

# BOOKS AND IDEAS PODCAST

*with Ginger Campbell, MD*

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## Episode #25

### Interview with Dr. Paul Offit, MD, on Vaccine Safety

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#### INTRODUCTION

This is Episode 25 of *Books and Ideas*, and I'm your host Dr. Ginger Campbell. For more information about this podcast please visit our website at [booksandideas.com](http://booksandideas.com). You can also send me email at [docartemis@gmail.com](mailto:docartemis@gmail.com).

If you live in the United States or the U.K. you are probably aware of the ongoing controversy about the relationship between autism and vaccines. Today we are going to examine why this controversy is continuing despite the overwhelming scientific evidence that there is no relationship between vaccines and autism. We're going to consider the evidence: Why are doctors so sure that vaccines are really safe? And we are going to look at the other side: Why is a small, very vocal minority still claiming that there is a link?

This episode of *Books and Ideas* is also going out to all subscribers of the *Brain Science Podcast*. Although we won't be talking today about autism and the brain, I think this information is extremely important. Also, it turns out that the ongoing controversy is partly fueled by how our brains perceive things like risk, and cause and effect.

My guest today is Dr. Paul Offit. Dr. Offit is the Chief of Infectious Diseases and the Director of Vaccine Education at The Children's Hospital of Philadelphia. He is also a professor at the University of Pennsylvania School of Medicine. He has spent over 20 years studying the immune response to rotavirus, which is one of the main causes of life-threatening diarrhea in young children. He is an international expert in this field, and the co-inventor of the rotavirus vaccine.

Today we're going to talk with him about his new book, *Autism's False Prophets: Bad Science, Risky Medicine, and the Search for a Cure*, which was published by

the University of Columbia Press in 2008. (Note from Dr. Campbell: this should be [Columbia University Press](#)) Dr. Offit is donating the royalties from *Autism's False Prophets* to autism research. This is a book I think everyone should read, because this short interview cannot do justice to Dr. Offit's meticulous research and comprehensive exploration of this topic. Let's get in to Dr. Offit's interview.

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## INTERVIEW

**GC:** I am very privileged to welcome Dr. Paul Offit to *Books and Ideas*. Paul, it's an honor to have you on the show today.

**PO:** Thank you, Ginger.

**GC:** Would you start out by just telling us a little bit about yourself?

**PO:** I am a pediatrician who trained in medical school in Baltimore, and then in residency in Pittsburgh. Then I entered a career of research. So, I worked both at the Wistar Institute, and Stanford, and at Penn doing basic science research trying to understand the factors of rotavirus—rotavirus is the cause of fever, and vomiting, and diarrhea in young children—sort of what about that virus made you sick. In other words, what were the genes that coded for proteins that made you sick, and what were the genes that coded for proteins that evoked a protective immune response.

And with those studies—which was about 12 years' worth of work—with a team here at Children's Hospital of Philadelphia, we actually created strains that became a rotavirus vaccine: A vaccine that was licensed and recommended for all children in the U.S. in 2006, and now is in a number of developing countries, which is good, because it's a virus that kills about 2000 children a day in the developing world.

**GC:** It's more likely to kill you if you're in the developing world, I guess.

**PO:** Far more, yes. There are about 60 deaths in the U.S. every year, and prior to the vaccines entering into this country, between 55,000 and 70,000 hospitalizations. But the vaccine has caused about an 80-90% reduction in the number of hospitalizations, just within the last couple of years. So, it works.

**GC:** So, it's fair to say that from a frontline standpoint you understand why we use vaccines and why they're important.

**PO:** Yes. I was fortunate enough to be able to be involved in a research project here at Children's Hospital that I think taught me a lot about how one makes a vaccine and what one needs to think about when making a vaccine. And then I've also been lucky to actually watch the vaccine be developed at Merck. The research part was the 10-year part. The development part was really about a 15-year part, and it was actually much harder.

I mean there is a research to development, in terms of showing just exactly how much virus needs to be in the vial, and making sure that no other adventitious agents are in there, and making sure the buffering agents and the stabilizing agents are right, that it has a long shelf life. That really opened my eyes as to how one goes about making a vaccine. And the care, I think, and money that's required to do it is really about a billion dollars, roughly, that it cost to do the research for the development.

**GC:** Paul, in the preface of your book you talk about two important events in your life that shaped your career. Would you take a few minutes to share those with my listeners?

**PO:** Right. Well, when I was a little boy, five years old, I had an operation on my foot, because I was born with club feet—meaning that my feet sort of turned down midward. One of the feet was corrected by just putting a cast on the foot, but the other never was corrected and so it needed to have an operation. It was actually one of the first operations of its kind. It was called a medial release operation, and the orthopedic surgeon that did it in Baltimore actually published that in a medical journal.

But for me as a five-year-old all it meant was that I had to be in the hospital for a couple of months in a chronic care facility in which there were about 20 other children, all of whom had polio. And the way it worked then—unlike today where they have people that are specifically hired to come around and play with children, and your parent can actually live in the room with you—that certainly was not true in the 1950's when I was hospitalized.

And it was a polio ward, and my parents were allowed to visit me one hour a week on Sundays from 2:00 to 3:00. I just remember sort of lying in that bed staring out the window, which actually looked onto the entrance of the hospital, and just waiting for my parents to come. And they basically never came, so it was just one hour a week. My mother was hospitalized with appendicitis, and she was also pregnant with my brother, so she actually never was able to come. It was a pretty lonely, isolating experience.

But what was even worse was looking at these other children who were just horribly crippled and disfigured by polio, many of whom never actually had

parents that came and visited them. I think I just identified with their suffering. I think it's what ultimately drove me into a career in pediatrics, and I think into a career in pediatric infectious diseases. And further, to be honest, I think it was the emotional impetus behind a book I wrote about the development of the polio vaccine called, *The Cutter Incident*.

**GC:** So, you were in the hospital before the polio vaccine was developed?

**PO:** It was actually right around the time of the polio vaccine. Jonas Salk's polio vaccine came in 1955—the killed vaccine came in 1955. I was in the hospital in 1956. But even when Salk's vaccine came out only about 40% of the country used it. So, there were still certainly a lot of cases of polio. We had polio in this country really up until 1979.

**GC:** So, that first event really influenced your decision to become a physician. The second thing happened when you were a medical student, or an intern?

**PO:** Right, exactly. I was an intern at The Children's Hospital of Pittsburgh. And that hospital was both a primary and a tertiary care center, so we took care of complex patients as well as the community, including the sort of Appalachian community, which was a blue collar community in the area around Pittsburgh. And there was a mother whose child had had fever, and vomiting, and diarrhea for less than 12 hours. She had called her pediatrician, talked to the nurse, and the nurse said just give frequent sips of fluid that contain minerals like salt and some sugar that you mix in.

And she tried. She was kind of a blue collar, just salt-of-the-earth mom who tried to do what the nurse had told her to do. And she loved her child and was trying to make her child better. But because of the vomiting she could never get her child to hold this fluid down. And the child became progressively more listless and lethargic, and by the time she came into our hospital she was severely dehydrated.

And we brought her into the treatment room and tried to get intravenous lines into her, but were unable to because she was that dehydrated. And then we did something that I had never seen before actually, which was took just a large-bore needle—a so-called bone marrow needle—and drilled it into the upper part of her tibia, which is the bone sort of just underneath the knee, to try and get fluids into her bone marrow in the hope that that would be absorbed into her circulation and would restore her blood pressure and save her life.

But that didn't work either, and she died, actually right in front of us, of dehydration secondary to what—as we learned a few days later—was a rotavirus infection. I didn't realize rotavirus could kill children in the United States, and I

remember looking at a paper in *The Journal of the American Medical Association* that was titled, “Fatal Rotavirus Gastroenteritis.” And it reported a handful of cases in U.S. children who had died of rotavirus disease. And I think that also provided an emotional impetus for what ultimately was a research career in rotavirus.

**GC:** It’s one thing to read about fatal cases in a journal, and it’s another thing entirely to see a child die before your eyes.

**PO:** Anybody who is a basic scientist who’s listening will know that it’s really a seven-day-a-week job. You know, you come in on Saturdays and Sundays because you love it. I mean in many ways it’s not work, because you’re so driven by, I think, the love of the science and the power of what you can create—in this case a vaccine to prevent a disease.

But that girl’s image was always in my head. When the child did die, the mother had been waiting outside while we were trying to revive her child. And then comes the worst part of all. You open the door and you have to tell this mother that you were unable to save her child. I just remember her coming into the room and leaning next to her child’s bed and holding her child’s hand, and we were just all there trying to fight back tears; just as I’m doing right now.

That image was always in my mind; that image of a child who dies from a rapidly dehydrating illness for which we were able to do little. And you know the good thing about our vaccine now is that I think it can prevent a lot of that suffering and death. And I really feel honored to be able to have worked with the team here at Children’s Hospital of Philadelphia to have created that vaccine.

**GC:** How did you come to write your latest book, *Autism’s False Prophets*?

**PO:** The main motivation for the writing of that book is that I think that our society has taken a dangerous turn. It’s really kind of an anti-science turn. That’s why I took such heart in President-elect Obama’s statements about how we have to get grounded again in science. I mean especially if you’re coming off President Bush, who I think leaned toward creationism, which was a little upsetting.

The notion that vaccines caused autism was certainly a reasonable one. I mean from a parent’s standpoint their child was fine, they got a vaccine, then they weren’t fine. And one can reasonably ask the question could the vaccine have done this. That’s a scientific question, and it can be answered in a scientific venue. And it has been answered.

First it was the question of whether it was the measles-mumps-rubella, MMR vaccine that did it. Then that sort of hypothesis kind of morphed to, well, could it

have been thimerosal—this ethyl mercury containing preservative that was in several vaccines prior to 2001. Could that have done it? Study after study that was done the right way, looking at hundreds of thousands of children that either did or didn't get MMR vaccine, or did or didn't get thimerosal-containing vaccines, was there evidence that those vaccines caused one to have an increased risk of autism?

And the answers were very clear, and consistent, and reproducible. No, vaccines didn't cause autism. And I give credit actually to the public health community and to the academic community for spending tens of millions of dollars to very quickly look at that to answer parents' concerns. The problem is—and I think this was the motivation for writing the book—there just seems to be a deep and abiding rift between the science that exonerated vaccines in this case, and the public's belief in that science.

I mean not only just knowledge of the science, because I think many parents actually do have sort of knowledge of those studies. They just choose to hold on to this belief that vaccines were the cause, much as one holds on to sort of deeply-held religious conviction. They refused to believe the science. And I just found that frightening, actually. And I think a lot of harm has come from that notion—harm because people don't vaccinate their children, and now we're seeing a measles epidemic in 2008 that was the largest we've ever seen.

And you're going to find out today, actually – today, January 23<sup>rd</sup>, the Centers for Disease Control is holding a press conference at 1:00 to talk about an outbreak of Haemophilus influenza type B meningitis in Minnesota that caused meningitis in five children, and the death of one child, all of whom were unvaccinated because their parents chose not to vaccinate them. It's just unconscionable.

In addition I think these children are subjected to an Arabian bazaar of therapies offered as cures by, I think, quacks and charlatans who take advantage of these parents. And so, I think there's a lot of harm that's come from this notion. And that was what drove me to write the book—for the same reason I went and worked on a vaccine—to try and prevent children from being hurt.

**GC:** How much time did you spend researching this book? Because it's very comprehensive.

**PO:** Thank you. Actually I kind of lived the story, in a sense, in that I was called by Dan Burton to testify at one of his Committee for Government Reform hearings. And I certainly, through our Vaccination Education Center, was in front of the media on this issue. So, it wasn't as much research as I had imagined because I had constantly been doing the research for the few years since this issue came up—which was around 1998—and had written actually a number of papers

about it. So, it wasn't as much research as I had done for other books that I've written.

But the writing was actually harder. It was actually the hardest book that I've ever written, just because there were so many characters in it that were so unsavory. Just the associations I think, between personal injury lawyers and some of these characters, I found it wasn't really a labor of love to write the book. It was difficult to write.

**GC:** Yes, the first day that I read maybe the first third of that book—I think I wrote you in an email—I actually had nightmares about it that night. I can't actually remember what they were, but I just remember waking up and knowing that I'd had nightmares about, I guess, just like you just said about the *Haemophilus influenzae* type B meningitis.

I went to medical school and graduated in 1984, so I guess the Hib vaccine came out—I don't know exactly what year—but somewhere around in there. So, in medical school we were doing lots of lumbar punctures and seeing meningitis. And now I'm an emergency room doctor and I haven't seen a case in I'm not sure how many years. And it scares me to think of that coming back just because of people not vaccinating.

**PO:** I couldn't agree more. I mean when I was a resident—I may be older than you, because I was resident in the late 70's, early 80's—and I worked in a busy children's hospital in Pittsburgh and we would see *Haemophilus influenzae* type B either as a cause of bloodstream infections or meningitis every week. And there were nationally 20,000 to 25,000 cases of severe infections with this bacteria every year. Since we introduced that vaccine, which happened in the 1980's, we've reduced the incidence of that disease to maybe 50 cases a year. I mean most of the residents at Children's Hospital of Philadelphia—again a big, busy hospital—have never seen a case of *Haemophilus influenzae* type B meningitis, where it really defined my residency.

And now you have an outbreak in Minnesota. And you can bet that's just the tip of the iceberg, because what that tells you is that the bacteria is back; that it's living in the lining of children's noses and throats. And when you start to see meningitis, or you start to see sepsis—meaning bloodstream infections and death—it's the tip of the iceberg of what has been now this spread of that bacteria.

And frankly—although it's not going to be reported, I think, as part of today's CDC conference—we had a case of Hib meningitis in a child in an Amish community here just outside of Philadelphia, again whose parents had chosen not to vaccinate them. And so, what we're going to try and do is go into that community and see if people would be willing to vaccinate other young children

in that community, knowing that they're at risk. And hopefully we'll be successful.

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**GC:** The question I want to explore is why, since the scientific evidence is so overwhelming, do we still face these claims that vaccines cause autism and other problems? And I wanted to start by talking a little bit about the scientific evidence, although you pointed out already that a lot of times we do know this. One of the things you said in the book is that people's eyes tend to glaze over when we talk about epidemiology, but I think that it might be worthwhile to spend a few minutes on that subject about exactly what is an epidemiological study and why do we use them.

**PO:** Sure. So, let's suppose that you have a question. You want to know whether or not in this case the measles, mumps, and rubella vaccine could have caused autism. And autism is diagnosed often between one and two years of age—that's around the same time the children are getting their MMR vaccine—and so, certainly, there's going to be at the very least a temporal association in many children from getting the vaccine and then having symptoms of autism.

But the question is, is it a causal association. I mean did one cause the other? And, frankly, the only way to answer that question is to have two large groups of children, one of which received the MMR vaccine and one of which didn't, and to make sure that those two groups are similar in all other aspects—meaning their socioeconomic background, their medical background—so that you can isolate the effect of one variable. And that variable in this case is receipt of the MMR vaccine. And then, and only then, can you tell the effect of that vaccine.

And that study has been done actually now 12 times. And most recently there was another study by Eric Fombonne that came out in *Lancet*. Really at this point you've looked at millions of children who either did or didn't receive that vaccine, and very carefully can look in a very powerful way as to whether the incidence of autism is greater in the vaccinated group. And the answer has been very clear, and consistent, and reproducible. No, that vaccine never caused autism.

But you're right, it's hard to make a statistical argument, or an epidemiological argument, to a parent who's seen something that's very emotional. There's a story that I tell, because I think it's a powerful one. My wife is a privately practicing pediatrician in the suburbs. And she was in the office one day and there was a four-month-old sitting on her mother's lap. And my wife was drawing a vaccine into a syringe that she was about to give this child.

Well, while she was drawing the vaccine into a syringe the child had a seizure, and actually went on to have a permanent seizure disorder—epilepsy. And there had been a family history of epilepsy, so she was certainly at risk for that. If my wife had given that vaccine five minutes earlier, I think there's no amount of statistical data in the world that would have convinced that mother that anything other than the vaccine caused the seizure, because I think those sort of emotional events are very hard to argue against.

**GC:** My main focus on my other show, the *Brain Science Podcast*, is about how our brains work. And one of the things we've talked about is how we have such a hard-wired pattern recognition system that we will actually see patterns that don't exist. The tendency to see a connection between events that happen close together in time is very powerful, especially if there's an emotional component.

One of the subjects that's come up often that people ask me is about the whole question of the full moon and what happens in the ER, and how we always talk about the full moon, even though we know scientifically there's no relationship. But it sometimes feels like there is. And it's one thing when your patient says, 'Oh, the flu shot made me sick,' and they refuse to have a flu shot. And you try to tell them no, and explain to them why that's not true. You kind of don't make a big deal out of it. But in this situation that kind of reasoning is truly dangerous.

**PO:** You're right. And I think everybody is subject to this. I mean no one is immune. I would include myself. My son and I—he's 16 years of age—are big Philadelphia Eagles football fans, and we were watching them play the Arizona Cardinals about a week or so ago. The Eagles were losing 24 to 6 at halftime, but in the third quarter I just happened to move over to the couch, and the Eagles scored three consecutive touchdowns. And so, I stayed on that couch. Now, did I think that I really was controlling the outcome of the game from my living room? I don't think so. But still, I didn't move from the couch. So, I think we're all subject to this.

**GC:** I can think of so many examples of that, I think we'd better not get sidetracked. But, what about when the other side claims that the studies are not adequate? I mean the epidemiological studies.

**PO:** One can reasonably argue that when you do an epidemiological study, what you've shown is that there is no statistically significant association—in this case, say, between receipt of a vaccine and the development of autism. But is that a proof? I mean have you really proven something, or have you merely said that at least given the power of that particular study that it's statistically unlikely? And that's true. There really are no proofs.

I mean if, for example, I wanted to see whether or not I could fly like superman – which I tried to do when I was little. I would go on my back lawn, I would put on a towel, and try and jump from a small height and see whether I could fly. And I couldn't. I tried maybe five times, or ten times. But that didn't prove I couldn't fly. And I could have done it a billion times, and that wouldn't have proven I couldn't fly. It would only have made it all the more statistically unlikely.

And I think that's what you can say here. That if study, after study, after study shows that statistically there's no association, I think one can say that although there's not a proof, I think you can say with comfort that a truth has emerged. That's certainly been true here. I think we can say with comfort that neither the MMR vaccine, nor thimerosal in vaccines, caused autism.

**GC:** How about a good counter example, because you give some examples of how epidemiology has detected problems with vaccines in the past.

**PO:** Right. Even very rare problems. Probably the rarest was the so-called Guillian Barret syndrome, which is kind of an ascending paralysis. It starts in the legs and then works up, and can even affect your muscles of respiration. That was seen following administration of the swine flu vaccine, which was a vaccine that was given in 1976 for fear that this outbreak of influenza in Fort Dix, New Jersey, presaged a pandemic.

It didn't, and it was probably a vaccine that should have never been given. But the fact is we gave 40 million doses of that vaccine in this country. 400 people developed Guillian Barret syndrome as a consequence of that vaccine. That's one per hundred thousand recipients. That tells you how powerful epidemiological studies can be.

And that was easily picked up in a retrospective analysis—the same kinds of analyses that are being done today looking at autism. We believe that autism is occurring at a rate of 1 per 150 children. There are tens of thousands of children with autism. If vaccines accounted for probably 1% of that, or even .1% of that, it would easily be picked up in a retrospective study. But it hasn't been. And it hasn't been because it's not there to be picked up.

**GC:** And then, opposition to using this approach is not new. One example you relate in the book is how the connection between smoking and lung cancer was picked up using epidemiological studies, but the results were opposed by the tobacco lobby.

**PO:** It was ironic, actually. And so, there were two epidemiological studies—interestingly, done on doctors that smoked—back in 1950. One was reported in the *British Medical Journal*. I think another was in *The Journal of the American*

*Medical Association.* And they were excellent studies looking at not only whether you smoked or not, but how much you smoked, so you could sort of see a dose response curve: If you smoked you were more likely to develop lung cancer than if you didn't, and the more you smoked, the more likely you were to develop cancer.

And those studies were the beginning of what were many epidemiological studies to prove that. But the tobacco industry, interestingly, made the same argument that the anti-vaccine movement makes today. They said, well, it's not a proof. It's just simply a statistical study. True. But it was a statistical study that held up again, and again, and again, and certainly people who don't smoke are at lesser risk of lung cancer, and those who do smoke are at greater risk, and it's certainly a truth. But it was interesting to watch the way that that was argued and compare it to what you hear today.

**GC:** So, basically what you're saying is that first of all we know how many people it takes in a study to detect an effect—depending on how rare it is—and given the frequency of autism, we definitely should have detected it by now.

**PO:** Absolutely. Well, that's what's so nice about these studies, is they're very, very powerful when done right. And so, I think parents should be enormously reassured by them. But you're right, I think at least some parents aren't, and I think that's very frustrating.

**GC:** One of the things that the vaccine opponents – are they still doing this: focusing on mercury, even though it's been out of the vaccine since 2001?

**PO:** Yes. Well, it's still contained in some preparations of the influenza vaccine, at preservative levels. But that's it, in terms of preservative levels. And actually the quantity of mercury to which you're typically exposed during the day is far greater. I mean mercury is in the earth's crust and therefore it's in the water that we drink and the food that we eat. Nobody lives in a mercury-free environment, but the quantity of mercury to which we're exposed is trivial, just as the quantity of mercury to which we're exposed in vaccines is trivial.

**GC:** I think tuna fish is a lot more dangerous than my flu vaccine. Right?

**PO:** I think that's right, yes.

**GC:** I thought maybe you might just tell us a little bit about the history of how mercury came to be in the vaccines in the first place.

**PO:** Right. More so in the past than today, we used to use multi-dose vials; which is to say a vial that contains roughly 10 doses of vaccine. And so, the doctor would take that vial, and take it out of the refrigerator, and put a needle into it attached to a syringe, and pull out a dose. And they would put the vial back in the refrigerator. And they would do this several times.

Well, the more that you do that the more likely you are to introduce bacteria or fungi into that vial. So that children that get the eighth, ninth, or tenth dose are at risk of having injected into them not only the vaccine but bacteria or fungi that were growing in that vial of vaccine. And there were many reports in the early 1900's of children who had severe, and occasionally fatal, infections, primarily with skin organisms like staph and strep, and hence the need to try and put in something that prevented bacteria that were inadvertently introduced into the vial from growing in the vial, and hence preservatives.

Mercury is actually a very gentle preservative. When used at the quantities used in vaccines it works well, and it essentially eliminated that problem. But it just never sounds good. You know mercury is, interestingly, the same stuff that was contained in that orange-colored stuff that our parents put on our cuts when we were little—at least those of us that are older. Mercurochrome was mercury.

**GC:** I bet you can't even buy that anymore.

**PO:** I think it's gone. It's true, yes. And so, that eliminated the problem. And influenza vaccine is still sold in multi-dose vials, so it does need some preservative. And you can argue that thimerosal is actually the safest, best-tested preservative we have. There are other preservatives, like 2-phenoxy ethanol or phenol, but they're not nearly as well-tested for safety as has thimerosal been.

But again, mercury is never going to sound good. I mean it's a heavy metal, and certainly heavy metals at high concentrations—which obviously aren't contained in the vaccines—can be toxic or dangerous to the central nervous system. And so it's not like there's the National Association for the Appreciation of Heavy Metals standing up in defense of mercury. So, it's never going to sound good. It's always going to be a hard sell.

**GC:** Well, is there any evidence in people that have had truly toxic levels of mercury? Did they get autism?

**PO:** Quite the opposite. Actually in Minamata Bay, for example, there was a chemical company that dumped mercury into the water around that bay, and so it resulted in a massive mercury poisoning in the 1960's and 1970's in Minamata Bay in Japan. And so, people suffered a number of problems associated with mercury poisoning, but autism wasn't among them.

And similarly there was an episode in Iraq where grain had been fumigated with environmental mercury—methyl mercury—and had been made into bread, distributed free to people in the country, and it was consumed, including by pregnant mothers who delivered babies who had seizure disorders, and mental retardation, and motor defects. But there wasn't an increased risk of autism. So, no, it appears that those are two separate events. It's yet another reason why it doesn't make sense that mercury would have ever caused autism.

**GC:** Well, when the mercury was removed from the childhood vaccines—that was in 2001—was there at that point any actual evidence that the mercury in vaccines was harmful?

**PO:** No. It was the precautionary principle. The thinking at the time—and it was largely driven by a person at the American Academy of Pediatrics—was that we don't know. We know that children are getting about 187 micrograms—which is a millionth of a gram—of mercury, and it's ethyl mercury, and we know that that's excreted far more quickly than environmental mercury, but we don't know that we aren't causing subtle forms of mercury toxicity.

And the American Academy of Pediatrics was never worried about autism, because autism never made sense. It was subtle forms of mercury toxicity they were worried about. And so, they said let's just exercise precaution, we'll move from multi-dose to single-dose vials, eliminate the need for a preservative, and get away from mercury.

And that scared people. I mean it was done in a precipitous and frightening manner. I think it led to the birth of certain parent advocacy groups—like Safe Minds, or A-CHAMP, or Moms Against Mercury—who said, hey, if they're taking it out in such a precipitous manner isn't it safe to assume that there was probably something wrong with it? A reasonable conclusion, but certainly the studies didn't support it.

And there have been now four studies, actually—and excellent studies; one that's coming out in next months' issue of *Pediatrics*—that have looked at children that received lesser or greater quantities of thimerosal in vaccines, to answer the question were there subtle forms of mercury toxicity; tics, or difficulties with speech or language. Those are the studies that actually make the most sense, because it makes sense that mercury could cause mercury poisoning. It never made sense that mercury could cause autism. And those studies have all been very consistent. No, there are not even subtle forms of mercury toxicity, because frankly the quantity of mercury that you get from other sources is greater.

**GC:** So, removing the thimerosal just makes the vaccines more expensive, not safer.

**PO:** That's correct. It's funny; if you look at the American Academy of Pediatrics' press release at the time it shows you the difficulty with trying to convey theoretical risks to the public. Because what they said was, 'There is no evidence that thimerosal at the level contained in vaccines is harmful.' But then later in the same paragraph they said, 'But to make safe vaccines even safer we're going to ask for its removal.' Well, if it's not harmful, then how does taking it out make it safer? It doesn't make it safer. It just makes it perceived to be safer, which is a very different thing.

Certainly vaccines, like any medicine, have side effects. You can certainly make vaccines safer. I think we always have that capacity. But this didn't do that, and it cost tens of millions of dollars to retool buildings and change manufacturing processes for certainly no advance in safety. It just made vaccines more expensive. You're exactly right.

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Before we return to Dr. Offit's interview I need to make one comment. We forgot to discuss the fact that since thimerosal was removed from childhood vaccines in 2001 there has been no drop in the rate of autism. In fact, the rate continues to increase. Some vaccine opponents have shifted their attacks to the increasing number of vaccines children receive. I had a chance to ask Dr. Offit about concerns about the increasing number of vaccines children receive.

**GC:** Paul, I know there's one concern that some parents have, even if they understand that there's no link between autism and vaccines, and that is the increasing number of vaccines our children are receiving. Can you talk about that?

**PO:** Sure. And it's reasonable. I mean if you look, for example, 30 years ago in the early 1980's children got vaccines to prevent seven different diseases. Now, in 2009 children get vaccines to prevent 14 different diseases as young children, and then they get another couple vaccines in adolescence. And the question is, is that too many? And I think it's a reasonable question. Children can get as many as 26 inoculations in the first couple years of life, and as many as five vaccines at one time—five shots at one time. I think it's hard for any parent to watch and not believe that this is just more than the child can handle.

But there are, I guess, a number of things that are reassuring. First of all, if you actually look at the number of immunological components in vaccines—and by that I mean bacterial proteins, or viral proteins; or bacterial polysaccharides, which are just the complex sugar coating of a bacteria—that’s actually decreased over the last 30 years. We actually had more immunological components in the seven vaccines that we got in 1980 than we have in the 14 vaccines today—by a lot; I mean there were probably about 3200 in 1980, and it’s about 150 today.

Because we’ve just had scientific advances; we’ve just gotten much better at purifying vaccines and making sort of single protein component vaccines. And that’s the consequence of recombinant DNA technology and protein purification. We’re just better at it. We make, I think, safer, purer vaccines. So, although the number 14 is greater than the number 7, the number of immunological components is actually much less.

Secondly, if you look at what you typically respond to in your environment every day, vaccines are nothing. When you’re in the womb you’re in a sterile environment. But when you enter the birth canal and the world you’re very quickly colonized with trillions of bacteria—literally trillions—that live on the lining of your nose, or your throat, or your intestines. You eat food that’s not sterile; you inhale dust that’s not sterile.

And each single bacterium contains between 2000 and 6000 immunological components, many of which to which you make an immune response. You’re making sort of gram levels of immunoglobulins every day to keep those bacteria from invading your body. Vaccines are really literally a drop in the ocean which I think you typically encounter and manage every day.

The difference is it looks terrible. You lay the kid on the table, and you watch them get five shots. That looks awful. But if you really want to scare yourself, just take a cotton swab, put it on a microscope slide, and look at it under the microscope. It’s teeming with bacteria from a child’s nose, or throat, and to which children are making immune responses. That’s a far greater challenge than what one sees in vaccines. I think that just a single ear infection or a single cold is a far greater immunological challenge to a child than are vaccines. But vaccines just look bad.

**GC:** And that’s not even counting what happens when they go to day care.

**PO:** Exactly right. It’s true.

**GC:** And some of the vaccines are really partly protecting kids from stuff that they’re likely to be exposed to when they get to day care; like the rotavirus.

**PO:** Right. Or pertussis, or pneumococcus, and then later chicken pox. These diseases are still fairly common in the United States. Certainly whooping cough is common, and rotavirus—although markedly down—is still pretty common. So, a choice not to get a vaccine is not a risk-free choice, it's just a choice to take a different risk; and I think one could easily argue a much more serious risk. And look at what's happening with these measles outbreaks, or Hib outbreaks. It really worries me. It's like how many warning shots do you have to hear?

You know in 2005 there was a 17-year-old girl who went to Romania as part of a church group; unimmunized, gets measles, brings it back to her church group; 34 people get measles, almost all of whom were unimmunized. In 2008 you see 135 cases of measles in this country. That's bigger than any measles epidemic we've had in more than 10 years. And it was, again, almost all in children whose parents had chosen not to vaccinate them.

It was an epidemic, which is to say in places like San Diego, or Chicago, there were nine cycles of transmission—meaning child, to child, to child, to child. The CDC was having trouble getting on top of those outbreaks because there were enough children that were unimmunized in the community that there wasn't so-called herd protection. And now you have this – I guess you're going to be able to scoop this, because this announcement doesn't occur till 1:00, so you have another hour-and-a-half before it happens.

**GC:** My show's not going to be out until next week, so I won't have a scoop.

**PO:** So, it's not going to be a scoop. But at 1:00 today the Centers for Disease Control is going to have a press conference talking about an outbreak of Haemophilus influenza type B meningitis and death in Minnesota. And again, in children whose parents have chosen not to vaccinate them. What's next?

It is certainly not out of the realm of possibility that we could again see cases of diphtheria in this country, again see cases of polio in this country. Those diseases still occur in the world. International travel is common. If we have pockets of children who are unvaccinated, or if enough children are unvaccinated in a community, there is no reason to believe that we wouldn't see those diseases again.

And I just wonder what is it going to take to sober some of these parents up that the choice they're making not to vaccinate their children is putting them in harm's way. There are parents now in Minnesota who have watched their children get meningitis, and watched one child die, because of a choice that they made. And I just don't see how one consciences that.

**GC:** Since I read your book the other day I was talking to a mom—I work in the ER, I see lots of kids—that had a baby about six months old. And I realized, well, maybe I should talk to her about her shots. And I talked to her about why they were so important, and I realized that that’s something that probably we need to do, even though it’s something we don’t think we should need to do. But we do. It’s just as important as some of the other educational things we try to do. And I’m going to come back to that in a minute.

But is there anything else you want to say about the evidence? I wanted to start talking about the other side of it; the kinds of stuff that the other side is using to keep the controversy going.

**PO:** Yes, let’s talk about that.

**GC:** Do you want to start out by giving us an overview before we try to delve into the details?

**PO:** Those who oppose vaccines, what their arguments are as to why they don’t believe the data? Is that what you mean?

**GC:** What I had in mind is things like dismissing the evidence, relying on personal anecdotes, claiming that there is opposing evidence, and then of course there’s the whole influence of the celebrities and the so-called balanced media coverage.

**PO:** Right. I think that’s a great point. How do people come to get information? I think probably the most important way they come to get information is off the Internet. And you know the Internet is a great source of wonderful information. It’s also a tremendous source of bad information. And it’s unscreened—anybody can write anything. And I think if you’re of the belief that vaccines cause autism you can certainly find a number of people who will support your view in this kind of shrouded pseudo-science of, and here’s this study that shows this, and here’s this study that shows that.

But the fact remains that there is not a single excellent epidemiological study that has ever shown that vaccines cause autism. So, the data aren’t there. And so, you’ll read about animal model studies, or some awful study that was done and reported in the non-peer review journal, or not reported at all. So, that’s frustrating.

I think the second thing is the media. As you mentioned, the media, under this kind of journalistic mantra of balance, feel that they need to tell two sides of every story. Well, in this case only one side is supported by the science, so it’s irresponsible, I think, for the media to do that. I would like to say I think the

mainstream media doesn't do it. I mean I think *The New York Times* recently had an article that was excellent. *The Washington Post* has been good on this. The *Los Angeles Times* has been good on this. I think mainstream media has actually gotten it.

Really where I'm talking about is sort of that second tier media which is newspapers from much smaller cities and towns, and then television or entertainment media—*Larry King Live*, *Oprah*—I mean they've been awful on this subject. Because they're driven to try and advertise, which means be controversial, and the worst thing that can happen is the controversy gets resolved. So, they keep it as a controversy. And it's just terrible. Some of the shows Larry King has done, honestly, have been the worst health-related shows on television.

**GC:** One of the things that struck me when I read your book was that while the vaccine opponents have attacked the integrity of the evidence against their position—claiming that the government is somehow in cahoots with the drug companies to hide the evidence, and stuff like that—their evidence is uniformly funded by vested interests like plaintiff's lawyers. And yet the media doesn't seem to give that any coverage.

**PO:** Right, because the story is a David and Goliath story. Jenny McCarthy is a perfect example. Jenny McCarthy is a mother of a child with autism. She is a sympathetic figure. And you could never go at her. But it's interesting how she promotes certain nutraceuticals, and those same nutraceuticals are promoted on a website that often bears her name—Generation Rescue.

So, there are always these associations. But you can just sort of never attack motherhood. And these are parents of children with autism. And even though some of them have clear conflicts of interest in terms of what they're putting out, they're sort of Teflon-coated.

But just in general I think the conspiracy theory thing—you know, that doctors are in the pocket of industry, that the government is lying to you—is so off the point. The fact of the matter is it doesn't matter who does the study. It really doesn't. I mean it could be funded by a religious organization, it could be funded by pharmaceutical companies, it could be funded by personal injury lawyers. It doesn't really matter who funds it.

What matters is the materials and methods section. Was that study done well? Is it internally consistent? Is it reproducible? How strong are those data? Because if the data are strong it will be reproducible, and if they're not strong they won't be reproducible. That's really all that matters. But we get so hung up in who's funding what. And it's irrelevant.

And I certainly have been at the brunt of much of this. I mean I'm the co-inventor of a vaccine. Now, I worked on that vaccine because I thought that it could do a tremendous amount of good for children. It's the same reason that I stand up for the science of vaccines and the science of vaccine safety. I care about children. That's my motivation. But people will always obviously ascribe a more sinister motivation to anyone who's done anything that potentially has a financial impact—which is certainly our rotavirus vaccine.

It's completely off the point. It's incredibly demoralizing. Personal injury lawyers have this statement where they say that if the facts are on your side, you argue the facts; if the law is on your side, you argue the law; if neither are on your side—as is the case here—then you attack the witness. And that's what they do. They make it personal. It's too bad, because it certainly side-tracks the discussion and doesn't provide the kind of information parents really need to make a decision.

**GC:** And then the parents that have children with autism that understand that it's not about the vaccines, when they try to speak up they get attacked also. It takes a lot of courage.

**PO:** Yes. I actually just put something on *The Huffington Post* a day or two ago. And I think there are almost 300 entries right now. But a lot of those entries attack me. I mean it was just really an article about the measles epidemics and how when you choose not to get a vaccine I think you're making a choice not only for yourself, but for the person next to you. I went through those data and linked it to a paper written; a recent account of Hopkins. I mean it's just a straightforward academic scientific discussion.

But I would say a solid half of those respondents—or the commenters—choose to attack me. And the article's not about me; it's about the data. If you have a problem with the way those studies were done, what's the problem with the way the study was done? But that's not what the discussion is. It's off the point.

And what bothers me is the degree to which the media takes that up. And they should be much, much more rigorous about sticking to the data. But I guess the data aren't as interesting. I guess you've got to make it a story about people.

**GC:** Yes. So, that was one of the factors you talked about in your book about how they continue to frighten and confuse parents, and the media is a part of that.

**PO:** Definitely.

[music]

**GC:** Actually nobody is completely off the hook in your book, because you talk about the failures of the media, the things politicians have done, health officials not being more aggressive, even physicians when they are a little bit arrogant toward parents can contribute to the problem. And then, as you mentioned before, the unfortunate general attitude towards science, which I hope maybe President Obama will be able to turn some of that around with his ability to inspire and to teach. But I think scientists themselves are going to have to take a more active role, just like you're doing.

**PO:** I couldn't agree more. I would say if I have any regret in the book, I think I let scientists off the hook. I did talk about how I think that certainly when one becomes a scientist—which is to say that you learn how to perform science, you learn how to write about science, you learn how to speak about science in front of other scientists—that in no way is a training for speaking to the media. You could argue actually it's a training away from speaking to the media.

**GC:** Just like physicians' training almost is. We don't get taught how to talk to patients either, and a lot of us never figure it out.

**PO:** Right. But I do think that when you do science you have a responsibility to the public. And that responsibility includes being able to explain to the public what you've done. I find myself often talking about studies done by the CDC more than they talk about it. And they should stand up for the science. It's their science. And I think it's hard. Certainly the kind of emails that I get sometimes, and then occasionally threats that I get make it hard.

And it's too bad that that is part of what this process has become. But you do have to stand up for the science, because ultimately the children are getting hurt by all this misinformation. And that should always be what drives you to do it. You know you've got to hang in there. I mean I don't think anybody is going to kill me; they're just going to threaten me. So, you have to be tough.

**GC:** I was going to ask you why it's important for all children to get their shots. I sort of think maybe we've already done that. But would you like to talk about that more explicitly?

**PO:** Right. I think vaccines are a victim of their own success. I mean the fact is you don't see many vaccine-preventable diseases today because they've been largely eliminated by vaccines. That's all true. And so, it becomes a matter of faith—faith in pharmaceutical companies, faith in public health officials, faith in your doctor. And we're living in a much more cynical, much more litigious time.

But if you make the choice not to get a vaccine—and certainly I think more and more people are making that choice—you put your child at risk. And you're just

starting to see it happening. It's not theoretical anymore. You know we had a mumps epidemic in 2006 that involved 4000 children, some of whom were left permanently deaf by that infection. Now we have this Haemophilus influenza type B meningitis outbreak in Minnesota. We now have measles outbreaks. Certainly, whooping cough outbreaks are occurring in communities which have lower rates of immunization. Whooping cough can certainly cause hospitalization, and causes 20-25 people to die every year—young children to die every year.

It's not theoretical anymore. We've passed the tipping point of what happens when enough people don't get vaccinated. And I think until we get it, it's only going to get worse.

**GC:** And then from the standpoint of the families of children that do have autism, research funds have been diverted onto this away from doing stuff that would actually help kids.

**PO:** Absolutely. I think probably the best story, that came out in the last week, is the story of a woman who was then an Executive Vice President of Autism Speaks, and their Communications Director, who sits on something called the Interagency Coordinating Committee, which is a group that decides where all that money that was put aside by the government through the Combatting Autism Act is going to go. And they have debated this back and forth. And she was uncomfortable with the fact that vaccines are still talked about as an area where funds should be devoted.

She's the mother of a child with severe autism, and she'd had enough. And she stood up at that meeting, and she knew that because she was a member of Autism Speaks and that Autism Speaks still believed at some level that vaccines were a problem, that she couldn't keep her job if she was going to vote the way she did. And so, she quit her organization in order to be able to vote against that notion that vaccines should still be funded. I mean she, to me, is a hero. That to me is the story of a woman who has a child with severe autism that's tired of constantly watching money being diverted to a hypothesis that has no chance of bearing fruit. And I give her credit for that.

**GC:** That was kind of the tone of an email I got from a listener who wanted me to talk about autism on the *Brain Science Podcast*. That show's not really normally disease-oriented, but she expressed her frustration with that too.

You said that one of the hard parts of writing your book was all the unsavory characters. But your book does have heroes, and most of the heroes are parents with autistic children who have spoken up for the truth. There's that one lady—

what was her name—the one that has uncovered all the connections between the pseudoscience research, and the plaintiff lawyers, and stuff like that.

**PO:** Kathleen Seidel. You're right. Although it was difficult—because I so didn't like some of the unsavory characters in the book—people like Richard Grinker, or Kathleen Seidel, or Peter Hotez, and Kevin Leech, and others, who have children that have autism and have to deal with the emotional challenges and financial challenges of that, and yet do it with their heads up and do it with good will, and try and stick to the science, and try and get it right, and try and stand up for advocating for what their children need. And I think mostly advocating that their children not be considered damaged goods. This whole thing of damaged by mercury, they found particularly offensive, because they thought it patheticized their children—children who they see in many ways as just having a different way of being, and should be accepted for that different way of being. These are the real heroes.

I work at Children's Hospital of Philadelphia and I see parents who suffer a lot. They suffer because their children have acute diseases, or chronic diseases, they suffer because their children were shot in the head—which we occasionally see in this hospital. And some of these parents—you never hear their story—just sit by that bed and deal with it, and deal with all that comes with those kinds of tragedies without complaining, and still trying to maintain good will for their family and other children. These are the real heroes, and you never hear their story. It's sad.

**GC:** It seems like the guys that are making these inflammatory movies and TV shows could, if they really worked at it, come at it from the other side and do something helpful instead of harmful.

**PO:** I agree. Although, interestingly, there was a recent episode of a show that I never see but have heard about called "Private Practice." It's on ABC, and they did a story about the mother of a child who had autism. She had two other children. She chose not to vaccinate the other children because she believed vaccines caused autism. And one then went to Switzerland; one of the children catches measles, and dies from measles. It was a pretty pointed show. Maybe the tide's turning a little bit.

**GC:** I came away from your book convinced that we really need a comprehensive campaign to get the truth out there. Do you think that scientists are finally learning that they can't just trust that the facts will speak for themselves?

**PO:** I think scientists are reticent to speak up. Maybe it's the nature of the kind of person that goes into science, maybe it's the training that comes with being a scientist. I think generally we're pretty reluctant to stand up. And I think you're

right. I think what we really need is a large-scale campaign to educate the public about where the real truth lies here.

But the question is who would pay for that campaign? Because it would be expensive and it would have to be done by people that really understand communication, which generally is not scientists. Who would pay? Pharmaceutical companies could pay, but obviously if they pay it's going to be seen as self-serving. Professional societies like the Infectious Disease Society of America, or the American Academy of Pediatrics, they would have to make a major commitment, and I don't see that happening.

The forces are much greater on the other side, and the money, frankly, is much greater on the other side, to convince the public that vaccines are a problem. Because it's in court. Right now it's in something called this Omnibus Autism Proceeding through a federal court in D.C., but it will spill over into civil courts and state courts. And the lawyers are certainly interested in seeing whether they can make money for themselves and for their clients off this. And I think that's in part what keeps this alive. And this notion will stay alive until it is officially and finally lost in court. And then I think it dies down. But it could be a decade.

**GC:** One thing I would mention is I was talking earlier about the mother that I talked to the other day, and I was sort of gaging her response as I went along. And I noticed that the thing—this is going to sound weird—but the thing that she really responded to was when I mentioned to her that the people that are claiming that vaccines are dangerous are being funded by the plaintiffs' lawyers, and their research is being funded; that they are the ones that are corrupt. Because, like you pointed out in your book, there's all this suspicion that everyone is in somebody's pocket. And they're being told that the public health officials are in collusion with the pharmaceuticals. And it's the opposite.

**PO:** You're absolutely right. And what surprised me in the writing of the book is that people—including government people; people from the NIH—who read the book said, 'I knew all the data, but what I didn't really know was all these sort of unsavory associations between those who claim to stand up for the health and well-being of children, but in fact are really in many ways self-serving.' It's too bad it comes to that.

I mean what you'd like to think is that the data alone are persuasive. But it seems to be that that isn't it. That once they see that the anti-vaccine side has these unsavory connections, that's what pushes them over the edge to not trust what they're saying. But it should always be about the quality of the data. But I guess it just isn't going to work that way.

**GC:** I guess it just comes down to the fact that the average person doesn't really understand that, so for them it gets down to the question who should I trust.

**PO:** Right. It becomes a personal thing. I think scientists get it wrong all the time. It's just the nature of science. Science is done by humans. But science doesn't get it wrong. I mean science is enormously self-correcting. Andrew Wakefield stands up in 1998 and says, 'I believe MMR causes autism.' Well, he raises a hypothesis. It's a testable hypothesis. It's been tested. He was wrong. And that's what I love about science. It's just enormously self-correcting, and I just think people don't see it that way.

**GC:** A legitimate scientist admits when his hypothesis has been disproved.

**PO:** Absolutely. And Andrew Wakefield, in this case, didn't.

**GC:** Yes. Now, one question that I forgot to ask you was, you talk about some of the other books on this subject and their lack of scientific rigor. Have there been any other books written on this subject from a true scientific point of view?

**PO:** Yes. There's a guy named Michael Fitzpatrick who wrote the book, *MMR and Autism*, which was published by Routledge Press in England a couple years ago. And then he's recently written a book called, *Defeating Autism: A Damaging Delusion*, which has been very responsible. But I would say that that's it. Just those two books.

**GC:** So, is there anything else you'd like to share with my listeners before we close?

**PO:** No, Ginger. I certainly appreciate the opportunity to speak. I do think things are getting better. I do. I mean I see many more newspapers now that are telling the story of the science rather than the story, really, that opposes the science. And although it's very seductive—that other story—because you have celebrities, and parents often, that are willing to support it, I do see a greater level of responsibility. So, I honestly believe things are turning, and I think it's because of the efforts of some of the people that I talk about in the book, as well as, I think, a media that's starting to get it. I'm optimistic.

**GC:** Unfortunately it looks like a lot of children are going to be harmed before the tide really turns.

**PO:** It's already happened.

**GC:** So, if listeners are interested in trying to do something to help the good guys, do you have any advice about what they should do?

**PO:** Yes, I think that certainly politicians have a lot to say in this. It's a new administration, it's a new day. You have Tom Daschle now I think will likely be confirmed as Secretary of the Department of Health and Human Services. You have a president in place who certainly believes in the strength of good science. And I think now is the time to call your congressman, or call your senator, and say, 'I think it's enough of this business of vaccines causing autism, and I think no more federal money should be devoted to that.'

And similarly to write Letters to the Editor about fears of the fact that people aren't getting vaccinated. I hear from parents almost every week that have their children in a classroom where there are a number of children that aren't immunized, that are worried about it and wonder what they can do about it. And the answer is, not much. All the rights really are on the other side. It's time that our politicians and our media hear from that voice of society that you never hear from, which are parents who are angry that this has taken the turn that it's taken, and that so many children now are unvaccinated.

**GC:** Do you have any advice for physicians who might be listening to this podcast?

**PO:** Hang in there. Especially pediatricians—my wife's a pediatrician—who have to hear that drumbeat every day of fear from parents, and popular books like Dr. Sears, *The Vaccine Book*, which basically says to separate, or withhold, or delay vaccines. I mean it's tough out there, but I do think that the fact of the matter is that science is on our side, that vaccines do work, that vaccines are safe, and that if we choose to use them less, we'll see—and are seeing—these diseases come back. And to just hang in there, and to try and fight the good fight. Because a good fight it is.

**GC:** Well, great. Thank you so much for coming on the show.

**PO:** Thank you, Ginger. It was my pleasure.

[music]

I want to thank Dr. Offit for taking the time to talk with me. I really think his book, *Autism's False Prophets: Bad Science, Risky Medicine, and the Search for a Cure*, should be read by everyone. After you read it I encourage you to share it with someone else, and perhaps send a copy to your congressman.

One of my goals as a podcaster is to promote a better understanding of science among non-scientists. Children have already died from diseases that were preventable by vaccines because of parents deciding not to vaccinate their children because of unfounded fears. I think it is vital that each of us help spread accurate information on this topic. The bottom line is vaccines save lives.

This may be the most important episode I have ever recorded. Please feel free to share it with others. If you are a podcaster, please feel free to put it into your feed. If you have any ideas about how we can get this episode to as many parents and grandparents as possible, feel free to write to me at [docartemis@gmail.com](mailto:docartemis@gmail.com).

If you are listening to *Books and Ideas* for the first time, please visit my website at [gingercampbellmd.com](http://gingercampbellmd.com). For those of you who are regular listeners, I will be back with another episode at the end of next month. My goal for this year is to put out the *Brain Science Podcast* around the second Friday of the month, and to put out *Books and Ideas* on the fourth Friday. That way you'll get a new podcast from me every two weeks.

Thanks again for listening. I look forward to talking with you again very soon.

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