

Bad Science Hurts Catholic Physicians

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Abstract. Good intentions have propelled conservative-minded scientists and medical practitioners to argue that certain medical interventions may have dangerous and unintended consequences. Such positions are motivated by a hope that showing the negative consequences of immoral acts, such as abortion and sexual promiscuity, will help curtail the behavior. Unfortunately, when these positions are supported by faulty science—as are claims of a reputed link between certain vaccines and autism, and questions about the safety of the human papillomavirus vaccine, for example—they weaken the already tenuous relationship between Catholic medical professionals and the generally liberal scientific establishment. *National Catholic Bioethics Quarterly* 16.4 (Winter 2016): 567–575.

Medicine's moral landscape is changing faster than could possibly have been imagined even a generation ago. This is due, in part, to the exponential growth of knowledge made possible through a combination of new technologies and collaborative efforts among scientists throughout the world. The greater change, however, is the way that both the scientific elite and the general public have elevated the value of individual license, particularly sexual freedom, to a level that outweighs all previously held moral standards. For society to hold that an individual must have the unfettered ability to follow his or her sexual desires necessarily requires that other members of society must be told that their values carry less weight. For example, a religious

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organization's commitment to long-held moral standards is less important than its employees' unencumbered access to contraceptives; a developing fetus's right to life is less significant than the mother's right to decide that the challenges in coping with her current pregnancy are too great, or a teenager's perceived right to sexual experimentation is a greater good than the virtues of patience, prudence, and chastity.

Coincidence Is Not Causality

In the face of such absurdity, it is no wonder that many concerned and well-intentioned scientists and physicians are attempting to show that the moral depravity in which we live will have dire consequences for the health of society. Generally, their courage should be applauded, because taking unpopular stands on issues like abortion and sexual promiscuity often leads to professional censure and public ridicule. If the highest standards of scientific rigor are not upheld during these efforts, however, conservative scientists and physicians can sometimes do more harm than good. Unfortunately, this has occurred recently in two particular instances: Dr. Theresa Deisher's claim that there is a link between vaccines containing fetal DNA and the rise in autism, and the American College of Pediatricians' declaration that the HPV vaccine is potentially responsible for an increase in premature ovarian failure.¹ Careful examination of the science shows that neither claim is defensible. Consequently, these well-intentioned individuals have only given the generally liberal scientific community more reason to doubt conservative claims.

Deisher has spent a significant portion of her career as a molecular and cellular physiologist studying the safety of vaccines derived from cell lines developed from aborted fetal tissue, specifically the MMR (measles, mumps, and rubella) and varicella vaccines that are in widespread use today. She claims the fetal DNA in these vaccines either triggers an immune response or alters the genome in children, leading to the development of autism. It is not difficult to understand the motivation behind such claims, since anyone committed to fighting the evil of abortion would empathize with the desire to reveal the negative consequences of using developing human beings for spare parts. That being said, Deisher's thesis on the relationship between fetal DNA in vaccines and autism is faulty, and her science cannot stand up to rigorous examination.

The overriding issue with her claim is that there is strong evidence that the MMR vaccine is not associated with autism.² Therefore, it is inconsequential to speculate on a causal relationship between this vaccine and autism. Even if one wanted to grant, for the sake of discussion, a potential relationship between childhood vaccinations and an increasing number of children with autism, Deisher's theories do not withstand scientific and statistical analysis. The primary fault is a common error made by the

1. Theresa A. Deisher et al., "Impact of Environmental Factors on the Prevalence of Autistic Disorder after 1979," *Journal of Public Health and Epidemiology* 6.9 (September 2014): 271–286, doi: 10.5897/JPHE2014.0649; and "New Concerns about the Human Papillomavirus Vaccine," American College of Pediatricians, January 2016, <http://www.acped.org/>.

2. Margaret A. Maglione et al., "Safety of Vaccines Used for Routine Immunization of US Children: A Systematic Review," *Pediatrics* 134.2 (August 2014): 325.

anti-vaccine community, namely, confusing a temporal association with causality. Epidemiological data show that the incidence of autism has risen dramatically over the past twenty-five years.³ It is reasonable, therefore, to look at other events that have occurred with increasing frequency over the same period and hypothesize that one of them is responsible for the increase.

The problem with this type of theorizing is that the fact that event A and event B happen in succession does not prove that A caused B. Johnny develops a swollen toe the morning after his chicken pox vaccine. But Johnny's swollen toe is not due to the vaccine but to the fact that he stubbed his toe on the door this morning. So while Deisher argues that the rate of autism has increased with the widespread use of the MMR and varicella vaccines, the association does not prove that the vaccines are responsible for the increased autism diagnoses.

To weaken her argument even further, when you look closely at her data, even the proposed temporal association is not actually present. This is pointed out nicely in a series of articles on this subject that can be found on the Rational Catholic blog.⁴ The articles cover in great detail the errors in Deisher's statistical analysis, but just one error will be summarized here for the sake of brevity: Deisher claims that the increase in the incidence of autism, which took place in 1988, corresponds to the CDC recommendation to add a second MMR dose to the childhood immunization schedule. The problem with Deisher's theory is that the implementation of that recommendation did not occur until December of 1989.⁵ So the increase in autism was seen before the additional MMR dose was administered and, therefore, before any possible increase in the exposure of children to fetal DNA.⁶ Current evidence suggests that children with autism have defined abnormalities that are present in utero, long before they receive any vaccines, so it is not surprising that Deisher's attempt to connect vaccine administration with autism also fails from a statistical perspective.⁷

Beyond the problems with her analysis of the temporal relationship between certain vaccines and the increase in autism, there are significant flaws in her hypotheses about how fetal DNA in these vaccines could lead to autism. Deisher offers two theories: that fetal DNA leads to autism by either triggering an autoimmune response or by inserting itself into the genome of the child. She focuses more on the second

3. Karen Weintraub, "The Prevalence Puzzle: Autism Counts," *Nature* 479.7371 (November 2011): 22–24.

4. Genevieve H., "Abortion, Autism and Immunization: The Danger of the Plausible Sounding Lie," *Rational Catholic* (blog), September 8, 2014, <https://rationalcatholicblog.wordpress.com/>.

5. "Measles Prevention: Recommendations of the Immunization Practices Advisory Committee (ACIP)," *Morbidity and Mortality Weekly Report* 38 suppl 9 (December 29, 1989): 1–18.

6. In "Abortion, Autism and Immunization," Genevieve H. also explores problems with other change points.

7. Rich Stoner et al., "Patches of Disorganization in the Neocortex of Children with Autism," *New England Journal of Medicine* 370.13 (March 26, 2014): 1209–1219, doi: 10.1056/NEJMoa1307491.

theory, because she herself has testified that free human DNA from any source, fetal or not, has never been shown to trigger an autoimmune reaction.⁸

The second theory is biologically implausible for several reasons. For fetal DNA to insert itself into a child's genome, the following series of events would have to occur: The fetal DNA would have to find a way to insert itself into neural cells, but how it would get past the blood-brain barrier to reach those cells is a mystery that Deisher cannot explain. Once in the neural cells, it would have to recombine into the genome of the cell at a point with a proper promoter region and termination sequence, and it would then have to somehow code for all the numerous genes associated with autism. If this were possible, it would be the greatest news ever given to scientists working on gene therapy! For decades, gene therapy researchers have been working with very specific DNA fragments, known viral transporters, and promoter and termination sequences, but they still struggle to reliably code for even a very few genes. It strains credulity to believe that the merely introducing of random fetal DNA parts into a distal portion of the human body could consistently and reliably produce the phenotype of autism.⁹

This critique is not to dismiss the appropriate concerns of those who have moral reservations about receiving vaccines derived from aborted fetal tissue. A thorough analysis of the ethics involved in this subject is beyond the scope of this article, but readers should be reassured that the Catholic Church has definitively spoken on this issue and teaches that receiving the currently recommended vaccines, including those for MMR and varicella, is morally sound and contributes to the common good of society.¹⁰ Advocating for the development of ethically derived alternatives to the currently available MMR and varicella vaccines is certainly praiseworthy, but the pro-life movement is done a significant disservice when anyone tries to make arguments against abortion with faulty science. Those who support abortion in this country like nothing more than to be able to make pro-life advocates look foolish and uneducated. If pro-life Catholics do not hold themselves to the very highest standards of scientific research, then we will quickly be dismissed out of hand.

Improper Use of Statistics

A similar risk of backlash against conservative values has occurred because of a recent statement by the American College of Pediatricians (ACPeds), which voices concerns about the safety of the human papillomavirus (HPV) vaccine.¹¹ The ACPeds is a national organization that was developed as a professional home for pediatricians who have concerns about some of the social, ethical, and political

8. Laura C., "Problems with Deisher's Study, Part II: Biological Implausibility," *Rational Catholic* (blog), September 23, 2014, <https://rationalcatholicblog.wordpress.com/>.

9. See *ibid.* for a more in-depth exploration and critique of this issue.

10. Pontifical Academy for Life, "Moral Reflections on Vaccines Prepared from Cells Derived From Aborted Human Fetuses," *National Catholic Bioethics Quarterly* 6.3 (Autumn 2006): 541–550.

11. Scott S. Field, "New Concerns about the Human Papillomavirus Vaccine," American College of Pediatricians, January 2016, <https://www.acped.org/>.

positions held by the better-known American Academy of Pediatrics. The ACPeds has no religious affiliation, but most of its members would describe themselves as politically and socially conservative.

The organization's statement on the HPV vaccine, which has drawn significant attention and no small amount of condemnation, asserts that there may be a relationship between receiving the HPV vaccine and the development of premature ovarian failure (POF). The ACPeds hypothesizes that this occurs because the HPV vaccine contains a substance called polysorbate 80, which has been linked to ovarian toxicity in rats.¹² The only positive reception that this statement received was from presumably well-intentioned individuals who have been trying for years to assert that the HPV vaccine recommendations are part of a liberal movement to encourage sexual promiscuity among young people. This position stems from the fact that HPV is a sexually transmitted disease: since the vaccine's administration is recommended in early adolescence, many parents are concerned that they are being advised to give their children a vaccine so that they can engage in premarital sex.

Advocates for the vaccine correctly point out that it was developed because HPV is a known cause of cervical cancer, and 80 percent of individuals will contract HPV in their lifetime. The rationale behind the timing of the vaccine's administration has to do both with the reality that many individuals do become sexually active during adolescence and because the immune response of early adolescents is greater than can be achieved later in life. Thus, giving the vaccine to young teens provides greater long-term protection against the disease.¹³ Since the vaccine's widespread release in 2006, the battle lines have been drawn between concerned, conservative parents and the medical community at large.

In today's moral environment, no one can fault parents for being wary when it comes to matters of their children's sexual health and education. But medical professionals, especially pediatricians who have dedicated their careers to the healthy development of children, should know better than to sacrifice scientific integrity in order to engage in ideological battles. The claims made in the ACPeds statement do not hold up to close scrutiny, suggesting once again that good intentions can blind individuals and organizations to bad science.

The initial error in the ACPeds statement is due to a misuse of the data from VAERS (Vaccine Adverse Events Reporting System), a national vaccine safety reporting system maintained jointly by the FDA and the CDC. Any individual can report a perceived adverse event from a vaccine, but VAERS cannot distinguish between temporal and causative associations. So it is, at best, an incomplete look at possible vaccine reactions. Furthermore, there is no denominator in VAERS numbers—a number of adverse events cannot be compared with the numbers of non-adverse events—because the system does not contain data about the millions of children who

12. Ibid.

13. "HPV Vaccine for Preteens and Teens," Centers for Disease Control and Prevention, July 2015, <http://www.cdc.gov/>.

receive vaccines without reacting to them. So using VAERS to draw conclusions about the incidence of any particular adverse event is inherently scientifically unsound.

VAERS was developed to quickly identify potential causative links between vaccines and adverse events, but those links must be confirmed using other epidemiologic methods. In this instance, the ACPeds asserts that VAERS shows an increased incidence of POF since the introduction of the HPV vaccine. The ACPeds statement does not address the following two facts, however: First, there is a normal incidence of POF in the population, and approximately one in a thousand women will suffer from POF prior to their fortieth birthday.¹⁴ Therefore, given that eighty million doses of the HPV vaccine were administered between 2006 and 2015, one would expect a certain number of POF cases to be reported in VAERS.¹⁵ Since the 213 reports referenced by the ACPeds statement do not come close to exceeding the number of cases expected from baseline incidence, it is hard to conclude that the HPV vaccine is responsible for increasing ovarian failure. Second, the ACPeds statement compares the number of POF reports in VAERS in the years prior to the HPV vaccine release and after, and states that there are no reports of POF in VAERS until after the HPV vaccine was added to the schedule. However, the statement does not include the critical observation that prior to the introduction of the HPV vaccine, very few vaccines were routinely given to adolescent patients. The vast majority of vaccinations were administered in early childhood, with the exception of a tetanus booster that was given later. Therefore, there would be no adolescents participating in VAERS at the time when they would experience POF, that is, after menarche. Again, there is a baseline incidence of POF among all adolescent girls. Therefore, it is not surprising that reports of POF only begin to show up in VAERS after the HPV vaccine was added to the schedule, because prior to then hardly any adolescent girls were receiving vaccines.¹⁶

Furthermore, the ACPeds assertion that polysorbate 80 is capable of causing POF is only defensible through sloppy statistics. First, polysorbate 80 is a common food additive found in numerous everyday products, including ice cream. It has been estimated that an individual consumes, on average, 100 mg of polysorbate 80 every day.¹⁷ The total dose of polysorbate 80 in the HPV vaccine series is 150 mcg, that is, orders of magnitude less than our average daily consumption.

In the studies of concern cited by the ACPeds, newborn rats were given large doses of polysorbate 80 directly into the peritoneal cavity, where reproductive organs are located, on four consecutive days. The rats were observed to have decreased fertility after this experiment. However, when adjusted for weight, the equivalent dose of polysorbate 80 for an average adolescent would be 18 g. In other words,

14. Carolyn B. Coulam, Steven C. Adamson, and John F. Annegers, "Incidence of Premature Ovarian Failure," *Obstetrics and Gynecology* 67.4 (May 1986): 604–606, doi: 10.1097/00006254-198742030-00020.

15. "Frequently Asked Questions about HPV Vaccine Safety," CDC, last updated October 21, 2016, <http://www.cdc.gov/>.

16. Laura C., "Round about the Roundabout and Back to HPV," *Rational Catholic* (blog), February 2, 2016, <https://rationalcatholicblog.wordpress.com/>.

17. *Ibid.*

to achieve the same exposure in an adolescent female, she would have to receive 120,000 times the amount of polysorbate 80 contained in the HPV vaccine, and it would have to be injected directly into her peritoneal cavity instead of into the arm muscle, where the vaccine is currently administered.¹⁸ There are many substances that we ingest or encounter on a daily basis that would become dangerous if taken at 120,000 times the recommended dose. Even water can be lethal if consumed in large enough quantities.

Parents who refuse the HPV vaccine for their adolescents are not simply concerned about the safety of the vaccine, however. So if the scientific concerns about the HPV vaccine voiced by the ACPeds are not valid, could there still be legitimate moral considerations? It is a well-recognized reality throughout the general pediatric and gynecologic communities that one of the greatest barriers to widespread acceptance of the HPV vaccine is the perception that adolescents who receive it will be more likely to engage in early, risky sexual behavior in the belief that they are protected from its consequences. Consequently, many well-designed studies have compared the sexual behaviors of young adolescents who have and have not received the HPV vaccine. The results of these studies are unanimous: administration of the HPV vaccine does not affect the age of sexual debut, rates of pregnancy among teenagers, or rates of sexually transmitted diseases other than HPV.¹⁹ These findings should not surprise anyone who routinely works with adolescents on matters of health and self-care. Young people in this age group are notorious for their inability to consider long-term consequences of actions or delay gratification—character traits that can be influenced but not completely overridden by parental guidance, since the frontal lobe of the brain, which is largely responsible for mature decision making, is not fully formed until they are well into their twenties.²⁰

18. Catherina, “The Toxin Gambit, Part 2: Polysorbate 80 and a Maths Fail,” *Just the Vax* (blog), September 22, 2012, <http://justthevax.blogspot.com/>.

19. Leah M. Smith et al., “Effect of Human Papillomavirus (HPV) Vaccination on Clinical Indicators of Sexual Behaviour among Adolescent Girls: The Ontario Grade 8 HPV Vaccine Cohort Study,” *Canadian Medical Association Journal* 187.2 (February 3, 2015): E74–E81, doi: 10.1503/cmaj.140900. See also Robert A. Bednarczyk et al., “Sexual Activity-Related Outcomes after Human Papillomavirus Vaccination of 11- to 12-Year-Olds,” *Pediatrics* 130.5 (November 2012): 798–805, doi: 10.1542/peds.2012-1516; Mary B. Rysavy et al., “Human Papillomavirus Vaccination and Sexual Behavior in Young Women,” *Journal of Pediatric Adolescent Gynecology* 27.2 (April 2014): 67–71, doi: 10.1016/j.jpag.2013.08.009; Allison Mayhew et al., “Risk Perceptions and Subsequent Sexual Behaviors after HPV Vaccination in Adolescents,” *Pediatrics* 133.3 (March 2014): 404–411, doi: 10.1542/peds.2013-2822; and Nicole C. Liddon, Jami S. Leichter, and Lauri E. Markowitz, “Human Papillomavirus Vaccine and Sexual Behavior among Adolescent and Young Women,” *American Journal of Preventive Medicine* 42.1 (January 2012): 44–52, doi: 10.1016/j.amepre.2011.09.024.

20. Elizabeth R. Sowell et al., “In Vivo Evidence for Post-Adolescent Brain Maturation in Frontal and Striatal Regions,” *Nature Neuroscience* 2.10 (October 1999): 859–861, doi: 10.1038/13154; and Francine M. Benes, “Brain Development, VII: Human Brain Growth Spans Decades,” *American Journal of Psychiatry* 155.11 (November 1998): 1489, doi: 10.1176/ajp.155.11.1489.

Furthermore, as a group they are also generally disposed to believe in their own immortality, which is why they are likely to engage in risky behaviors to begin with.²¹ It is unrealistic to believe that a vaccine given to a child between the ages of nine and eleven and designed to prevent a cancer decades in the future will significantly affect an adolescent's thought process about sexual behavior in the next few years, just as it is unrealistic to believe that counseling young children to wear seat belts will lead them to drive more recklessly later. Adolescent decision making about sexual behavior is a complex process, influenced by personality, upbringing, and ever-evolving social pressures. It is not a decision process, however, that will be significantly influenced by perceived protection from a future cancer risk.

Some parents have expressed concern that the mere fact that HPV is a sexually transmitted disease makes a vaccine that protects against it a morally questionable proposition for their children, whom they have raised to abstain from any sexual activity until after marriage. This line of thought, however, often confuses preventive medicine, including the HPV vaccine, and contraceptive medicine, such as condoms, birth control pills, and intrauterine devices. Condoms are the most directly comparable, as they are designed to prevent transmission of most sexually transmitted diseases, just as the HPV vaccine is designed to prevent the transmission of HPV.

As in all moral arguments, one cannot discuss the ends without analyzing the means. The use of condoms to prevent sexually transmitted diseases requires the sexual act. There is no use of condoms that does not require sexual activity and, consequently, is not contraceptive in nature. In contrast, the HPV vaccine has no contraceptive effect, and receiving it is not a sexual act. It is not an immoral act, then, to receive this particular preventive medicine. Of course, to benefit from the HPV vaccine requires sexual activity at some point in one's life. It is also true that lifelong celibacy would be equally protective against HPV, but consider how little any of us know about the life trajectory of our children when they are young. Their vocations are as much a mystery to them as to us, their parents, during those adolescent years. Also consider the world that we live in: under the best circumstances, we all hope and pray that our children will follow our guidance and the guidance of the Catholic Church as they come of age. But the statistics are undeniable: 41 percent of adolescents are sexually active before they graduate from high school, and approximately 90 percent of individuals in today's society engage in premarital sex.²²

So it is highly probable that either your child or your child's future spouse will engage in sexual activity before marriage. Perhaps your child is the one who will lead their future spouse to Catholicism—what then? The sacrament of Confession may cleanse the soul of the consequences of premarital sex, but it cannot change

21. Joseph T. McLaughlin et al., "1987 Amici Curiae Brief in the U.S. Supreme Court Case of *Thompson v. Oklahoma*," in *Adolescent Psychiatry: Annals of the American Society for Adolescent Psychiatry*, vol. 26, *Developmental and Clinical Studies*, ed. Lois T. Flaherty (Hillsdale, NJ: Analytic Press, 2002), 289.

22. "Sexual Risk Behaviors: HIV, STD, and Teen Pregnancy Prevention," CDC, July 18, 2016, <http://www.cdc.gov/>. See also Lawrence B. Finer, "Trends in Premarital Sex in the United States, 1954–2003," *Public Health Reports* 122.1 (January–February 2007): 77.

the biological reality of a person already infected with HPV who can then infect their virginal wife or husband. We should be grateful for a vaccine that can protect our children from the ramifications of mistakes made in the heady days of youth, not to mention protecting them against the tragedies of abuse and incest that, while uncommon, are still a reality in today's fallen world.

The ACPed's poor science achieves only two ends: it inflames the fears of parents who are trying to do the best for their children but do not have the education and training necessary to sort through poor statistical analyses, and it further distances the ACPeds from the general medical community at a time when respect is critical if there is to be any hope of collaboration.

Growing Hostility

I have only been in the trenches of medicine for a little over a decade, but I am stunned at the change in attitude toward conservative, Catholic physicians that I have observed over this short period of time. When I began medical school, I was considered an interesting oddity at Johns Hopkins. My classmates thought of me as a unique specimen of sorts. One woman told me in the first few weeks of classes that I was the first pro-life person that she had ever met! But they were very tolerant of my views, and some of them were willing to listen to my arguments. No one questioned that I should be allowed to hold leadership positions or that I would be allowed to practice medicine under the guidelines of my conscience. Just ten years later, I can assure you that the attitude is very different. There is a marked hostility toward any physician who practices from the pro-life viewpoint, whether it influences their positions on abortion, contraception, end-of-life care, or anything else. The only way I know of combating this hostility—other than prayer, of course—is to defend my positions with unimpeachable science.

Whether or not Deisher's work continues to give credence to the idea that there is a link between autism and childhood vaccinations, and whether or not the ACPeds continues to feed into a misguided concern about a potentially life-saving vaccine, bad science is damaging to any conservative medical professional who wishes to be taken seriously. If progress is to be made in gaining the respect of more liberally oriented colleagues, then relying on the Catholic Church's long history of combining faith and reason is the only pathway to success.

