauman, Ana-Maria Iosif, Stephen E.P. Smith, Catherine Bregere, David G. Amaral, and Paul H. Patterson

Background: Maternal infection during pregnancy is associated with an increased risk of schizophrenia and autism in the offspring. Supporting this correlation, experimentally activating the maternal immune system during pregnancy in rodents produces offspring with abnormal brain and behavioral development. We have developed a nonhuman primate model to bridge the gap between clinical populations and rodent models of maternal immune activation (MIA).

Methods: A modified form of the viral mimic, synthetic double-stranded RNA (polyinosinic:polycytidylic acid stabilized with poly-L-lysine) was delivered to two separate groups of pregnant rhesus monkeys to induce MIA: 1) late first trimester MIA ($n = 6$), and 2) late second trimester MIA ($n = 7$). Control animals ($n = 11$) received saline injections at the same first or second trimester time points or were untreated. Sickness behavior, temperature, and cytokine profiles of the pregnant monkeys confirmed a strong inflammatory response to MIA.

Results: Behavioral development of the offspring was studied for 24 months. Following weaning at 6 months of age, MIA offspring exhibited abnormal responses to separation from their mothers. As the animals matured, MIA offspring displayed increased repetitive behaviors and decreased affiliative vocalizations. When evaluated with unfamiliar conspecifics, first trimester MIA offspring deviated from species-typical macaque social behavior by inappropriately approaching and remaining in immediate proximity of an unfamiliar animal.

Conclusions: In this rhesus monkey model, MIA yields offspring with abnormal repetitive behaviors, communication, and social interactions. These results extended the findings in rodent MIA models to more human-like behaviors resembling those in both autism and schizophrenia.

True in mice, true in monkeys, click image to read study

<http://vaccinepapers.org/wp-content/uploads/Activation-of-the-maternal-immune-system-during-pregnancy-alters-behavioral-development-of-rhesus-monkey-offspring.pdf>

In 2014, the M.I.N.D. Institute at UC-Davis published an [important study](#) that took Dr. Patterson's work in mice and replicated it in monkeys. Why do monkeys matter? The study authors explained:

“Maternal infection during pregnancy is associated with an increased risk of schizophrenia and autism in the offspring. Supporting this correlation, experimentally activating the maternal immune system during pregnancy in rodents produces offspring with abnormal brain and behavioral development. We have developed a nonhuman primate model to bridge the gap between clinical populations and rodent models of maternal immune activation (MIA).”

And, the M.I.N.D. Institute scientists saw similar results to what had been found in mice:

“In this rhesus monkey model, MIA yields offspring with abnormal repetitive behaviors, communication, and social interactions. These results extended the findings in rodent MIA models to more human-like behaviors resembling those in both autism and schizophrenia.”


There are many additional studies that support Dr. Patterson's findings, here's one more to make the point from *Neuroscience* — [Brain IL-6 elevation causes neuronal circuitry imbalances and mediates autism-like behaviors](#) — published in 2012:

“In summary, our study supports a critical role of IL-6 elevation in modulating autism-like

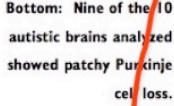
behaviors through impairments on synapse formation, dendritic spine development, as well as on neuronal circuit balance. These findings suggest that manipulation of IL-6 may be a promising avenue for therapeutic interventions.”

Dr. Patterson: what can cause immune activation?

Dr. Patterson helped establish as scientific fact that an MIA during pregnancy can cause autism. As a parent, I’m haunted by Dr. Patterson’s words that “there’s an ongoing, permanent immune-system activation in the brains of autistic people.” If that’s really what’s happening to my son, it creates an obvious question: What can we do about it? It’s why understanding exactly what happened to my son is so important...



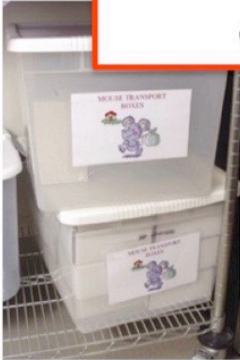
Top: Purkinje cells (purple-blue dots) in a normal human cerebellum.



Bottom: Nine of the 10 autistic brains analyzed showed patchy Purkinje cell loss.

ally, using this animal model.
 Finally, I want to ask a question that’s come up in the literature in the last few years—should we really be promoting universal maternal vaccination? The flu vaccine has been recommended routinely to pregnant women in the United States since 1957. The official policy of the Centers for Disease Control states that “administration of vaccines to women seeking prenatal care is an opportunity for preventative intervention that should not be wasted.” Now you might say, “Well, of course, you don’t want to get the flu if you’re pregnant!” But remember that double-stranded RNA experiment—we activated the immune system, and it caused all these downstream effects on the fetus. And what does a vaccination do? It activates the immune system. That’s the *point* of vaccination. In practice, not all pregnant women receive flu shots, and I think that universal vaccination of pregnant women could get us into a whole new set of problems. I’m hoping, therefore, that a way will be found to intervene somehow and repair the damage or reregulate the immune system. This mouse model is an excellent place to start. □

late Ruben Care Autism the Stanley Foundation Health.



Mouse limos.

PICTURE CREDITS: 17, 18, 21—Bob Paz; 14, 18 — Doug Cummings

2006: Dr. Patterson connects maternal vaccination to possible immune activation, raises cautionary flag.

...And why there’s something else Dr. Patterson mentioned in his [2006 magazine article](#), something that today might get him run out of Caltech but was still allowed in the scientific discourse back then, he said this:

Finally, I want to ask a question that’s come up in the literature in the last few years—**should we really be promoting universal maternal vaccination?** The flu vaccine has been recommended routinely to pregnant women in the United States since 1957. The official policy of the Centers for Disease Control states that “administration of vaccines to women seeking prenatal care is an

opportunity for preventative intervention that should not be wasted.” Now you might say, “Well, of course, you don’t want to get the flu if you’re pregnant!” But remember that double-stranded RNA experiment—we activated the immune system, and it caused all these downstream effects on the fetus. And what does a vaccination do? It activates the immune system. That’s the *point* of vaccination. In practice, not all pregnant women receive flu shots, and **I think that universal vaccination of pregnant women could get us into a whole new set of problems.**

Dr. Patterson said it, so I don’t have to be the first to bring it up. He said a vaccination “activates the immune system” and he also told us that “immune activation” can cause autism. How exactly does a vaccine activate the immune system?

Aluminum hydroxide, aka “aluminum adjuvant”.

Discovery #2: Aluminum Adjuvant causes immune activation and is far more neurotoxic than previously thought

Aluminum compounds (Al hydroxide and Al phosphate) are the most common adjuvants used in vaccines. They are currently used in the hepatitis A, hepatitis B, diphtheria-tetanus-pertussis (DTaP, Tdap), Haemophilus influenzae type b (Hib), human papillomavirus (HPV) and pneumococcus (PCV) vaccines. Aluminum adjuvant “activates” the immune system, which induces long term immunity to antigens in the vaccine.

The scientific understanding of aluminum adjuvant toxicity has changed and deepened dramatically in recent years (since 2007).

In fact, the published research on aluminum adjuvant is so new it has not even been considered by our FDA or CDC, who are still basing their recommendations about aluminum use in vaccines on a [study published in 2011](#) that erroneously concluded that aluminum from a vaccine likely ends up in the body’s skeletal system:

“While the contribution of vaccines to an infant’s aluminum body burden can be slightly higher than that of the dietary contribution in our model, the fact that the primary pool where the aluminum is residing, as a long-term storage depot, is likely to be skeletal and not a more sensitive soft organ system is reassuring.”

Most of the guess work about aluminum is based on dissolved aluminum, not aluminum hydroxide, which is the type of aluminum used in vaccines. We’re now learning that aluminum hydroxide is a nanoparticle, absorbed by our body’s macrophage (the immune system’s garbage man) where the macrophage can then easily transport the aluminum hydroxide to the brain (the macrophage passes easily through the blood-brain barrier). If you’d like to see a complete takedown of the “safe level” of aluminum argument still made by the FDA and CDC, see VP’s [excellent work](#), here’s a short excerpt:

“It is not reasonable or scientific to use studies of ingested, water-soluble aluminum salts (like

AlCl₃ or Al-lactate) to establish a safe dose of injected aluminum adjuvant (comprising aluminum hydroxide/phosphate nanoparticles). The chemical forms and route of administration are different. It is well-established today that nanoparticles can have higher toxicity than bulk or soluble forms of the same material...It's the vaccine promoters that created this inherently-invalid approach to aluminum adjuvant safety. Vaccine critics including me argue that the safety of injected aluminum adjuvant can only be tested using injected aluminum adjuvant, not ingested aluminum salts like AlCl₃ or Al lactate. This should be common sense. So, leaving aside the important issues of nanoparticle toxicity and administration route, I want to address the question: is it really true that animals (mice or rats) are not harmed by ingesting 62mg/kg/day or 26 mg/kg/day aluminum? After all, this is the fundamental basis for aluminum adjuvant safety. Vaccine promoters rely on Keith and Mitkus to make the case that aluminum adjuvant is safe, and Keith and Mitkus depend on the claim that these dosages are safe for animals to ingest. If the 26 mg/kg/day dosage is in fact harmful to animals, then the analyses by Keith and Mitkus are wrong and unsalvageable. Several studies clearly demonstrate that dosages much lower than 26 mg/kg/day are harmful, and they are presented below.”

Dr. Chris Shaw interview

The first time I personally woke up to the the idea that the aluminum adjuvant used in vaccines might be far more toxic and dangerous than I knew was when I started reading about the incredible work of Dr. Chris Shaw at the University of British Columbia in Canada. (Check out this video of Dr. Shaw discussing aluminum adjuvant, and some of the experiments he and his colleagues did on mice.)

In 2007, Dr. Shaw published the first study looking at injected aluminum adjuvant in this paper, [Aluminum Adjuvant Linked to Gulf War Illness Induces Motor Neuron Death in Mice](#) and sounded a worldwide alarm about the dangers of aluminum adjuvant:

“In addition, the continued use of aluminum adjuvants in various vaccines (i.e., Hepatitis A and B, DPT, and so on) for the general public may have even more widespread health implications. Until vaccine safety can be comprehensively demonstrated by controlled long-term studies that examine the impact on the nervous system in detail, many of those already vaccinated as well as those currently receiving injections may be at risk in the future. Whether the risk of protection from a dreaded disease outweighs the risk of toxicity is a question that demands urgent attention.”

In 2009, Dr. Shaw's and his colleagues in British Columbia published [another study](#) looking at injected aluminum hydroxide, and the results were deeply disturbing:

“Overall, the results reported here mirror previous work that has clearly demonstrated that aluminum, in both oral and injected forms, can be neurotoxic. Potential toxic mechanisms of action for aluminum may include enhancement of inflammation (i.e., microgliosis)...”

2012: Mechanisms of aluminum adjuvant toxicity and autoimmunity in pediatric populations

Three years after his groundbreaking study, Dr. Shaw and his colleague, Dr. Lucija Tomljenovic, published [this paper](#) in 2012, expressing grave concerns about the limited understanding of aluminum adjuvant's toxicity:

“...it is somewhat surprising to find that in spite of over 80 years of use, the safety of Al adjuvants continues to rest on assumptions rather than scientific evidence. For example, nothing is known about the toxicology and pharmacokinetics of Al adjuvants in infants and children... Yet, in spite of these observations children continue regularly to be exposed to much higher levels of Al adjuvants than adults, via routine childhood vaccination programmes.”

The two scientists called for an urgent reevaluation of the safety profile of aluminum adjuvant-containing vaccines:

“However, the existing data (or lack thereof) raise questions on whether the current vaccines aimed at pediatric populations can be accepted as having adequate safety profiles. Because infants and children represent those who may be most at risk for complications following vaccination, a more rigorous evaluation of potential vaccine-related adverse health impacts in pediatric populations than what has been provided to date is urgently needed.”

2013: Slow CCL2-dependent translocation of biopersistent particles from muscle to brain

In 2013, French scientists demonstrated that aluminum adjuvant, when injected into the body of a mouse, ended up in the brain 1 year later. The study authors expressed serious concerns about this very new discovery:

“However, continuously escalating doses of this poorly biodegradable adjuvant in the population may become insidiously unsafe, especially in the case of overimmunization or immature/altered blood brain barrier...”

The authors chose their words carefully, recognizing the ubiquity of aluminum adjuvant's use in pediatric vaccines all over the world, which is why their choice to call aluminum adjuvant “*insidiously unsafe*” should cause any parent worry. Unfortunately, the very thing they express real concern about—escalating doses—is exactly what has been happening to children since the early 1990s, when the immunization schedule in the U.S. and all over the world more than tripled, largely due to new vaccines being introduced that contain aluminum adjuvant.

2015: Biopersistence and brain translocation of aluminum adjuvants of vaccines

In 2015, another study from Université Paris Est Créteil (UPEC) in France further supported this new view of aluminum adjuvant as a dangerous, biopersistent, and ultimately brain-injuring toxin. (The study confirmed that aluminum adjuvant slowly makes its way to the brain, where it then stays, possibly forever.)



Biopersistence and brain translocation of aluminum adjuvants of vaccines

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Edited by:

Lucija Tomljenovic, University of

Aluminum oxyhydroxide (alum) is a crystalline compound widely used as an immunological adjuvant of vaccines. Concerns linked to the use of alum particles emerged following <http://vaccinepapers.org/wp-content/uploads/Biopersistence-and-brain-translocation-of-aluminum-adjuvants-of-vaccines.pdf>

The study explained that aluminum adjuvant can generate a long-term immune response because of its “biopersistence”, which basically means our body has no ability to rid itself of aluminum adjuvant, because it's a man-made substance we have no natural designs to eliminate:

“Thus alum and other poorly biodegradable materials taken up at the periphery by phagocytes circulate in the lymphatic and blood circulation and can enter the brain using a Trojan horse mechanism similar to that used by infectious particles. Previous experiments have shown that alum administration can cause CNS dysfunction and damage, casting doubts on the exact level of alum safety.”

November 2016: [Non-linear dose-response of aluminium hydroxide adjuvant particles: Selective low dose neurotoxicity](#)

And, just last Fall in 2016, the most important and revealing study yet done on aluminum adjuvant provided more bad news, and more insight.

It's safe to say that this study's conclusions have revolutionized our understanding of aluminum adjuvant. From the journal *Toxicology*, the French study authors were very concerned about the widespread use of aluminum adjuvant:

“Concerns about its [aluminum adjuvant's] safety emerged following recognition of its unexpectedly long-lasting biopersistence within immune cells in some individuals, and reports of chronic fatigue syndrome, cognitive dysfunction, myalgia, dysautonomia and autoimmune/inflammatory features temporally linked to multiple Al-containing vaccine administrations.”

They also discovered, through mouse-models, a deeply alarming unique characteristic of aluminum adjuvant: low, consistent doses were MORE neurotoxic than a single bolus dose:

“We conclude that Alhydrogel [aluminum adjuvant] injected at low dose in mouse muscle may selectively induce long-term Al cerebral accumulation and neurotoxic effects. To explain this unexpected result, an avenue that could be explored in the future relates to the adjuvant size

since the injected suspensions corresponding to the lowest dose, but not to the highest doses, exclusively contained small agglomerates in the bacteria-size range known to favour capture and, presumably, transportation by monocyte-lineage cells. In any event, the view that Alhydrogel neurotoxicity obeys ‘the dose makes the poison’ rule of classical chemical toxicity appears overly simplistic.”



Contents lists available at ScienceDirect

Toxicology

journal homepage: www.elsevier.com/locate/toxicol



Non-linear dose-response of aluminium hydroxide adjuvant particles: Selective low dose neurotoxicity



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ARTICLE INFO

ABSTRACT

<http://vaccinepapers.org/wp-content/uploads/Non-linear-dose-response-of-aluminium-hydroxide-adjuvant-particles-Selective-low-dose-neurotoxicity.pdf>

This a confusing conclusion, but profoundly important, so I'm bringing in VP to further explain:

A new paper (Crepeaux et al.) by the Gherardi research group in France reports important results on the toxicity and transport of aluminum (Al) adjuvant in mice. This single study is especially valuable because it looked at many outcomes: behavioral effects, immune (microglial) activation in the brain, and Al transport into the brain. The study tested dosages of 200, 400 and 800 mcg/Kg, injected intramuscularly (IM). The Al adjuvant used was AlOH (brand name Alhydrogel), the most common vaccine adjuvant in use today. It is used in the tetanus, Hep A, Hep B, HiB, pneumococcal, meningococcal, and anthrax vaccines.

Remarkably, the study found that the lowest dosage (200 mcg/Kg) was the most toxic! For many outcomes, the 400 and 800 mcg/Kg dosages had no observable adverse effects, but the 200 mcg/Kg dosage did.

The low toxicity of the higher dosages appears to be a consequence of dosage-dependent inflammation at the injection site. The high dosages caused intense inflammation at the injection site, forming “granulomas”. The 200 mcg/Kg dosage did not produce granulomas. Granulomas are hard nodules in tissue produced in response to injury, infection or foreign substances. Its a way the body “walls off” injured tissue and prevents the spread of infection or toxins. The granuloma appears to provide protection from Al adjuvant toxicity; apparently the granuloma

prevented Al adjuvant particles from leaving the injection site. This explains why the 200 mcg/Kg dosage affected the brain and behavior, while the higher dosages did not. This suggests that it is more dangerous and harmful to administer numerous small injections of Al adjuvant, compared to a large single injection capable of inducing a granuloma.

The study authors also disputed the way the FDA and CDC currently think about aluminum adjuvant toxicity, basically saying that the current approach is wrong:

“As a possible consequence, comparing vaccine adjuvant exposure to other non-relevant aluminium exposures, e.g. soluble aluminium and other routes of exposure, may not represent valid approaches.”

And, the French scientists finish with a conclusion that all parents should find very troubling:

“In the context of massive development of vaccine-based strategies worldwide, the present study may suggest that aluminium adjuvant toxicokinetics and safety require reevaluation.”

Reminder: this study has only been public for 2 months!

Discovery #3: Aluminum can increase IL-6 in the brain

One of the only frustrations of the remarkable toxicity studies on aluminum adjuvant coming out of France is that many scientists did not explicitly measure the mice brains for the cytokine IL-6 which we know can be released during an immune activation event and also know is strongly associated with causing autism. But, a study from the Middle East published roughly one year ago, provides a strong foundation for the IL-6-aluminum adjuvant connection.

In this case, [scientists were using aluminum to induce Alzheimer’s in rats](#), which they appear to have done successfully, showing that aluminum caused a 4-fold increase in IL-6:

*“The results also showed that aluminum administration increased the hippocampus pro-inflammatory cytokines TNF- α by 3.8-fold, **IL-6 by 4-fold**, and iNOS by 3.8-fold compared to the normal control group.”*

If any of this remains confusing, I think VP’s description of aluminum adjuvant in the body will fill in any holes:

Most vaccines contain aluminum, and aluminum is a proven neurotoxin, in amounts received from vaccines. Vaccines in combination can result in toxic aluminum overload. Even the aluminum in a single vaccine can be harmful because the aluminum is in a form that is more dangerous than ingested aluminum. Specifically, vaccine aluminum is in nanoparticulate form, which is harder for the body to eliminate, and because it is transported around the body differently than ingested aluminum.

It is natural and normal to ingest small doses of aluminum from food and water. Its not good for

you, but the body has adequate defenses. Absorption of ingested Al is low, about 0.3%, so about 99.7% is eliminated in feces. Ingested aluminum is in ionic form (individual charged atoms), which is readily removed by the kidneys. Also, ionic aluminum is blocked from entering the brain by the blood brain barrier. The low absorption, rapid elimination by the kidneys and barrier to brain entry adequately protects the brain from aluminum.

However, nanoparticulate aluminum from vaccines cannot be removed by the kidneys. The particles are far too large to be filtered out by the kidneys. The Al nanoparticles do dissolve slowly (converting to ionic aluminum). But long before they can dissolve completely, the Al nanoparticles are “eaten” by immune system cells called macrophages. In other words, the particles wind up inside the macrophages. Once loaded with the Al nanoparticles, the macrophages spread aluminum as they travel through the body. This is dangerous, because the Al-loaded macrophages carry Al nanoparticles to tissues (e.g. the brain) that are damaged by very small amounts of aluminum.

Quick Pause: The chicken-egg of immune activation

Before I discuss the fourth discovery—the final puzzle piece from China—I want to address a topic that triggered much of the exploration that drove me to write this article in the first place.

A few weeks ago, I got into a bit of a [public squabble](#) with Dr. Peter Hotez, a vaccine patent holder who also serves as a spokesperson for the merits of vaccines. Dr. Hotez also has a daughter with autism, so this debate is very personal for him, as it is for me. Dr. Hotez is convinced that autism is “created” in utero as he explained to me, “my read of the scientific literature is that brains of children with autism, like ours, were that way by the first or second trimester of pregnancy.” Dr. Hotez bases his conclusion about autism’s timing on the work of a single study by Dr. Eric Courchesne and colleagues titled, [“Patches of disorganization in the neocortex of children with autism.”](#) which was published in 2014 in the *New England Journal of Medicine*. Dr. Hotez even took his refutation of some of the things I have publicly written about autism and vaccines a step further, and I think this is really the dividing line for many scientists, he wrote to me:

“A vaccine given in the first year of life could not possibly cause a total reorganization of the brain architecture, it just defies reason.”

Does it? Does it defy reason that the re-wiring of the brain—that we now believe is caused by an immune activation event—could never happen after a child is born?

This is the single most important question that needs to be answered to determine autism’s cause, and I think the answer will govern the autism causation debate from here on out:

- If vaccines cannot cause a “reorganization of brain architecture” after a child is born, then vaccines are unlikely to be the cause of autism (however, vaccines given to a pregnant women may still pose a risk to triggering a Maternal Immune Activation).
- If vaccines given after birth can cause the brain to “reorganize”, then we have a serious, serious problem with vaccines.

I believe the science is very clear on this point. Read on.

The evidence for post-natal autism triggers is strong

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Patches of Disorganization in the Neocortex of Children with Autism

Rich Stoner, Ph.D., Maggie L. Chow, Ph.D., Maureen P. Boyle, Ph.D.,
Susan M. Sunkin, Ph.D., Peter R. Mouton, Ph.D., Subhojit Roy, M.D., Ph.D.,
Anthony Wynshaw-Boris, M.D., Ph.D., Sophia A. Colamarino, Ph.D.,
Ed S. Lein, Ph.D., and Eric Courchesne, Ph.D.

ABSTRACT

Does this prove autism is genetic? <http://www.nejm.org/doi/pdf/10.1056/NEJMoa1307491>

The study that Dr. Hotez mentioned to me, the study that proved to him that autism was determined in utero, I have now read probably a dozen times. You can read it for yourself, it's a study where scientists looked at the actual post-mortem brains of children with autism, and found striking differences in brain architecture. What the study didn't do, because it would be impossible to do with post-mortem brains, some as old as 15 years, was speculate exactly WHEN the brain disorganization took place. And, really, how could they? I'm guessing Dr. Hotez was thrown off by the conclusion of this study, where the authors offered up a guess:

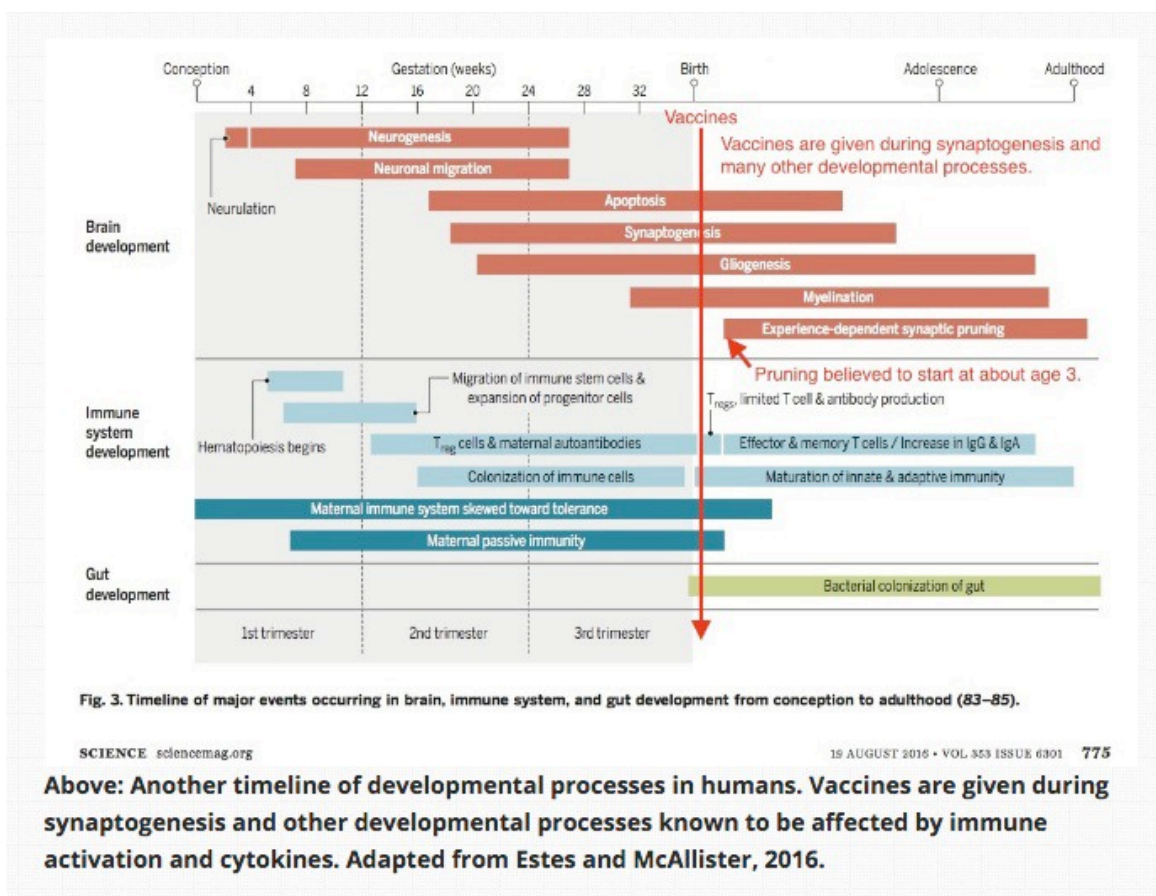
*"In conclusion, we identified discrete patches of disorganized cortex in the majority of postmortem samples obtained from young autistic children that we examined. These patches occurred in regions mediating the functions that are disturbed in autism: social, emotional, communication, and language functions. Such abnormalities may represent a common set of developmental neuropathological features that underlie autism and **probably result from dysregulation of layer formation and layer-specific neuronal differentiation at prenatal developmental stages.**"*

Did you catch what the study said, the part that Dr. Hotez turned into fact to support his claim (and by the way he has cited this study repeatedly in public writings about autism's cause)? The authors said the dysregulation they saw in the brains of children "probably" happened during "prenatal development stages." I think the evidence you will see actually points to the opposite. VP explained it well:

The "patches of disorganization" paper is actually further evidence implicating immune activation and therefore vaccines. Immune activation experiments have shown that immune

activation/cytokines causes disruption of neuron layers. So a vaccine could definitely do this. I believe that autism-associated differences in the prenatal period are simply indicators that the baby is particularly susceptible to immune activation injury. Immune activation works like this: each time there is an activation event, the immune system becomes more sensitive and reactive to immune stimulus. So, an activation “hit” during gestation can render the baby more susceptible to immune activation injury postnatally. This increased reactivity is known to occur with microglia in the brain (microglia are immune cells in the brain). its called “microglial priming”. Once microglia are primed by immune activation, they become hyperreactive for a long time, perhaps a lifetime.

VP went a little farther than Dr. Hotez did, providing this image which is hard to shake once you’ve seen it:



What you can see fairly clearly is that the brain is far from done developing once a child is born. In fact, 5 separate phases of brain development are either in process or yet to start. Could an immune activation event after the child has been born impact brain development? Yes, it could.

And, the published science also supports this view. In a study done in 2012, Wei and colleagues induced autism-like symptoms in mice by injecting them with IL-6 AFTER they were born. This is NOT a maternal immune activation event, this is an immune activation event of a newborn that leads to the development of symptoms of autism.



Brain IL-6 elevation causes neuronal circuitry imbalances and mediates autism-like behaviors

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<https://vaccinepapers.org/wp-content/uploads/Brain-IL-6-elevation-causes-neuronal-circuitry-imbances-and-mediates-autism-like-behaviors.pdf>

The authors noted:

“Here we show that mice with elevated IL-6 in the brain display many autistic features, including impaired cognitive abilities, deficits in learning, abnormal anxiety traits and habituations, as well as decreased social interactions. IL-6 elevation caused alterations in excitatory and inhibitory synaptic formations and disrupted the balance of excitatory/inhibitory synaptic transmissions. IL-6 elevation also resulted in an abnormal change in the shape, length and distributing pattern of dendritic spines. These findings suggest that IL-6 elevation in the brain could mediate autistic-like behaviors, possibly through the imbalances of neural circuitry and impairments of synaptic plasticity.”

Still think Dr. Hotez has a point, that autism happens during gestation or never? Then this study will really blow your mind, from all the way back in 1981.

Child Neurology

Acquired Reversible Autistic Syndrome in Acute Encephalopathic Illness in Children

G. Robert DeLong, MD; S. Charles Bean, MD; Frank R. Brown III, MD, PhD

• In seeking the neurologic substrate of the autistic syndrome of childhood, previous studies have implicated the medial temporal lobe or the ring of mesolimbic cortex located in the mesial frontal and temporal lobes. During an acute encephalopathic illness, a clinical picture developed in three children that was consistent with infantile autism. This development was reversible. It was differentiated from acquired epileptic aphasia, and the language disorder was differentiated from aphasia. One child had rises in serum herpes simplex titers, and a computerized tomographic (CT) scan revealed an extensive lesion of the temporal lobes, predominantly on the left. The other two, with

strate of this symptom complex is unknown. We have previously reported that pneumoencephalograms in a subset of children with the autistic syndrome showed medial temporal lobe damage, especially evident on the left side.² We were led by this finding to explore the analogy between autistic symptomatology and that seen with medial temporal lobe disease in adult man and in experimental studies in animals (the Klüver-Bucy syndrome and the amnesic syndrome).⁴ Boucher and Warrington noted the similarities between autistic behavior and the behavioral deficits reported in animals with hippocampal lesions and

in the left third.

REPE

CASE 1.—A 5-year-old child developed norm of restlessness four days she had feeding herself, with other child uncontrollably screaming, and At examination onset, she was able to walk, climb, or reflex abnormally walked, climbed objects, and made stethoscope

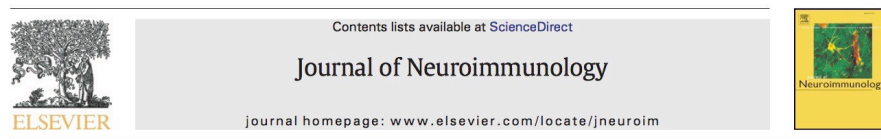
<https://vaccinepapers.org/wp-content/uploads/Acquired-reversible-autistic-syndrome-in-acute-encephalopathic-illness-in-children.pdf>

In this case study of three children, published in *Child Neurology*, the authors describe three cases of sudden onset autism, all caused by infection and inflammation of the brain. It appears that not only can an infection trigger an immune activation event that leads to autism after a child is born, it can even happen to a child who is 5, 7, or 11 years old (the ages of the three children in this study). Are you reading this, Dr. Hotez?

“During an acute encephalopathic illness, a clinical picture developed in three children that was consistent with infantile autism...In our cases, the abnormalities are acquired and not developmental, but they clearly fit the critical clinical features of the childhood autistic syndrome.”

Discovery #4: Hepatitis B vaccine induces IL-6 in postnatal rats

When [this paper](#) was published in China, no one I knew in the autism community mentioned it, I'm guessing because it was hard to patch together its significance. You had to appreciate all of Patterson's work. You had to understand the IL-6 connection to autism. You had to appreciate the brand new insights about aluminum adjuvant toxicity, the low dose implications, and that aluminum adjuvant was ending up in the brain. And, you had to read a paper from China that covered a lot of other ground, as well as providing the missing link in the aluminum adjuvant-cytokine (IL-6)-autism hypothesis that it helped fortify.



Neonatal vaccination with bacillus Calmette–Guérin and hepatitis B vaccines modulates hippocampal synaptic plasticity in rats



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ABSTRACT

Immune activation can exert multiple effects on synaptic transmission. Our study demonstrates the influence of neonatal vaccination on hippocampal synaptic plasticity in rats under normal physiological conditions. The results revealed that neonatal BCG vaccination enhanced synaptic plasticity. In contrast, HBV hampered it. Furthermore, we found that the cytokine balance shifted in favour of the T helper type 1/T helper type 2 immune response in BCG/HBV-vaccinated rats in the periphery. The peripheral IFN- γ :IL-4 ratio was positively correlated with BDNF and IGF-1 in the hippocampus. BCG raised IFN- γ , IL-4, BDNF and IGF-1 and reduced IL-1 β , IL-6, and TNF- α in the hippocampus, whereas, HBV triggered the opposite effects.

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Study from China that seals the deal

<http://vaccinepapers.org/wp-content/uploads/BCGhepB-vaccines.pdf>

VP has written extensively about this study, I will start by quoting VP, but if you want a highly detailed scientific analysis of this study, [check this out](#).

“An important new study by Li et al. reports the effects of bacillus calmette-guerin (BCG) vaccine (for tuberculosis) and hepatitis B vaccine on brain development in infant rats. The study

relates the observed brain changes to the type of immune activation (Th1 or Th2, explained below) stimulated by the vaccines. The BCG and hep B vaccines had opposite effects on the brain (BCG being beneficial, and hep B being detrimental), and a combination of both vaccines resulted in cancellation of the effects.

This is the first study to test the effects of immune activation by vaccination on brain development. All other studies of immune activation have used essentially pathological conditions that mimic infection and induce a strong fever. A criticism I have heard often from vaccine advocates is that the immune activation experiments are not relevant to vaccines because vaccines cause a milder immune activation than injections of poly-IC or lipopolysaccharide (two types of immune system activators).

This new study demonstrates that vaccines can affect brain development via immune activation. Hence, the immune activation experiments are relevant to vaccines...The hep B vaccine increased IL-6 in the hippocampus (the only brain region analyzed for cytokines)."

And, VP continues, explaining the timing of the injury to the Hep B rats:

"An important finding in the rat BCG/Hep B study is that many of the effects of hep B vaccine did not appear until age 8 weeks. This finding undermines claims of vaccine safety, which are almost always based on short-term outcomes of a few days or weeks. Furthermore, 8 weeks is a long time in rats. 8 week old rats are almost fully mature adults. This suggests that adverse effects of vaccines may take years or decades to appear in humans. This is consistent with what is known about immune activation and schizophrenia. Immune activation in the fetus can cause schizophrenia 20–30 years later.

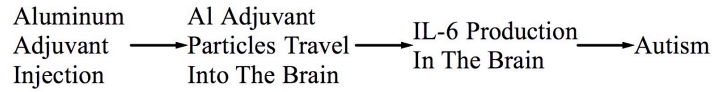
The accumulating scientific evidence and the Li et al study in particular suggest that vaccination may cause mental illness. The mental illnesses would emerge years or decades after vaccination of an infant. Vaccines are likely contributing the the rise of mental illnesses in the USA over the last 25 years. The rise in mental illnesses in the USA is coincident with the dramatic increase in vaccination that started in the 1980s."

This study is extraordinary. There were three different groups of rats: rats receiving the BCG vaccine (not given in the U.S.), rats receiving the Hepatitis B vaccine (given on day 1 of life in the U.S.) and a control group with no vaccine. The BCG vaccine does NOT contain aluminum adjuvant and the impact on the rat's brains from BCG was actually positive! The Hep B vaccine rats, however, showed the kind of immune activation event we are seeing in autism (high IL-6) This is biological proof of the link between a vaccine—given to a post-natal animal—inducing an immune activation event, including the cytokine marker for autism, IL-6. A scientific first.

Four discoveries, a clear path to autism

Here's a simple graphic that I think spells out the process of triggering autism very clearly, as demonstrated by the published science I have shared with you:

How Aluminum Adjuvant Causes Autism

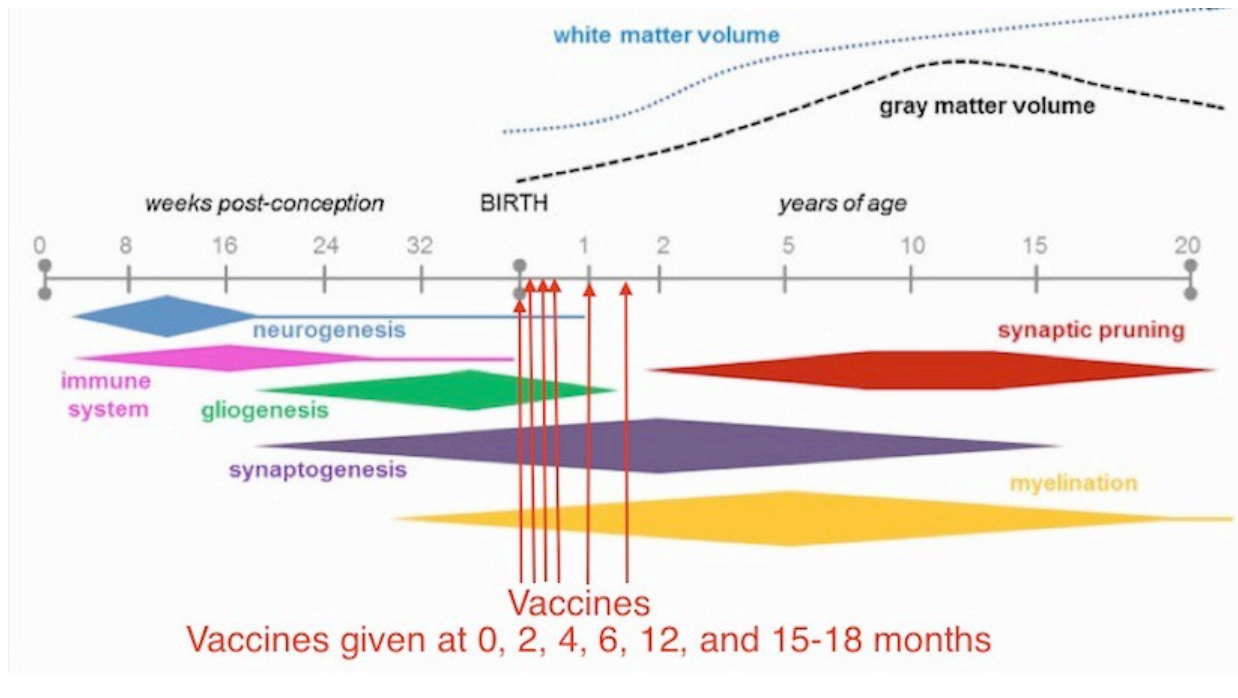


All these causal connections have been demonstrated in multiple, replicated studies.

Published studies are showing that autism is caused by an immune activation event. The adjuvant in vaccines—aluminum adjuvant—can activate the brain’s immune system and is far more neurotoxic than previously realized—all the new science has been published in just the last few years. Aluminum can cause IL-6, the key cytokine implicated in autism. Chinese scientists—for the first time anywhere in the world—used a vaccine to trigger an immune activation event, and recorded elevated levels of IL-6 in rats. THIS is a biological basis for HOW a vaccine can cause autism. Remember what Dr. Hotez said to me? He said:

“A vaccine given in the first year of life could not possibly cause a total reorganization of the brain architecture, it just defies reason.”

But, that’s exactly what the science is showing us. Vaccines, administered early and often, are igniting immune activation event after immune activation event. Here’s a different chart looking at the development of the brain over time, from a neuro-immunological perspective. Imagine 6–7 immune activation events (right after they receive 4–6 aluminum adjuvant containing vaccines in a single appointment) in certain vulnerable children during critical phases of brain development. With everything you’ve just read, is it really that hard to imagine?



Implications and questions

I can't help but tie everything I read and see here to my own son's experience. Born in 2002, my son seemed to get sicker with every vaccine appointment, and his head always seemed to be hurting. And, with each appointment, unusual behaviors and odd movements began to appear. A really sad reminder of this reality appeared in a study published just last week in [Nature](#), that described how children with autism developed enlarged foreheads:

NATURE | LETTER



日本語要約

Early brain development in infants at high risk for autism spectrum disorder

Heather Cody Hazlett, Hongbin Gu, Brent C. Munsell, Sun Hyung Kim, Martin Styner, Jason J. Wolff, Jed T. Elison, Meghan R. Swanson, Hongtu Zhu, Kelly N. Botteron, D. Louis Collins, John N. Constantino, Stephen R. Dager, Annette M. Estes, Alan C. Evans, Vladimir S. Fonov, Guido Gerig, Penelope Kostopoulos, Robert C. McKinstry, Juhi Pandey, Sarah Paterson, John R. Pruett, Robert T. Schultz, Dennis W. Shaw, Lonnie Zwaigenbaum + et al.

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<http://www.nature.com/nature/journal/v542/n7641/full/nature21369.html>

“Brain enlargement has been observed in children with autism spectrum disorder (ASD), but the timing of this phenomenon, and the relationship between ASD and the appearance of behavioural symptoms, are unknown. Retrospective head circumference and longitudinal brain volume studies of two-year olds followed up at four years of age have provided evidence that increased brain volume may emerge early in development.”

Wouldn't the above theory about how autism is triggered do a pretty good job of explaining why these children have large (swollen) heads? As you know, the immune activation event leads to what Dr. Patterson called “an ongoing, permanent immune-system activation in the brains of autistic people.” And, guess what, permanent immune system activation means inflammation...which would lead to a “large brain” and a “swollen forehead.” Is that why children with autism are known to head bang? Perhaps you would too if you're brain was in a state of permanent inflammation?

Question: What about gastrointestinal disorders?

So many children with autism experience [gastrointestinal disorders](#), my son most certainly did. And, gastrointestinal distress is now fully appreciated to be a “co-morbid” condition of autism, [according to Autism Speaks](#). But what, exactly, might cause it? You don't have to look too far:

OPEN

Aluminum enhances inflammation and decreases mucosal healing in experimental colitis in mice

G Pineton de Chambrun^{1,2,3,4,12}, M Body-Malapel^{1,2,3,12}, I Frey-Wagner⁵, M Djouina^{1,2,3}, F Deknuydt^{6,7,8}, K Atrott⁵, N Esquerre^{1,2,3}, F Altare^{6,7,8}, C Neut^{1,2,3,9}, MC Arrieta¹⁰, T-D Kanneganti¹¹, G Rogler⁵, J-F Colombel^{1,2,3,4}, A Cortot^{1,2,3,4}, P Desreumaux^{1,2,3,4} and C Vignal^{1,2,3}

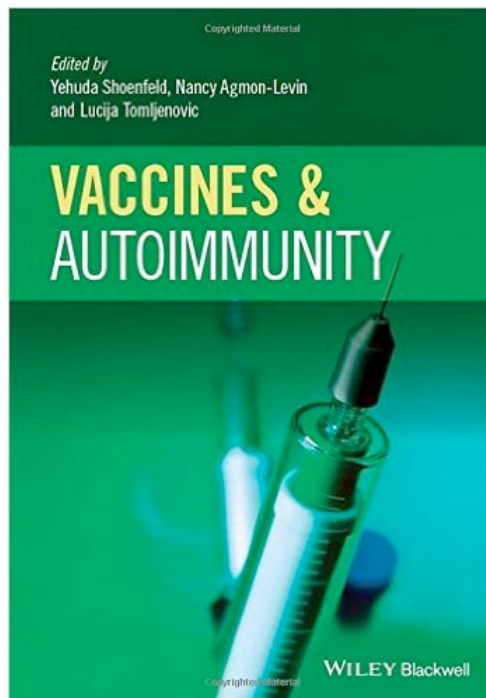
The increasing incidence of inflammatory bowel diseases (IBDs) in developing countries has highlighted the critical role of environmental pollutants as causative factors in their pathophysiology. Despite its ubiquity and immune toxicity, the impact of aluminum in the gut is not known. This study aimed to evaluate the effects of environmentally relevant intoxication with aluminum in murine models of colitis and to explore the underlying mechanisms. Oral administration of aluminum worsened intestinal inflammation in mice with 2,4,6-trinitrobenzene sulfonic acid- and dextran sodium sulfate-induced colitis and chronic colitis in interleukin 10-negative (IL10^{-/-}) mice. Aluminum increased the intensity and duration of macroscopic and histologic inflammation, colonic myeloperoxidase activity, inflammatory cytokines expression, and decreased the epithelial cell renewal compared with control animals. Under basal conditions, aluminum impaired intestinal barrier function. *In vitro*, aluminum induced granuloma formation and synergized with lipopolysaccharide to stimulate inflammatory cytokines expression by epithelial cells. Deleterious effects of aluminum on intestinal inflammation and mucosal repair strongly suggest that aluminum might be an environmental IBD risk factor.

<http://www.nature.com/mi/journal/v7/n3/pdf/mi201378a.pdf>

“Aluminum increased the intensity and duration of macroscopic and histologic inflammation, colonic myeloperoxidase activity, inflammatory cytokines expression, and decreased the epithelial cell renewal compared with control animals. Under basal conditions, aluminum impaired intestinal barrier function. *In vitro*, aluminum induced granuloma formation and synergized with lipopolysaccharide to stimulate inflammatory cytokines expression by epithelial cells. Deleterious effects of aluminum on intestinal inflammation and mucosal repair strongly suggest that aluminum might be an environmental IBD risk factor.”

(Note: Down below I cite a [second paper](#) by Hsiao and colleagues that shows that an immune activation event can CAUSE gut dysbiosis, in the section titled “Heal the Microbiome.”)

Question: What about all the other types of autoimmunity (food allergies, etc.) that are at epidemic levels, and often co-morbid with autism?



All about aluminum adjuvant

<https://www.amazon.com/Vaccines-Autoimmunity-Yehuda-Shoenfeld/dp/1118663438>

Spearheaded by Israeli scientist Dr. Yehuda Shoenfeld, the scientific evidence that aluminum adjuvant is causing epidemics of a wide variety of auto-immune conditions is becoming overwhelming. Dr. Shoenfeld even has his own text book explaining this!

“With the discovery of autoimmune/inflammatory syndrome induced by adjuvants (ASIA), the work of leading researchers from 14 countries on the role of adjuvants in different vaccines and how they can induce diverse autoimmune clinical manifestations in genetically prone individuals has been published in the newly released medical textbook, [Vaccines and Autoimmunity](#).”

Consider this article: “Researchers at the University of Virginia Health System’s Division of Asthma, Allergy & Immunology report that an era of food allergies that began with the post-millennial generation might be a response to vaccines containing the adjuvant alum, a known trigger for allergic traits. Alum is usually the name given to [potassium aluminum sulfate](#) when used in vaccines, the FDA states. Sometimes, [aluminum hydroxide](#) and even other forms of aluminum adjuvants are also referred to as alum in allergy research.”

[Certain Vaccines Increase Food Allergen IGE: Susceptible Post-Millennials Reacting To Adjuvant...](#)

[Health Researchers at the University of Virginia Health System's Division of Asthma, Allergy &](#)

[Immunology report that...www.inquisitr.com](http://www.inquisitr.com)

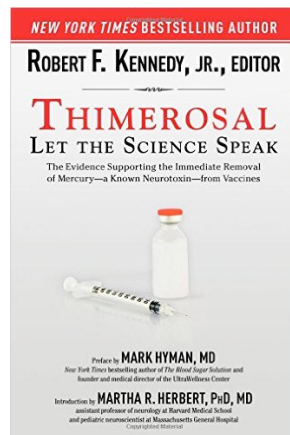
Dr. Shoenfeld's groundbreaking study in 2013 explained the role of aluminum adjuvant in triggering autoimmunity across a wide variety of conditions:

[Autoimmune/inflammatory syndrome induced by adjuvants \(ASIA\) 2013: Unveiling the pathogenic, clinical and diagnostic aspects](#)

The study reads: *“Notwithstanding that molecular mimicry and bystander activation in a genetically predisposed individual have been called to be responsible, the finger should be pointed at the adjuvants. One in particular has raised several distresses: aluminum. Indeed, this has been used as an adjuvant for the past 90 years but it is also an experimentally demonstrated neurotoxin. Experimental research has showed that alum adjuvants have a potential to induce serious immunological disorders in humans. Thus, efforts should be put in clarifying the potential threat of alum-containing vaccines.”*

Question: What about mercury?

When my son was diagnosed with autism in 2004, the only thing parents were talking about was the mercury in vaccines. Thimerosal, a preservative made from ethyl-mercury, had recently been revealed to be in children's vaccines far in excess of EPA safety guidelines. The autism rate was exploding, and a [2001 paper](#) showed a compelling correlation between the symptoms of autism and the symptoms of mercury poisoning.



Mercury is not good for humans

<https://www.amazon.com/Thimerosal-Supporting-Immediate-Mercury-Neurotoxin/dp/1632206013>

The use of mercury in a vaccine seems insane to most rational people given the extreme neurotoxicity of mercury, which has been demonstrated in hundreds of published studies. We've learned that vaccine mercury travels [straight to the brain](#) of monkeys, that it [depletes glutathione](#), a vital antioxidant, that it [blocks critical pathways](#) in methylation, and that [mice injected with](#)

[Thimerosal](#) exhibit behaviors similar to autism.

Thimerosal has been removed from most pediatric vaccines (beginning in 2002), but in an odd development, started being injected into pregnant women in 2004, when the flu shot (of which a portion contain thimerosal) was recommended for the first time by the CDC for pregnant women.

So, does this article abandon the mercury-autism hypothesis? My personal answer is complex:

- Mercury in vaccines is dangerous and unjustifiable based on published science. It should be removed from 100% of vaccines immediately.
- [Synergistic toxicity](#) means that mercury combined with aluminum may be 100x more toxic than either metal by itself, we don't really know:

“How can $1 + 1 = 100$? ‘Synergistic toxicity’ refers to the effect that when exposed to two toxins, the toxicity level is far greater than the additive toxicity levels of the two toxins.”

- There are many anecdotal stories that children diagnosed with autism today are “less severe.” Is this true? Is the removal of mercury the reason? There's no data I can find to support this, so it's just conjecture for the moment.
- However, IF the core hallmark of triggering autism is an immune activation event, than aluminum adjuvant is more likely the central cause, and this matches the reality that autism rates have continued to rise after the removal of MOST mercury from vaccines. Mercury is NOT an immune system antagonist the way aluminum adjuvant is, mercury was in vaccines for its effectiveness as an antibacterial and an anti fungal, **not an adjuvant**.
- [VP has very strong opinions](#) about the mercury vs. aluminum adjuvant debate, including this: “There are far more important issues than mercury, such as aluminum adjuvant neurotoxicity, and immune activation injury.”

Question: What about the MMR, it has no aluminum adjuvant?

The MMR vaccine does not contain aluminum adjuvant. Yet, many (but far from all) parents point to the appointment where their child received the MMR vaccine as a trigger for autism. We need more scientific data than we have about what exactly the MMR vaccine does to the brain (does it generate IL-6 or other cytokines?), but because we don't know, we're left to speculate.

The most obvious answer is that the MMR vaccine is the first live virus vaccine children receive (it's typically given between age 12–18 months, most children have received 15–20 vaccines by then), and it's a triple (measles, mumps, rubella) live virus. For an immune system bathed in aluminum adjuvant and possibly already simmering with activation events, this triple dose might push a child right over the edge. This might explain the seizures (an extreme immune activation event) that sometimes follow the MMR appointment. We also know that children who also receive the varicella vaccine (chicken pox) along with the MMR have [higher rates of seizure](#)

[events](#). This would make sense, four live viruses at once would likely challenge the immune system more than three, but we can't explain exactly how the MMR biologically impacts the immune system the way we can for aluminum adjuvant, and now for Hepatitis B vaccine (thanks to Chinese scientists). Dr. Yehuda Shoenfeld [discusses](#) the fact that a live vaccine activates the immune system more than a vaccine using aluminum adjuvant:

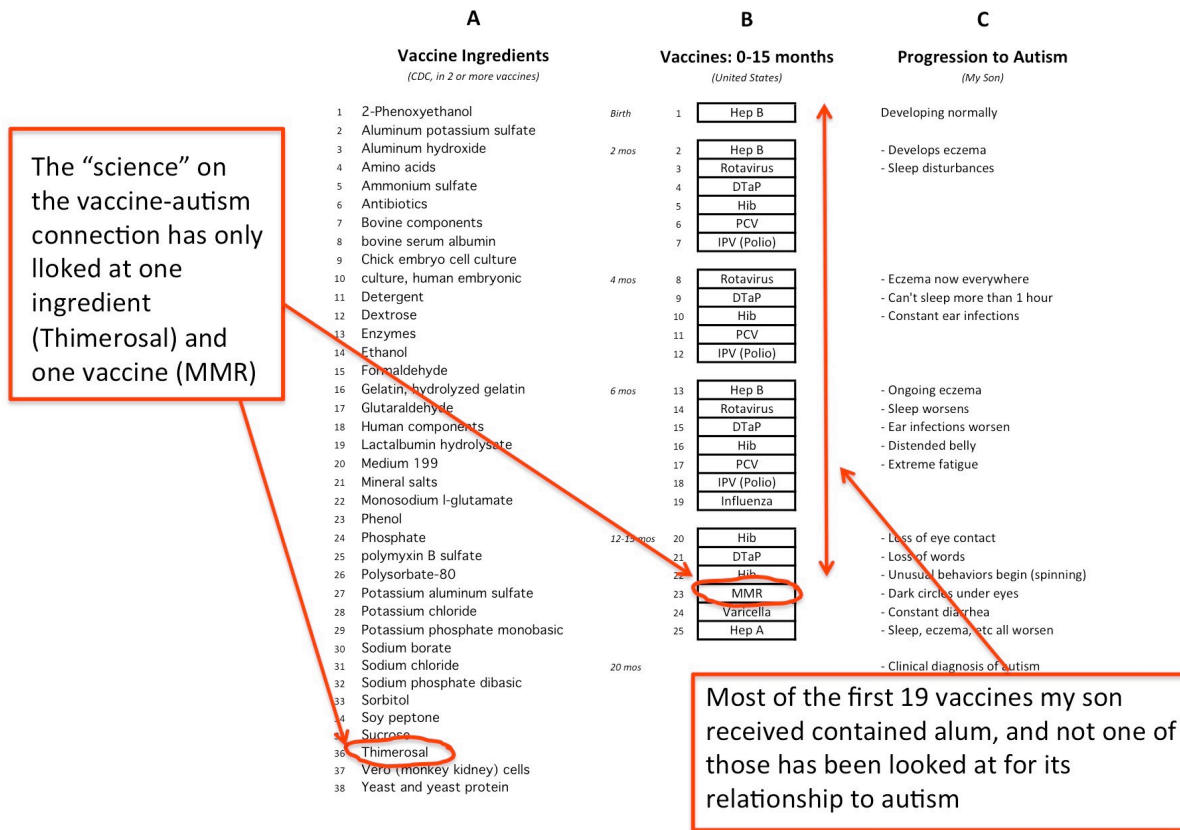
“It is evident that a live attenuated vaccine is more prone than a killed vaccine to activate the immunity response.”

Question: Didn't they already prove vaccines don't cause autism?

If you've read this far, I assume you already know this is a fable. If you're unsure, just look at this simple graphic. All those vaccine industry spokespeople who say “the science is settled” fail to mention that only one ingredient (thimerosal) and one vaccine (MMR) has ever been looked at for its relationship to autism.

No vaccine containing aluminum adjuvant has ever been explored for its relationship to autism, despite a growing and clear body of evidence implicating aluminum adjuvant in causing “immune activation,” the central cause of autism.

Vaccine ingredients (38), Vaccines (25), and Autism, Birth to 15 months: What has actually been studied? Very little.



It's also worth pointing out that in the early and mid-2000s when parents first started sounding the alarm about the connection between vaccines and autism, we had no biological evidence to support our view, we just had the collective experience of seeing our children disappear after vaccine appointments. Today, it's a completely different world. Consider the words of [Dr. Kimberley McAllister](#) of the UC Davis Mind Institute just this past August (2016):

"These MIA (maternal immune activation) animal models meet all of the criteria required for validity for a disease model: They mimic a known disease-related risk factor (construct validity), they exhibit a wide range of disease-related symptoms (face validity), and they can be used to predict the efficacy of treatments (predictive validity)."

It's time for the CDC, FDA, Autism Speaks, and the American Academy of Pediatrics to face the biological evidence staring us all in the face!

Question: Aren't you just "moving the goalposts" on the autism-vaccine hypothesis?

Of course critics will say this. First it was the MMR. Then it was mercury. Then it was "too

many, too soon.” What’s different now is very important: overwhelming published, peer-reviewed science making a clear connection between immune activation events, aluminum adjuvant, and autism. That’s why this article is filled with study references, not conjecture.

What’s been true throughout the autism epidemic remains true today: an overwhelming (tens of thousands) number of parental reports of regression of their children into autism after vaccination.

Implications for Treatment



We want our children to feel better

I want to know what, exactly, happened to my son. When he was diagnosed with autism in 2004, the prevailing understanding of autism in the parent community was that it was growing exponentially, many parents were seeing changes after vaccine appointments, and that mercury or a live virus (measles) were the most likely causes. We had no biological science. The understanding of aluminum or the aluminum adjuvant was comically simplistic, almost a throw away point. We had no idea what an immune activation event, a cytokine, or IL-6 meant. (In fact, if you want a good laugh, [see how Dr. Paul Offit is still describing aluminum adjuvant](#), despite its now proven extreme neurotoxicity. He states: *“Parents can be reassured that the trace quantities of aluminum in vaccines can’t possibly do harm.”* Based on published science beginning in 2009, this is an unsupportable lie.)

Everything you have read so far is based on published science. The grand theory of autism’s causation, in my opinion, holds together pretty strongly.

Will we look back one day and say that aluminum adjuvant caused the autism epidemic the way we say that Thalidomide triggered birth defects? I think we will, but that’s just my opinion.

What follows next is conjecture and opinion. I'm not a doctor, and this is most certainly NOT medical advice, but I do believe that the treatment of children suffering from autism may be radically altered by the simple description Dr. Patterson made of children with autism:

“there’s an ongoing, permanent immune-system activation in the brains of autistic people.”

If he’s right, and if aluminum adjuvant is the primary trigger of the immune activation, than the following ideas might prove helpful in reducing the symptoms of autism in children. (Please note that any links I include to actual products are just for illustrative purposes, I’m not endorsing anything and I have no commercial interests in any products or ideas mentioned here):

1. Get the aluminum adjuvant out of the body.

I know that [silica](#) and [zeolites](#) are both considered possible ways to remove aluminum from the body. Will they also work on aluminum adjuvant? I have no idea. VP has a perspective on aluminum removal that [cites a wide body of scientific research](#).

2. Consider ketogenics

I was incredibly excited to see this study, released this month (February 2017), about the impact a ketogenic diet had on suppressing immune activation in mice. Could ketones play a role in reducing brain inflammation and turning off the brain’s immune system?



RESEARCH ARTICLE

Ketogenic diet improves behaviors in a maternal immune activation model of autism spectrum disorder

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<http://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0171643&type=printable>


“Here we show that metabolic therapy with a KD [ketogenic diet] improves and can even reverse ASD-like behaviors in the MIA mouse model.”

It’s worth noting that the [ketogenic diet](#) has been used for years to help reduce seizures. Ketogenics are going through a bit of a revolution, with “[exogenous ketones](#)” now being made available as supplement products to put a body into [ketosis](#) more quickly. Could these exogenous ketones accelerate recovery? I have no idea, but this study alone seems to show its worth far more exploration.

See another study from 2014: [Potential Therapeutic Use of the Ketogenic Diet in Autism Spectrum Disorders](#). And, [a study of the ketogenic diet with children with autism](#), way back in 2003.

3. Heal the microbiome

We know that aluminum adjuvant can contribute to gastrointestinal distress. But, how do you heal that gut (the microbiome)? A 2013 study highlights the relationship between the gut microbiota, immune activation, and autism:

	NIH Public Access Author Manuscript <i>Cell</i> . Author manuscript; available in PMC 2014 December 19.
Published in final edited form as: <i>Cell</i> . 2013 December 19; 155(7): 1451–1463. doi:10.1016/j.cell.2013.11.024.	
The microbiota modulates gut physiology and behavioral abnormalities associated with autism	
Elaine Y. Hsiao^{1,2,*}, Sara W. McBride¹, Sophia Hsien¹, Gil Sharon¹, Embriette R. Hyde³, Tyler McCue³, Julian A. Codelli², Janet Chow¹, Sarah E. Reisman², Joseph F. Petrosino³, Paul H. Patterson^{1,*†}, and Sarkis K. Mazmanian^{1,*†}	
¹ Division of Biology & Biological Engineering, California Institute of Technology, Pasadena, CA 91125, USA	
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https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3897394/pdf/nihms543590.pdf	

Discussion: *“Our findings provide a novel mechanism by which a human commensal bacterium can improve ASD-related GI deficits and behavioral abnormalities in mice, possibly explaining the rapid increase in ASD prevalence by identifying the microbiome as a critical environmental contributor to disease. We propose the transformative concept that autism is, at least in part, a disease involving the gut that impacts the immune, metabolic and nervous systems, and that microbiome-mediated therapies may be a safe and effective treatment for ASD.”*

There a wide variety of natural therapies to “heal the gut” that should be discussed with your health care professional.

A more recent study: [Emerging Roles for the Gut Microbiome in Autism Spectrum Disorder](#).

4. Vitamin D

[VP has an excellent section](#) on the role Vitamin D can play in reducing immune activation, stating:

Vitamin D strongly reduces immune activation and IL-17 production specifically. Vitamin D strongly improves many diseases, including almost any disease with inflammatory or autoimmune aspects. Vitamin D favorably regulates the immune system, simultaneously improving its effectiveness at eliminating pathogens, and reducing inflammation. This is exactly what you want for optimal health: the combination of high immune function and low inflammation. When the body has adequate vitamin D, the immune system can eliminate pathogens without becoming dangerously overactivated.

Vitamin D is consumed by the immune system when its activated. It is a nutrient that is metabolized at a faster rate during infection or inflammation. Consequently, people with inflammatory conditions need greater amounts of vitamin D. They must supplement at a higher dose to achieve healthy blood levels. Since chronic immune activation is always present in autism, autistics require higher vitamin D intake than normal people.

And, here's a case report from China where a child's autism symptoms improved dramatically from Vitamin D:

Core Symptoms of Autism Improved After Vitamin D Supplementation

Feiyong Jia, PhD, MD^a, Bing Wang, MD^a, Ling Shan, MD^a, Zhida Xu, PhD^{a,b}, Wouter G. Staal, PhD^c, Lin Du, MD^a

abstract

Autism spectrum disorder (ASD) is a common neurodevelopmental disorder caused by a complex interaction between genetic and environmental risk factors. Among the environmental factors, vitamin D₃ (cholecalciferol) seems to play a significant role in the etiology of ASD because this vitamin is important for brain development. Lower concentrations of vitamin D₃ may lead to increased brain size, altered brain shape, and enlarged ventricles, which have been observed in patients with ASD. Vitamin D₃ is converted into 25-hydroxyvitamin D₃ in the liver. Higher serum concentrations of this steroid may reduce the risk of autism. Importantly, children with ASD are at an increased risk of vitamin D deficiency, possibly due to environmental factors. It has also been suggested that vitamin D₃ deficiency may cause ASD symptoms. Here, we report on a 32-month-old boy with ASD and vitamin D₃ deficiency. His core symptoms of autism improved significantly after vitamin D₃ supplementation. This case suggests that vitamin D₃ may play an important role in the etiology of ASD, stressing the importance of clinical assessment of vitamin D₃ deficiency and the need for vitamin D₃ supplementation in case of deficiency.

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Dr Jia conceptualized and designed the study and drafted the initial manuscript; Drs Xu, Staal, and Du assisted with the initial analyses and reviewed and

<http://vaccinepapers.org/wp-content/uploads/Core-symptoms-of-autism-improved-after-vitamin-D-supplementation.pdf>

5. Selenium

[Selective induction of IL-6 by aluminum-induced oxidative stress can be prevented by selenium](#) *Journal of Trace Elements in Medicine and Biology*, 2012, Dale Viezeliene, Piet Beekhof, Eric Gremmer, Hiliaras Rodovicius, Ilona Sadauskien, Eugene Jansen, Leonid Ivanov

This fascinating study from scientists in Lithuania and the Netherlands highlighted two things:

- Aluminum raises IL-6 levels in rats
- The mineral Selenium reduces some of Aluminum's negative effects

“Therefore it was concluded that short-term exposure to Al [aluminum] causes adverse effects on the intracellular oxidative stress processes in the liver, as reflected by the selective increase in the IL-6 concentration. This process can be restored by co-administration of the trace element Se [selenium] as a part of the glutathione redox system.”

Next Steps

I believe we may be far closer to a complete explanation of how autism—and many related autoimmune conditions—are being caused. Scientists from all over the world have created a compelling body of work to support an almost complete biological understanding of how autism is triggered by aluminum adjuvant inside the body, creating an immune activation event, and leading to autism—most of this research has been published in just the last 5 years.



Dr. Chris Shaw of Canada

Is everything published and written here true? Could the explanation really be that simple? Did a rising number of vaccines containing the aluminum adjuvant trigger an autoimmune epidemic, of which autism is the most severe, but not only, manifestation? Does an epidemic of food allergies, ADHD, learning disabilities, eczema, and diabetes fall into the same realm of causation?

Is it possible that injecting an immune system antagonist (aluminum adjuvant), all but guaranteed to cause immune activation events, has done just that in the brains of many of our children? Do

even mildly impacted children also suffer from a permanent, simmering brain immune system activation? Should we believe the growing body of scientists from all over the world who are sounding the alarm about the impact injected aluminum adjuvant is having on our children?

Recently, scientists from the U.S., Canada, France, and Israel are all sounding the alarm about the aluminum adjuvant (“alum”) used in vaccines

“... it is somewhat surprising to find that in spite of over 80 years of use, the safety of Al adjuvants continues to rest on assumptions rather than scientific evidence. For example, nothing is known about the toxicology and pharmacokinetics of Al adjuvants in infants and children... Yet, in spite of these observations children continue regularly to be exposed to much higher levels of Al adjuvants than adults, via routine childhood vaccination programmes.”

- **Dr. Chris Shaw, University of British Columbia (Canada), 2012**

“continuously escalating doses of this poorly biodegradable adjuvant in the population may become insidiously unsafe, especially in the case of overimmunization or immature/altered blood brain barrier.”

- **Dr. Josette Cadusseau, Université Paris-Est Créteil (France), 2013**

“Experimental research has showed that alum adjuvants have a potential to induce serious immunological disorders in humans. Thus, efforts should be put in clarifying the potential threat of alum-containing vaccines “

- **Dr. Yehuda Shoefeld, Tel-Aviv University (Israel), 2013**

“The problem with vaccine- derived aluminum is really twofold: It drives the immune response even in the absence of a viral or bacterial threat and it can make its way into the central nervous system. It is not really a matter of much debate that aluminum in various forms can be neurotoxic.”

- **Dr. Lucija Tomljenovic, University of British Columbia (Canada), 2013**

“Thus alum and other poorly biodegradable materials taken up at the periphery by phagocytes circulate in the lymphatic and blood circulation and can enter the brain using a Trojan horse mechanism similar to that used by infectious particles. Previous experiments have shown that alum administration can cause CNS dysfunction and damage, casting doubts on the exact level of alum safety.”

- **Dr. Romain K. Gherardi, Université Paris-Est Créteil (France), 2015**

“Concerns about its [alum’s] safety emerged following recognition of its unexpectedly long-lasting biopersistence within immune cells in some individuals, and reports of chronic fatigue syndrome, cognitive dysfunction, myalgia, dysautonomia and autoimmune/inflammatory features temporally linked to multiple Al-containing vaccine administrations... In the context of massive development of vaccine-based strategies worldwide, the present study may suggest that aluminium adjuvant toxicokinetics and safety require reevaluation.”

- **Dr. Guillemette Crépeaux, Ecole Nationale Vétérinaire d’Alfort (France), 2016**

Is there any hope of recovery for all these impacted children? Will removing aluminum, introducing ketones to the brain, repairing the gut, and supplementing with Vitamin D do anything to alleviate autism and other ailments in children who have already been damaged?

And, importantly, will these scientists who have published all this wonderful work pool their collective expertise and let the world know what they are learning? Will they take their exhortations for caution and further exploration—all buried inside their published studies—and publicly warn parents about what is becoming so clear?

In my opinion, we are much, much closer to understanding how autism has been triggered in so many children, and I hope this article is another step on the path to the truth. And, for so many of you out there doing everything you can to help you son or daughter with autism live the best possible life, perhaps a clearer understanding of how their autism was triggered will improve their chances for recovery.

J.B. Handley is the father of a child with Autism. He and his wife co-founded Generation Rescue, a national autism charity. He spent his career in the private equity industry and received his undergraduate degree with honors from Stanford University. He is also the author of [“The Only Vaccine Guide a New Parent Will Ever Need”](#), [“An Angry Father’s Guide to Vaccine-Autism Science”](#), and [“7 reasons CDC employees should be crying in the hallways”](#) Mr. Handley has started a podcast called [“How to End the Autism Epidemic”](#)—you might enjoy his first six interviews: