The Truth About the HPV Vaccines

Madeline Miller

NITE

May 1, 2020

Table of Contents

The Truth Behind the HPV Vaccine

Introduction:

Since the beginning of time, sexual attraction has been the strongest human instinct. Equally strong is the parental instinct to protect. Behind every child acting on sexual attraction is a parent warning of consequences like unwanted pregnancy and sexually transmitted diseases. In modern times, the most common STD in the United States is Human Papillomavirus (HPV), which has infected approximately 79 million people and annually infects 14 million people, who are mostly in their late teens or early 20's (STD Facts, 2019). There are over 200 viruses that make up the HPV family, and only some of them spread from vagnial, anal and oral sex. Most people infected with HPV are unaware they are carriers, due to having no symptoms. In fact, 90% of infected young adults clear the infection entirely on their own within 12-24 months (STD Facts, 2019). If any symptoms do arise, typically they show as genital warts.

Unfortunately, a small fraction of abnormal squamous cells, caused by certain strains of HPV, do develop into cervical cancer. "Every year, nearly 12,000 women and 12,000 men living in the U.S. will be diagnosed with HPV-related cancer, and more than 4,000 women die from cervical cancer—even with screening and treatment" (STD Facts, 2019). This means that out of the 14 million individuals that contract HPV annually, only 0.002% contract cancer, and only 0.0003% die from that cancer. Since cervical cancer is a serious health issue, there are proactive and routine screenings used to identify those individuals at risk. "The primary goal of screening is to identify precancerous lesions caused by HPV so they can be removed to prevent invasive cancers from developing. Routine cervical screening has been shown to greatly reduce both the number of cervical cancer cases and deaths from the disease" (HPV, 2019).

For decades, screening was the only way to prohibit cervical cancer from developing into a life-threatening condition, until the race for an anticancer vaccine began. Researchers began searching for a way to replicate the HPV virus in order to create a vaccine. Eventually, the US government got involved in the sprint, and many universities and institutions were filing for patents to protect and earn royalties from their intellectual property (Schiller & Lowy 2011). Tracing the path of exactly who invented the vaccine is difficult because the US government and certain health departments were involved in every aspect of its development. The intent of this paper is to untangle the conflicts of interest and highlight the necessary information that consumers, parents and teenagers have a right to know about the safety and effectiveness of the HPV vaccines.

History of the HPV Vaccine Development:

In 1971, US President Nixon signed the National Cancer Act into law, announcing significant federal funding for cancer research, and declaring a "war on cancer" (National Cancer Act, 2016). This declaration ignited a fire in the research community, and scientists began to explore a connection between viruses and cancer. Once Dr. Harald zur Hausen successfully isolated HPV strains, the race in the 1990's was to replicate a weakened version of the virus for a vaccine to "stimulate the immune system" (Harald, 2008). Many teams around the world were competing to crack the HPV viral code. At the US National Cancer Institute, Dr. Lowy and Dr. Schiller made significant headway, then filed a patent in 1993 because they were able to grow a virus-like particle to mimic the real virus from an insect cell culture (Schiller & Lowy, 2011). At the University of Queensland, Professor Ian Frazer and Jian Zhou engineered virus-like particles from two HPV strains. They filed a US patent in 1992. There were two other teams that filed

patents, but the Federal Circuit awarded top priority to the Queensland team, and Frazer and Zhou took home the patent prize (McNeil, 2006). Although Queensland has the patent, each team shares royalties, including the National Institutes of Health (NIH) Office of Technology Transfer (OTT). The OTT facilitates scientific advances reaching the public sooner, but it also creates potential conflicts of interest since the government and its employees profit directly from its success. It is unclear just how much the US government makes in royalties, especially since in 2010, the NIH refused to disclose HPV vaccine royalties earned from pharmaceutical companies Merck & Co. and GlaxoSmithKline (National Archives, 2010). While that question is left unanswered, it leaves room for information that should be public knowledge to be hidden away. However, conflicts of interest are not limited to royalty information but rather extend to HPV vaccine research and clinical trials as well.

Questionable Clinical Trials:

In the midst of the patent sorting and licensing approval, two pharmaceutical companies were granted permission to begin developing a vaccine, while the legal battles wore on. One vaccine is called Gardasil, developed by Merck & Co., and the other is called Cervarix, developed by GlaxoSmithKline. Before administering vaccinations, clinical trials are required. This is a crucial part of developing any medicinal product, and many would assume that this vaccine for cancer would be held to the highest of standards. Gardasil is marketed as an anticancer vaccine, so there better be research to back that up- right? Well, the clinical trials for Gardasil never tested whether the vaccine prevented cancer of any kind. Merck and the US Food and Drug Administration (FDA) decided that it was “not feasible to use cancer as an endpoint” (Vaccines, 2006) and went as far to say that “a cancer endpoint would be unethical” (Schiller,

2012). Instead, they tested for the development of cervical lesions called CIN2 and CIN3. The cervical lesions are labeled beginning with CIN1, but it is important to note that they do not always progress to the next stage. In fact, "long-term research data show that as much as 60% of CIN1 lesions spontaneously regress, 30% persist, 10% progress to CIN 3, and only 1% eventually progress to invasive cancer." (Tomljenovic, 2012) Meaning that testing for CIN markers is not adequate in understanding how effective the vaccine is in terms of preventing cancer. Also, since these lesions develop in far less time than cervical cancer, Merck was able to shorten the clinical trials to just a few years, rather than wait the decades that responsible research requires. Not only that, but the group of individuals chosen to be in the efficacy Gardasil and Cervarix trials were not even the age group that the vaccine is marketed for. "For practical reasons, **efficacy studies have not been conducted in the primary target populations of current vaccination programs**, adolescent girls and boys." The mean age was 20, but it ranged from ages 15-26. (Schiller, 2012) Although the age and endpoint factors are concerning, that does not conclude the discrepancies in the clinical trials.

Most clinical trials for a new vaccine or pharmaceutical drug test against a benign control substance, known as the placebo. The most neutral substance would be to test the vaccine against a saline injection to truly understand the effects of safety. According to Merck's data, only 320 females and 274 males were tested with saline. Rather than saline for the other 5,499 control individuals, "the placebo used in this study contained identical components to those in the vaccine, with the exception of HPV L1 VLPs and aluminum adjuvant" (Little, 2014). In other words, the solution being called a 'placebo' could have contained a number of potentially toxic substances like aluminum, polysorbate80, sodium borate, genetically modified yeast, and L-histidine. The frustrating part about how the data from the trial is reported, is that the 'saline' and

the Amorphous Aluminum Hydroxyphosphate Sulfate (AAHS) control numbers are grouped together for reporting adverse events, as seen in the table below (Gasdasil, 2006).

Table 5: Common Systemic Adverse Reactions in Girls and Women 9 Through 26 Years of Age (GARDASIL ≥Control)*

Adverse Reactions (1 to 15 Days Postvaccination)	GARDASIL (N = 5088) %	AAHS Control† or Saline Placebo (N = 3790) %
Pyrexia	13.0	11.2
Nausea	6.7	6.5
Dizziness	4.0	3.7
Diarrhea	3.6	3.5
Vomiting	2.4	1.9
Cough	2.0	1.5
Toothache	1.5	1.4
Upper respiratory tract infection	1.5	1.5
Malaise	1.4	1.2
Arthralgia	1.2	0.9
Insomnia	1.2	0.9
Nasal congestion	1.1	0.9

*The adverse reactions in this table are those that were observed among recipients of GARDASIL at a frequency of at least 1.0% and greater than or equal to those observed among AAHS control or saline placebo recipients.
†AAHS Control = Amorphous Aluminum Hydroxyphosphate Sulfate

This merging of data is misleading on the safety of the vaccine, due to the fact that AAHS has safety concerns of its own. A more in-depth look at the data shows that for mild injection-site reactions, such as swelling and bruising, Merck provided data for the saline group. When it came to displaying data for more serious adverse events, such as autoimmune disorders, Merck combined the saline group with the AAHS group. Interestingly enough, the little data Merck provided for the saline group shows up to a **50% decrease in adverse reactions** in comparison to the true vaccine and AAHS group (see Appendix A and Appendix B). This extra substance of AAHS allows for the Gardasil data to appear very similar to the placebo for serious reactions and does not portray an accurate depiction of the placebo group.

The last piece of clinical trials that will be focused on is the lack of attention to effects on reproductive health. One would assume that a vaccine targeting a sexually transmitted virus would provide safety studies on the gonads that affect fertility. In this case, that assumption would prove to be wrong. Manufacturers only tested the vaccine on rats for fertility as a way to access safety for humans. Thanks to Australian Gynecologist Dr. Diedre Little, who requested

information on the rat studies, observations can be made on the data. She found that Merck had not conducted the study including all three doses of vaccination that are typically delivered to humans, and it is unclear why only the two doses were given. Even still, the fertility rate of the rats dropped to 95% compared to the 98% that the control groups demonstrated (Little, 2014). It is curious why the third dose was not given, but even more curious to know what the rate *would* have dropped to if the rats were given the full dosing schedule. Another interesting speculation on global fertility is the dropping rates of teenage pregnancy in countries where HPV vaccine rates are high. The United States, Canada, Ireland, Denmark, Norway and Australia all reached record low teen pregnancy rates in the last decade (Holland, 2018). The HPV vaccines have been around for over a decade now, and while there may be many factors that play into this, it is just another reason why the effects on the reproductive system need to be further studied. Finally, one of the most outstanding pieces of evidence as to why more research on reproductive function is necessary, comes from the American College of Pediatrics:

> "Pre-licensure safety trials for Gardasil used placebo that contained polysorbate 80 as well as aluminum adjuvant. Therefore, if such ingredients could cause ovarian dysfunction, an increase in amenorrhea probably would not have been detected in the placebo controlled trials. Furthermore, a large number of girls in the original trials were taking hormonal contraceptives which can mask ovarian dysfunction including amenorrhea and ovarian failure" (Field, 2018).

This emphasizes the point that the 'placebo' was *far* from what the research and medical communities, as well as parents and young adults, would expect from safety trials. Unfortunately, despite all of these red flags and missing pieces, the FDA fast tracked the approval process for Gardasil in 2002, allowing for priority review and assurance that any

problems would be quickly resolved. “Although Gardasil only *partially* satisfies the FDA’s criteria for Accelerated Approval*,* ultimately it does not satisfy the criteria for Fast Track approval as **the vaccine fails to show superior efficacy to pap screening**” (Tomljenovic, 2012). The FDA has standards to accelerate approval, and Garadsil paved the way for HPV vaccines without even meeting them. It did not take long for the clinical trials to wrap up and the official vaccines to commence.

Gardasil and Cervarix Hit the Market:

GlaxoSmithKline, the British pharmaceutical company, developed a vaccine called Cervarix that was approved for females 10 to 45 years of age; it was expected to create a multi-million-dollar market (Potter, 2007). On March 29, 2007, GlaxoSmithKline submitted a Biologic License Application (BLA) for Cervarix to the FDA, which included data from clinical trials in almost 30,000 females 10 to 55 years of age and contains data from the largest Phase III cervical cancer vaccine efficacy trial to that date. The application was approved for administration in 2009. Cervarix was administered in the US until 2016 when the revenue could no longer compete with the other HPV vaccine on the market.

The competitor that drove Cervarix off the US market began when in 2006 in the United States, the pharmaceutical company Merck & Co. announced an HPV vaccine called Gardasil. It was approved and by 2007, the Advisory Committee on Immunization Practices (ACIP) was recommending the vaccination for girls 11 to 26 years of age (Moro, 2014). Since Gardasil was released, it has earned over $1 billion in sales each year, topping sales of the flu shot in 2010 (Kladdar). Thirteen years later, an updated version of Gardasil is offered as early as age 9, and is encouraged for both girls and boys until age 45. Gardasil was created to be given in a series of

three doses, with at least six months between the first and second dose. It was a quadrivalent vaccine, meaning it was designed to protect against 4 of the 23 most high-risk HPV strains that could potentially lead to cancer. However, even in the vaccine insert itself, the effectiveness was not guaranteed due to limitations, such as "vaccination with Gardasil may not result in protection in all vaccine recipients," and "not all vulvar, vaginal, and anal cancers are caused by HPV, and Gardasil protects only against those vulvar, vaginal, and anal cancers caused by HPV 16 and 18" (Gardasil, 2006). Yet more than 67 million doses were administered nationally between June 2006 and March 2014. (White, 2014).

Prior to replacing Gardasil with its updated version, data was gathered by the Journal of Infectious Diseases about the efficacy of the Gardasil vaccine. The data displayed in the table below refers to Human Papillomavirus (HPV) prevalence among sexually active females 14 to 19 years of age, along with their vaccination history. (Markowitz, 2013).

HPV Type[a]/ Vaccination History	Prevalence, % (95% CI)		
	2003–2006 (n = 736)	2007–2010 (n = 358[b])	aPR[c] (95% CI)
Any HPV			
Overall	53.1 (48.9, 57.2)	42.9 (36.2–49.9)	0.82 (0.69–0.98)*
Vaccinated	NA	50.0 (38.3–61.6)	0.90 (0.72–1.16)
Unvaccinated	NA	38.6 (30.8–47.2)	0.77 (0.64–0.93)**

Interestingly, the number of unvaccinated individuals with HPV prevalence was 38.6%, whereas the number of *vaccinated* individuals with HPV prevalence was 50%. According to this study, vaccinated females were 12% *more* likely to have HPV than those who were not. This raises the question of the true effectiveness of the Gardasil vaccine, and should call for re-evaluation of pre-licensure clinical trials.

In 2020, the only HPV vaccine on the market for the United States is Gardasil 9, although many other countries still use Cervarix. Why did the United States switch from Gardasil to Gardasil 9? Rather than targeting the 4 most common strains of HPV that could potentially cause cancer, they amped it up to 9 strains, hoping for increased effectiveness. For girls and women ages 9 through 26, it is listed to prevent vaginal, vulvar, cervical and anal cancers, genital warts and various tissue neoplasia (abnormalities) caused by certian strains of HPV. For boys and men ages 9 through 26, it is listed to prevent anal cancer, genetial warts and neoplasia caused by certian strains of HPV. Each dose of Gardasil 9 is .5 mL and is given in a span of 3 shots, just like the original Gardasil (Package Insert). Once again, the clinical trials for Gardasil 9 were problematic. Gardasil 9 was *never* tested with cancer as an endpoint, even though the FDA statement below seems to claim otherwise, and it was only tested for efficacy against Gardasil- never against a true inert placebo.

According to the FDA:

> "A randomized, controlled clinical study was conducted in the U.S. and internationally in approximately 14,000 females ages 16 through 26 who tested negative for vaccine HPV types at the start of the study. Study participants received either Gardasil or Gardasil 9. Gardasil 9 was determined to be 97 percent effective in **preventing cervical, vulvar and vaginal cancers** caused by the five additional HPV types" (Press, 2014).

Since Gardasil 9 has only been approved since 2014, it is clear that such an early statement can not possibly be conclusive in terms of long-term outcomes in correlation to the vaccine safety and disease prevention. Continuing on, the focus will be shifting from premarket clinical trials, to breaking down the ingredients and what biological effects they have on the human body.

Inside the Vial of HPV Vaccines:

Many people have faith in government agencies such as the Food and Drug Association and the Center for Disease Control, in assuming that the drugs and vaccines being given to our citizens are composed of safe ingredients. It is uncommon to hear that the ingredients could potentially cause harm and trigger adverse reactions in the body. If someone does share that opinion- they are labeled as the derogatory term 'anti-vaxxer'. However, knowledge is power, and the information and data *is* out there on what is inside the vials that people so willingly get injected with. If more people were aware of these facts, they would critically think about the risk versus the benefit ratio in making medically informed decisions.

Gardasil 9 has very similar ingredients to Gardasil, so both vaccines will be inspected simultaneously. Gardasil, as mentioned previously, includes 4 strains of L1 HPV proteins that mimic the virus. The amounts of each strain varies between 20-40 mcg. Gardasil 9 includes 9 strains of L1 HPV proteins, with amounts varying between 20-60 mcg. Additional ingredients for Gardasil are as follows: "Each 0.5-mL dose of the vaccine contains approximately 225 mcg of aluminum (as Amorphous Aluminum Hydroxyphosphate Sulfate, or AAHS, adjuvant), 9.56 mg of sodium chloride, 0.78 mg of L-histidine, 50 mcg of polysorbate 80, 35 mcg of sodium borate, <7 mcg yeast protein/dose, and water for injection" (Gardasil, 2006). Each ingredient's purpose will be described, beginning with the AAHS adjuvant.

An adjuvant is used in Gardasil and Gardasil 9 because the virus-like particles are not alive. Without the adjuvant to kickstart the immune response, the virus-like particles in the vaccine would be killed off (Holland, 2018). The FDA claims that they are generally regarded as

safe, “aluminum adjuvant containing vaccines have a demonstrated safety profile of over six decades of use and have only uncommonly been associated with severe local reactions” (Biologics, 2018). However, many scientists have spoken out saying that very little is known about the safety of vaccine ingredients. Dr. Christopher Exley, of the UK’s Keele University, is one of the world's foremost aluminum toxicity experts and says point blank: “It has never been demonstrated that aluminum is safe” (Holland, 2018). The argument is often made that aluminum is everywhere, including our food and drinking water. However, there is a vast difference between consuming a substance and having it pass through the digestive system for filtration *prior* to absorption, and injecting it directly into the body. In December of 2008, the US government brought together experts from the FDA, CDC, WHO, the pharmaceutical industry, research institutions, the Gates Foundation and more, to discuss safety issues. During the workshop, it was called upon the WHO to research this exact topic.

> “Safety issues will require a thorough understanding of the effects of adjuvants on the immune response and related mechanisms. Adjuvant safety is an important and neglected field. Since adjuvants have their own pharmacological properties, which might affect both the immunogenicity and the safety of vaccines, **safety assessment is essential**”..... “Adverse events attributable to adjuvants need to be documented and reviewed, and the information made available. That is another important role for WHO” (Global, 2004).

Although their call to action occurred, studies have not since been provided. It was made apparent from the meeting that experts in the field agree that aluminum adjuvants need to be accessed more in depth. However, without providing a reason as to why, Merck *doubled* the amount of AAHS in Gardasil 9 to 500 mcg. One may assume the other five ingredients were

adjusted as well- but no, those remained exactly the same. Moving on through the list of ingredients, keep in mind that these amounts are identical between Gardasil and Gardasil 9.

Polysorbate 80 or Tween 80, is another controversial substance included in Gardasil and Gardasil 9 (but not Cervarix). Polysorbate 80 is an emulsifier and binding agent and is "used in pharmacology to assist in the delivery of certain drugs or chemotherapeutic agents across the blood-brain-barrier", acting as a 'trojan horse' type substance (Palevsky). The blood brain barrier is an extremely important membrane to keep toxins and pathogens out of our brain tissue. Why is it necessary to open the barrier that is meant to protect us, and potentially bring aluminum, DNA fragments, and other substances along with it into the brain? Little research has been done on humans testing this substance, and the few studies done on rats leaves room for uncertainty in the impacts on ovarian function. According to the Food and Chemical Toxicology Journal:

> "Neonatal female rats were injected ip (0.1 ml/rat) with Tween 80 in 1, 5 or 10% aqueous solution on days 4-7 after birth. Treatment with Tween 80 accelerated maturation, prolonged the oestrus cycle, and induced persistent vaginal oestrus. The relative weight of the uterus and ovaries was decreased relative to the untreated controls. Squamous cell metaplasia of the epithelial lining of the uterus and cytological changes in the uterus were indicative of chronic oestrogenic stimulation. Ovaries were without corpora lutea, and had degenerative follicles" (J;, Gajdová M, 1993).

In short, the normal physiological changes expected were disrupted, the ovaries did not develop to a healthy size, hormone secreting glands were non-existent, and the follicles responsible for inducing menstruation were degenerated. The utter lack of research has been made aware by many, including the American College of Pediatrics. They correlated the use of polysorbate 80 with ovarian issues such as amenorrhea (loss of menstruation) and premature menopause, from

reports on the Vaccine Adverse Events Reporting System (VAERS) where 88% of these adverse events were associated with Gardasil. Another excellent point made by The College pertains to the clinical trials:

> "Pre-licensure safety trials for Gardasil used placebo that contained polysorbate 80 as well as aluminum adjuvant. Therefore, if such ingredients could cause ovarian dysfunction, an increase in amenorrhea probably would not have been detected in the placebo controlled trials" (Field, 2018).

This blaring issue is not something to be glossed over, these words clearly state that the so-called 'placebo' means virtually *nothing* in detecting adverse reactions. Similar to the aluminum adjuvants, more studies are clearly needed to prove the safety of adding polysorbate 80 into Gardasil and Gardasil 9.

The next four ingredients highlighted have little research on safety for injection purposes, and will be briefly discussed. First is 9.56 mg of sodium chloride, more commonly known as salt. Considering salt is appropriately studied and common in pharmaceuticals, it will be skipped. Next, L-Histidine is an essential amino acid found in both Gardasil vaccines, and is a known vasodilator (widens the blood vessels in the body). Gardasil was the *first* vaccine to ever include L-Histidine, and it is unclear what purpose it serves (Holland, 2018). Another ingredient that is included is yeast. Both yeast and proteins can trigger allergic reactions and was acknowledged in the vaccine description: "Contraindications- Hypersensitivity, including severe allergic reactions to yeast (a vaccine component)" (Package insert). Most parents and children do not thoroughly read the vaccine insert, so it falls upon the doctor to inform the patient prior to injection. Last is Sodium Borate, otherwise known as Borax. It is uncommonly found in vaccines, and more traditionally located in cleaning products, pest control products, and industrial applications. The

Material Safety Data Sheet for sodium borate however, warns that it "May cause eye and skin irritation. May cause respiratory and digestive tract irritation. May impair fertility. May cause harm to the unborn child" (Material, 2009). Interestingly, vaccine manufacturers are permitted to include ingredients in vaccines *without* evidence that they are safe to inject into humans, because they are only required to study that vaccine as a *whole* (Holland, 2018). That would be like selling a car simply because it drove cohesively around the block once, without ever checking the functionality of the brakes, the engine or the transmission- that simply is not the standard, so why is it acceptable for vaccines? This becomes especially concerning once agents typically used for cleaning and pest control, are wrapped up in the vaccine being given to 9 year old children.

The last HPV vaccine to dissect is Cervarix. According to the vaccine insert, its ingredients are as follows: 50 mcg of the 3-*O*-desacyl-4'-monophosphoryl lipid A (MPL), 0.5 mg of aluminum hydroxide, 4.4 mg of sodium chloride, 0.624 mg of sodium dihydrogen phosphate, and each dose may also contain residual amounts of insect cell and viral protein and bacterial cell protein (Cervarix, 2009). The sodium chloride and sodium phosphate are naturally occurring substances and have not been found to be problematic. While Cervarix did not incorporate polysorbate 80, it does include .5 mg of an aluminum adjuvant. Aluminum hydroxide is mostly used as an antacid and is consumed orally for relief of indigestion. It was found to effectively stimulate the immune system's response to antigens, which is why it is used in Cervarix. However, there are well-documented side effects listed from use of aluminum hydroxide including seizure, impaired bone metabolism, and chronic degenerative brain disorders (Shon, 2020). Once again, there were no individual studies available on aluminum hydroxide in injection form as an individual substance, which seems to be a reoccurring observation. The overarching theme for HPV vaccines, is the fact that the manufacturers seem to

have a potentially dangerous loophole where they do not have to provide safety testing for each substance, even when research shows points of concern. It is vital to have a complete understanding of the effects of every ingredient, especially when males and females struggle with adverse reactions as frequently as they do with HPV vaccines. The next piece of the puzzle is to illuminate who suffers the adverse reactions, what is the range of reactions reported, when they occur and *why* are they so prevalent?

Adverse Effects:

'Adverse effect or event' is the term used in medicine to describe an undesired harmful effect resulting from a medication or other intervention (NCI Dictionary). There are three areas to explore the depth of these adverse effects; pre and post-licensure clinical trial data, the Vaccine Adverse Events Reporting System (VAERS) and anecdotal evidence. As previously discussed, the clinic trials had issues with a false placebo and misleading ways of displaying the information that was gathered. Keeping these discrepancies and concerns in mind, it is still data to evaluate.

For Cervarix, they conducted safety testing by pooling controlled and uncontrolled clinical trials from all over the world, totaling "23,952 females 9 through 25 years of age in the pre-licensure clinical development program" (Cervarix, 2009). The control group included using two Hepatitis vaccines and one aluminum adjuvant mixture- none of the control used saline. The participants were sent home with diary cards to record any adverse effects they experienced for up to 30 days after vaccination. Due to the use of other vaccines and aluminum adjuvant being used as the control, the numbers are sometimes *higher* in control groups for events such as

headache and dizziness. Nonetheless, the vaccine insert has an entire section to warn of the risk of syncope, meaning fainting or seizure-like activity (Cervarix, 2009). The data does not paint a clear picture of what the HPV vaccine events would be next to a simple saline injection, because that test was never conducted. A more visual representation of the reported effects are displayed in multiple charts taken from the Cervarix package insert, including autoimmune disorders that developed post-vaccination (see Appendix C and D).

An alternative way to explore potential events caused by Cervarix is to search the government database VAERS. The reporting system is based on correlation, not causation, but it includes valuable reports. Although anyone can send in a report, most people are not aware of the system and 73% of reports come from vaccine manufacturers or health care providers rather than patients or parents (Vaccine Adverse). In fact, it is estimated that *fewer than 1%* of vaccine adverse events are reported to VAERS simply due to lack of awareness (Bernstein, 2011). Even still, over 4,500 reports were made related to Cervarix in the system, with 1,400 being considered 'serious' (VAERS Search). To be considered serious, the effect must meet criteria of death, life-threatening, birth defect or permanent damage. Considering Cervarix was only on the market in the US for 7 years, 4,500 adverse events is not a dismissible amount.

Shifting focus to Gardasil, the way they conducted their clinical trials was previously discussed. To quickly refresh, they used an aluminum adjuvant for most of their control data, producing potentially misleading safety information. Similar to Cervarix, the Gardasil trial participants were sent home with vaccination report cards to report any effects for 14 days post vaccination (Gardasil, 2006). The follow-up being encouraged for only 14 days is *not* enough time to understand long-term health effects on important aspects such as fertility. Based on the data that the package insert provides, the most common adverse events were fainting, headache

and fever. There is one section in the insert that lists occurrences of serious reactions including, but not limited to; autoimmune diseases, nervous system disorders, appendicitis, pelvic inflammatory disease, sepsis, arthritis, arrhythmia, cancer, diabetes, thyroid disorders and more. An interesting statistic is the fact that 2.5% of trial participants reported a serious adverse reaction during clinical trials, but the "study investigator" deemed only 0.04% of those reports were related to the vaccine. (Gardasil, 2006). How the study investigator deemed only 10 individuals reports to be true, is unclear because there was no supporting evidence or explanation to clarify. Since the clinical trials depict a limited amount of information, VAERS may provide insight into what individuals have experienced since Gardasil was made available.

According to VAERS, over 45,000 individuals have reported an adverse event related to Gardasil. Of those 45,000 people, almost 7,000 are considered serious (VAERS Search). Keeping in mind that fewer than 1% of events are reported, that number may reach upwards of 700,000 people that have been seriously affected by Gardasil! The range of adverse events is extensive, but there are many reports of fertility issues for men and women, menstrual irregularities, and hormonal issues. Who is to say that the aluminum adjuvants or polysorbate 80 in Gardasil are not the cause, or at the very least partially responsible, for some of these issues? Research on rats points to it being a possibility, but the lack of human research makes it impossible to know scientifically.

Gardasil 9 clinical trial data was similar to Gardasil. According to the vaccine package insert, "Out of the 15,705 individuals who were administered Gardasil 9 and had safety follow-up, 354 reported a serious adverse event; representing 2.3% of the population" (Package Insert). Here is some food for thought. According to 2019 data, there are 167 million women and 161 million men in the United States (US Census, 2019). Revisiting an earlier statistic, 12,000 men

and 12,000 women will be diagnosed with HPV related cancer each year. For men and women both, there is a .000007% chance of getting an HPV related cancer in a year. This calculation is not exact, but there is a *much* higher chance of having an adverse reaction than being diagnosed with HPV related cancer. The immune system is almost always prepared *without* intervention to clear HPV infection naturally, and the risk-benefit ratio based on the data of a vaccine related adverse reaction, is highly unbalanced. Outside of clinic trials, what did VAERS data show? In just 6 years, there are already over 13,000 reports potentially related to Gardasil 9. There are 700 that were reported to be serious (VAERS Search Results). It is important to realize that according to VAERS, 5,300 reports were females and 3,000 reports were from males. The reactions are not gender specific. Many reports describe fainting immediately after, seizure like activity, vomiting, and fever. However, there are reports of more serious conditions as well, including reports of death. These reports are directly correlated, and it is evidence that must be considered. There are side effects and risks when using any medication or receiving any vaccine. However, the issue with HPV vaccines, and Gardasil specifically, is that there are *many* areas that were questionable. The unjustified fast track approval of the clinical trials, using abnormal lesions as an endpoint rather than cancer, precarious ingredients that have not been scientifically proven safe, misleading representation of data and so forth. Men, women and children were marketed a product to ensure protection from HPV related issues, but at what cost?

Personal Anecdote:

This research topic is near and dear to my heart for unfortunate reasons, but real reasons nonetheless. Middle and high school were my most athletic years. I ran cross country in the fall and track and field in the spring. I was happy and healthy in every way. Before my freshman

year of high school began, I needed to get a routine sports physical. Looking back at my immunization records, the exact date of the physical was August 19, 2014. Up until this point, I had been seeing the same pediatrician since birth who never pushed vaccinations on my parents, and gave honest insight about his hesitations with the Gardasil vaccine. He shared that he would not give Gardasil to his children, due to its newness and lack of time under study. Sadly, my pediatrician retired and I was assigned a new doctor. I vividly remember sitting in the office with my mother and my brand-new doctor, who had quite a different approach to consulting with us about Gardasil. He initially assumed my mother was okay with giving me the first dose of Gardasil, and when she politely expressed we were waiting to do so, his entire demeanor shifted. Instead of respecting her decision, he became frustrated and eventually said "Well, when your daughter is dying of cancer, you are going to feel pretty guilty knowing *you* could have prevented it."

At the time, my family was unaware and uneducated on how to handle a physician stepping outside of their boundaries. Essentially bullied into it, my mother gave in and I received the vaccine. Two weeks after the first dose, my alarm clock for school went off and I went to get out of bed, but ended up collapsing to the floor. It was something I had never experienced before. My legs felt numb and heavy at the same time, and I had lost all motor function to stand up. I screamed and my step-dad ran down to find me (a runner with no previous issues) unable to move. Not making the connection, we brushed it off as my legs "falling asleep". For months following the vaccine, my menstrual cycle that was once completely normal, became painful and dangerously heavy in flow. I was miserable each month and would often need to leave school on my period due to its unpredictability and inability to be controlled. My cycle went from being heavy and painful, to extremely irregular. Then, six months after the first dose at another doctor

appointment, a nurse came into my exam room while my physician was talking to my mom and gave me the second dose of Gardasil *without* my consent, or her consent. Following the second Gardasil shot, my menstrual cycle had completely disappeared. I was eventually prescribed an estrogen pill to give me a false period after going *nine months* without a cycle. That did not help. I was then put on an oral contraceptive pill (even though I wasn't sexually active) in an attempt to 'regulate' my cycles. That came with many unexpected side effects, so I stopped that after four months of taking it.

Long story short, I was struggling with menstrual issues, loss of motor function, fainting spells, emotional toll, fatigue and more. I went from being active and healthy- to quitting all sports, losing all sense of control and balance in life, having blood drawn every other week, and feeling different than who I was 'before'. One of the hardest parts for me was visiting new doctors, never getting answers and then watching them blow my mother off when she began to question if Gardasil could have caused this. At the time, I did not understand all of the research she had done about vaccines. I did not realize there was a potential that the *very* vaccine given to me to 'protect' my reproductive health, may have destroyed it. Recently, I was diagnosed with Polycystic Ovarian Syndrome (PCOS), even though I have *none* of the risk factors for the chronic condition. Although this gave me some answers I have been desperately seeking, I have had to face a lot of emotions. Feeling damaged, broken and betrayed by my own body. By the healthcare system. By the pharmaceutical companies claiming to 'save' lives. The past six years have been a journey with my health to say the least, and I am not yet back to the health I was in prior to the vaccine. However, with education, comes empowerment. I refuse to accept the chance of infertility and diabetes simply due to a new diagnosis. I refuse to allow an injection to

affect my health for the rest of my life. Doing this research paper has opened my eyes to the plethora of information out there and has proven to me that I am *far* from alone.

Conclusion:

This vaccine has impacted so many people's lives, but not in the way it is marketed. Books have been written, documentaries have been made, and support groups have been formed to shed light on the tragedy that the HPV vaccines are for so many. While no cancer should be taken lightly, so many experts in the field have expressed that cervical cancer is not the largest concern. According to the American Cancer Society, "cervical cancer can often be found early, and sometimes even prevented entirely, by having regular pap tests. If detected early, cervical cancer is one of the **most successfully treatable cancers**" (Cervical, 2020). Some may argue that its survival rate is due to the HPV vaccines, but data shows a clear decline in death rate beginning as far back as the 1960's, with *no significant change* after the vaccines were introduced (see Appendix E). Not only is the death rate low in comparison to other cancers like lung and breast cancer, but the rate of diagnosis is also comparatively low. According to the American Cancer Society, cervical cancer incidence rates are listed 16th on the list as far as frequency (American, 2018). Yes, protection from HPV is crucial for societal health, but pap smears have provided an *effective* way to catch abnormal cell growth through routine screening. Observation of the data is *clear* that the process of acquiring HPV and recovering naturally is safer and *more* effective than vaccination. The body's immune system and routine pap smears ensure that proactive measures and front-line defenses are in place to handle HPV most of the time.

Every parent and young adult deserve ethical research, thorough clinical trials, and transparency around the risks of vaccination. Patients deserve open and honest conversations with their physicians, and the *informed* right to choose or decline vaccinations. Regrettably, in this scenario, the entire system failed. When the system fails, it falls upon each individual to inform themselves through their own research. The truth about the HPV vaccines is an ugly truth. Knowledge is power.

Works Cited

"American Cancer Society: Cancer Facts & Statistics." *American Cancer Society | Cancer Facts & Statistics*, 2018, cancerstatisticscenter.cancer.org/?_ga=2.150321206.1214933191.1587667861-1447223113.1587502260#!/.

Bernstein, Steve. *Electronic Support for Public Health–Vaccine Adverse Event Reporting System*. Harvard Pilgrim Health Care, Inc., 2011, www.nvic.org/CMSTemplates/NVIC/Pdf/FDA/ahrq-vaers-report-2011.pdf.

Biologics Evaluation and Research. "Common Ingredients in U.S. Licensed Vaccines." *U.S. Food and Drug Administration*, FDA, 2018, www.fda.gov/vaccines-blood-biologics/safety-availability-biologics/common-ingredients-us-licensed-vaccines.

CERVARIX *[Human Papillomavirus Bivalent (Types 16 and 18) Vaccine, Recombinant]*. GlaxoSmithKline Biologicals, 2009, www.fda.gov/media/78013/download

"Cervical Cancer." *American Cancer Society*, 2020, www.cancer.org/cancer/cervical-cancer.html.

Field, Scott S. "New Concerns about the Human Papillomavirus Vaccine." *American College of Pediatricians*, 17 Aug. 2018, www.acpeds.org/the-college-speaks/position-statements/health-issues/new-concerns-about-the-human-papillomavirus-vaccine.

GARDASIL®. Merck & Co., Inc., 2006, www.fda.gov/media/74350/download.

Global Advisory Committee on Vaccine Safety. *World Health Organization*, 11 June 2004, www.who.int/wer/2004/en/wer7929.pdf?ua=1.

Harald zur Hausen – Biographical. NobelPrize.org. Nobel Media AB 2020. Tue. 7 Apr 2020. https://www.nobelprize.org/prizes/medicine/2008/hausen/biographical/

Holland, Mary, et al. *The HPV Vaccine on Trial: Seeking Justice for a Generation Betrayed*.

Skyhorse Publishing, 2017.

"HPV and Pap Testing." *National Cancer Institute*, Dec. 2019, www.cancer.gov/types/cervical/pap-hpv-testing-fact-sheet.

J; Gajdová M;Jakubovsky J;Války. "Delayed Effects of Neonatal Exposure to Tween 80 on Female Reproductive Organs in Rats." *Food and Chemical Toxicology : an International Journal Published for the British Industrial Biological Research Association*, U.S. National Library of Medicine, 31 Mar. 1993, pubmed.ncbi.nlm.nih.gov/8473002/.

Kadder, Miloud. *Global Vaccine Market Features and Trends*. World Health Organization, www.who.int/influenza_vaccines_plan/resources/session_10_kaddar.pdf.

Little, Deirdre Therese, and Harvey Rodrick Grenville Ward. "Adolescent Premature Ovarian Insufficiency Following Human Papillomavirus Vaccination: A Case Series Seen in General Practice." *Journal of Investigative Medicine High Impact Case Reports*, SAGE Publications, 28 Oct. 2014, www.ncbi.nlm.nih.gov/pmc/articles/PMC4528880/#bibr38-2324709614556129.

Markowitz, et al. "Reduction in Human Papillomavirus (HPV) Prevalence Among Young Women Following HPV Vaccine Introduction in the United States, National Health and Nutrition Examination Surveys, 2003–2010." *OUP Academic*, Oxford University Press, 1 Aug. 2013, academic.oup.com/jid/article/208/3/385/2192839.

Material Safety Data Sheet Sodium Borate. LabChem Inc, 7 Jan. 2009, webs.anokaramsey.edu/chemistry/MSDS/Borax Solution.pdf.

McNeil, and Caroline. "Who Invented the VLP Cervical Cancer Vaccines?" *OUP Academic*, Oxford University Press, 5 Apr. 2006, academic.oup.com/jnci/article/98/7/433

/2522050.

Moro, Pedro (2014). "Safety of quadrivalent human papillomavirus vaccine (Gardasil) in pregnancy". *Vaccine*. **33** (4): 519–522. doi:10.1016/j.vaccine.2014.11.047. PMC 6524774. PMID 25500173.

"National Cancer Act of 1971." *National Cancer Institute*, 16 Feb. 2016, www.cancer.gov/about-nci/overview/history/national-cancer-act-1971.

"NCI Dictionary of Cancer Terms." *National Cancer Institute*, www.cancer.gov/publications/dictionaries/cancer-terms/def/adverse-effect.

Package Insert - *Gardasil 9 - Immunization Info*. www.immunizationinfo.com/wp-content/uploads/Gardasil-9-Prescribing-Information.pdf.

Palevsky, Lawrence B. "The Truth About Aluminum and Vaccine Ingredients." *National Vaccine Information Center (NVIC)*,www.nvic.org/Doctors-Corner/Lawrence-Palevsky/Aluminum-and-Vaccine-Ingredients.aspx.

"Pfizer and GlaxoSmithKline Announce Joint Venture to Create a Premier Global Consumer Healthcare Company." *Pfizer*, 19 Dec. 2018, www.pfizer.com/news/press-release/press-release-detail/pfizer_and_glaxosmithkline_announce_joint_venture_to_create_a_premier_global_consumer_healthcare_company.

Potter, Mark. "Glaxo Cervical Cancer Shot Approved in Australia." *Reuters*, Thomson Reuters, 21 May 2007, www.reuters.com/article/idUSL2149778820070521.

"Press Announcements." *FDA Approves Gardasil 9 for Prevention of Certain Cancers Caused by Five Additional Types of HPV*, FDA, 10 Dec. 2014,

web.archive.org/web/20150110233107/www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm426485.htm.

Schiller, John T, et al. "A Review of Clinical Trials of Human Papillomavirus Prophylactic Vaccines." *Vaccine*, U.S. National Library of Medicine, 20 Nov. 2012, www.ncbi.nlm.nih.gov/pmc/articles/PMC4636904/.

Schiller, John T., and Douglas R. Lowy. "Developmental History of HPV Prophylactic Vaccines." *SpringerLink*, Springer, New York, NY, 1 Jan. 2011, link.springer.com/chapter/10.1007/978-1-4419-1339-5_27.

Shon, Nathaniel N. "Aluminum Hydroxide." *StatPearls [Internet].*, U.S. National Library of Medicine, 20 Feb. 2020, www.ncbi.nlm.nih.gov/books/NBK546669/.

"STD Facts - Human Papillomavirus (HPV)." *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, 20 Aug. 2019, www.cdc.gov/std/hpv/stdfact-hpv.htm.

Tomljenovic, Lucija, and Christopher A Shaw. *Too Fast or Not Too Fast: The FDA's Approval of Merck's HPV Vaccine Gardasil*. Journal of Law, Medicine & Ethics, 2012, katlynfoxfoundation.com/wp-content/uploads/2013/10/2012-Tomljenovic-LT-Shaw-CA-FDAs-Approval-of-Mercks-Gardasil-JLaw-Med-Ethics-LTShaw-2012.pdf.

"U.S. Census Bureau QuickFacts: United States." *Census Bureau QuickFacts*, 2019, www.census.gov/quickfacts/fact/table/US/PST045219.

"VAERS Search Results." *Search Results from the VAERS Database*, medalerts.org/vaersdb/findfield.php.

White, Mark Donald. "Pros, Cons, and Ethics of HPV Vaccine in Teens-Why Such Controversy?" *Translational Andrology and Urology*, AME Publishing Company, Dec.

2014, www.ncbi.nlm.nih.gov/pmc/articles/PMC4708146/.

"Vaccine Adverse Event Reporting System." *Vaccine Adverse Event Reporting System | Healthy People 2020*, www.healthypeople.gov/2020/data-source/vaccine-adverse-event-reporting-system.

"Vaccine Ingredients," The Immunisation Advisory Centre (New Zealand), August 2017, http://www.immune.org.nz/sites/default/files/resources/Written%20Reources/ConcernVaccineIngredients20170825V01Final.pdf

"Vaccines and Related Biological Products Advisory Committee Meeting." Merck Research Laboratories, 18 May 2006, wayback.archive-it.org/7993/20170405062320/www.fda.gov/ohrms/dockets/ac/06/slides/2006-4222S-1_files/frame.htm.

Appendix A

Gardasil Injection-Site Adverse Reactions for Females

Table 1: Injection-Site Adverse Reactions in Girls and Women 9 Through 26 Years of Age*

Adverse Reaction (1 to 5 Days Postvaccination)	**GARDASIL** (N = 5088) %	**AAHS Control†** (N = 3470) %	**Saline Placebo** (N = 320) %
Injection Site			
Pain	83.9	75.4	48.6
Swelling	25.4	15.8	7.3
Erythema	24.7	18.4	12.1
Pruritus	3.2	2.8	0.6
Bruising	2.8	3.2	1.6

*The injection-site adverse reactions that were observed among recipients of GARDASIL were at a frequency of at least 1.0% and also at a greater frequency than that observed among AAHS control or saline placebo recipients.
†AAHS Control = Amorphous Aluminum Hydroxyphosphate Sulfate

Gardasil Injection-Site Adverse Reactions for Males

Table 2: Injection-Site Adverse Reactions in Boys and Men 9 Through 26 Years of Age*

Adverse Reaction (1 to 5 Days Postvaccination)	**GARDASIL** (N = 3093) %	**AAHS Control†** (N = 2029) %	**Saline Placebo** (N = 274) %
Injection Site			
Pain	61.4	50.8	41.6
Erythema	16.7	14.1	14.5
Swelling	13.9	9.6	8.2
Hematoma	1.0	0.3	3.3

Appendix B

Gardasil Systemic Autoimmune Disorder for Females

Table 9: Summary of Girls and Women 9 Through 26 Years of Age Who Reported an Incident Condition Potentially Indicative of a Systemic Autoimmune Disorder After Enrollment in Clinical Trials of GARDASIL, Regardless of Causality

Conditions	GARDASIL (N = 10,706)	AAHS Control* or Saline Placebo (N = 9412)
	n (%)	n (%)
Arthralgia/Arthritis/Arthropathy[†]	120 (1.1)	98 (1.0)
Autoimmune Thyroiditis	4 (0.0)	1 (0.0)
Celiac Disease	10 (0.1)	6 (0.1)
Diabetes Mellitus Insulin-dependent	2 (0.0)	2 (0.0)
Erythema Nodosum	2 (0.0)	4 (0.0)
Hyperthyroidism[‡]	27 (0.3)	21 (0.2)
Hypothyroidism[§]	35 (0.3)	38 (0.4)
Inflammatory Bowel Disease[¶]	7 (0.1)	10 (0.1)
Multiple Sclerosis	2 (0.0)	4 (0.0)
Nephritis[#]	2 (0.0)	5 (0.1)
Optic Neuritis	2 (0.0)	0 (0.0)
Pigmentation Disorder[Þ]	4 (0.0)	3 (0.0)
Psoriasis[ß]	13 (0.1)	15 (0.2)
Raynaud's Phenomenon	3 (0.0)	4 (0.0)
Rheumatoid Arthritis[à]	6 (0.1)	2 (0.0)
Scleroderma/Morphea	2 (0.0)	1 (0.0)
Stevens-Johnson Syndrome	1 (0.0)	0 (0.0)
Systemic Lupus Erythematosus	1 (0.0)	3 (0.0)
Uveitis	3 (0.0)	1 (0.0)
All Conditions	245 (2.3)	218 (2.3)

*AAHS Control = Amorphous Aluminum Hydroxyphosphate Sulfate
[†]Arthralgia/Arthritis/Arthropathy includes the following terms: Arthralgia, Arthritis, Arthritis reactive, and Arthropathy
[‡]Hyperthyroidism includes the following terms: Basedow's disease, Goiter, Toxic nodular goiter, and Hyperthyroidism
[§]Hypothyroidism includes the following terms: Hypothyroidism and thyroiditis
[¶]Inflammatory bowel disease includes the following terms: Colitis ulcerative, Crohn's disease, and Inflammatory bowel disease
[#]Nephritis includes the following terms: Nephritis, Glomerulonephritis minimal lesion, Glomerulonephritis proliferative
[Þ]Pigmentation disorder includes the following terms: Pigmentation disorder, Skin depigmentation, and Vitiligo
[ß]Psoriasis includes the following terms: Psoriasis, Pustular psoriasis, and Psoriatic arthropathy
[à]Rheumatoid arthritis includes juvenile rheumatoid arthritis. One woman counted in the rheumatoid arthritis group reported rheumatoid arthritis as an adverse experience at Day 130.
N = Number of individuals enrolled
n = Number of individuals with specific new Medical Conditions
NOTE: Although an individual may have had two or more new Medical Conditions, the individual is counted only once within a category. The same individual may appear in different categories.

Appendix C

Cervarix Rates of Adverse Effects in Females

Table 3. Rates of Unsolicited Adverse Events in Females 9 through 25 Years of Age within 30 Days of Vaccination (≥1% For CERVARIX and Greater than HAV 720, HAV 360, or $Al(OH)_3$ Control) (Total Vaccinated Cohort[a])

	CERVARIX %	HAV 720[b] %	HAV 360[c] %	$Al(OH)_3$ Control[d] %
	N = 6,893	N = 3,186	N = 1,032	N = 581
Headache	5.2	7.6	3.3	9.3
Nasopharyngitis	3.7	3.4	5.9	3.3
Influenza	3.1	5.6	1.3	1.9
Pharyngolaryngeal pain	2.9	2.7	2.2	2.2
Dizziness	2.2	2.6	1.5	3.1
Upper respiratory infection	2.0	1.3	6.7	1.5
Chlamydia infection	1.9	4.4	0.0	0.0
Dysmenorrhea	1.9	2.3	1.9	4.0
Pharyngitis	1.4	1.8	2.2	0.5
Injection site bruising	1.4	1.8	0.7	1.5
Vaginal infection	1.3	2.2	0.1	0.9
Injection site pruritus	1.3	0.5	0.6	0.2
Back pain	1.1	1.3	0.7	3.1
Urinary tract infection	1.0	1.4	0.3	1.2

[a] Total vaccinated cohort included subjects with at least one dose administered (N).

[b] HAV 720 = Hepatitis A Vaccine control group [720 EL.U. of antigen and 500 mcg $Al(OH)_3$].

[c] HAV 360 = Hepatitis A Vaccine control group [360 EL.U. of antigen and 250 mcg of $Al(OH)_3$].

[d] $Al(OH)_3$ Control = Control containing 500 mcg $Al(OH)_3$.

Appendix D

Cervarix New Onset Autoimmune Disease throughout Follow-up Period in Females

Table 4. Incidence of New Medical Conditions Indicative of Potential New Onset Autoimmune Disease and New Onset Autoimmune Disease throughout the Follow-up Period Regardless of Causality in Females 9 through 25 Years of Age (Total Vaccinated Cohort[a])

	CERVARIX N = 12,772	Pooled Control Group[b] N = 10,730
	n (%)[c]	n (%)[c]
Total Number of Subjects with at Least One Medical Condition	96 (0.8)	87 (0.8)
Arthritis[d]	9 (0.1)	4 (0.0)
Celiac disease	2 (0.0)	5 (0.0)
Dermatomyositis	0 (0.0)	1 (0.0)
Diabetes mellitus insulin-dependent (Type 1 or unspecified)	5 (0.0)	5 (0.0)
Erythema nodosum	3 (0.0)	0 (0.0)
Hyperthyroidism[e]	15 (0.1)	15 (0.1)
Hypothyroidism[f]	30 (0.2)	28 (0.3)
Inflammatory bowel disease[g]	8 (0.1)	4 (0.0)
Multiple sclerosis	4 (0.0)	1 (0.0)
Myelitis transverse	1 (0.0)	0 (0.0)
Optic neuritis/Optic neuritis retrobulbar	3 (0.0)	1 (0.0)
Psoriasis[h]	8 (0.1)	11 (0.1)
Raynaud's phenomenon	0 (0.0)	1 (0.0)
Rheumatoid arthritis	4 (0.0)	3 (0.0)
Systemic lupus erythematosus[i]	2 (0.0)	3 (0.0)
Thrombocytopenia[j]	1 (0.0)	1 (0.0)
Vasculitis[k]	1 (0.0)	3 (0.0)
Vitiligo	2 (0.0)	2 (0.0)

[a] Total vaccinated cohort included subjects with at least one documented dose (N).

[b] Pooled Control Group = Hepatitis A Vaccine control group [720 EL.U. of antigen and 500 mcg $Al(OH)_3$], Hepatitis A Vaccine control group [360 EL.U. of antigen and 250 mcg of $Al(OH)_3$], and a control containing 500 mcg $Al(OH)_3$.

[c] n (%): Number and percentage of subjects with medical condition.

[d] Term includes reactive arthritis and arthritis.

[e] Term includes Basedow's disease, goiter, and hyperthyroidism.

[f] Term includes thyroiditis, autoimmune thyroiditis, and hypothyroidism.

[g] Term includes colitis ulcerative, Crohn's disease, proctitis ulcerative, and inflammatory bowel disease.

[h] Term includes psoriatic arthropathy, nail psoriasis, guttate psoriasis, and psoriasis.

[i] Term includes systemic lupus erythematosus and cutaneous lupus erythematosus.

Appendix E

American Cancer Society Death Rate Graph for Females