On Immunity Study Guide

On Immunity by Eula Biss

BOOKRAGS

Contents

Summary

That being a new mother is the most challenging and difficult transition that a woman will ever make is underscored in On Immunity by Eula Biss. The author is the daughter of a physician father and poet mother. The legacy she gains from the two disciplines is obvious throughout the work. As a child she was exposed to the story of Achilles, a metaphor that her father used to drive home the importance of immunity and the dangers of not being fully protected by vaccination. Her literary heritage directly from her mother is obvious in the metaphoric examples that are replete throughout the book and her somewhat lyrical approach to the world of science.

Having the benefit of her oncologist father's wisdom and experience, Eula understood the topic of immunology at a higher level than most of her peers. She understood that germs and bacteria that largely held no danger were literally everywhere. And Eula also understood that there were good and bad germs. The topic of bad germs is known to everyone and needed no explanation. But good germs were those upon which natural immunities were structured in the body and in some cases taught immune systems how to be most effective.

But her wealth of knowledge from her father and her ability to think in the abstract that she gained from her artistic mother were not enough when she herself became a new mother. She may have suffered from a bit of postpartum depression because her obsession as described to keep her son safe and healthy went beyond most expected and normal levels.

Eula Biss dug into the pass to learn the history of inoculations and vaccines. She found that reactions to the vaccination process even centuries before were viewed in diverse ways by the parents of young children. There was always fear of injecting a foreign substance into a child's body. The process of variolation was created hundreds of years ago in Africa. The process involved the injection of a miniscule amount of tissue from a diseased person into the body of a healthy child or person. Amazingly, this concept has been proven beneficial and is the fundamental of advanced inoculation processes in today's world.

As a young adult Eula witnessed the bigotry and panic that resulted from the AIDS epidemic. As a young mother, she dealt with the strong opinions of anti-vaccination activists who believed that vaccinations, especially the MMR inoculation, was responsible for inflicting children with disease, in particular autism. The debate still rages. Many activists are parents of autistic children who cannot accept that it was nature that betrayed them; it is more satisfying to blame their child's affliction on manmade solutions.

Bottom line, the influence that science had on Eula's mindset led her to make sure that her son had the advantage of every recommended vaccination. The artistic side of Eula Biss understood and sympathized how others felt and left an opening for new evidence that peril exists in the inoculation process.

Chapters 1 through 6

Summary

The first story author Eula Biss ever heard about immunity was from her physician father. He told her the tale of Achilles who was a strong warrior but had a weak heel. To prepare her for the dangers in life, her mother read Eula and her siblings bedtime stories from Grimm's Fairytales. Eula remembered the magic more than the violence and brutality. As she matured, her mother read her tales from Greek mythology. Her father told her about a hero who was made immune to injury by being bathed in blood. A leaf that had adhered to his skin left a tiny spot unprotected which later led to his death in battle by a fatal blow to that spot. The point of this tale and that of Achilles was that no one is ever fully immune to disease. When her son was born, Eula and her husband were almost ready to deal with the devil to keep him safe from injury and disease.

When Eula's son was an infant, she was obsessed with his health and care and how much he ate and slept. She heard the news that a dangerous influenza was spreading into the U.S. from Mexico. She would do everything in her power to protect her baby but knew that she did not have complete power over his health and safety. By the time she paid attention, the disease from Mexico had become a pandemic. News clips showed people wearing surgical masks and sterilizing high touch areas. She did not feel that the pandemic was a threat to her baby son.

At the time, Eula was unsure how she felt about inoculations for babies in general. There was debate among young mothers about the influenza inoculation for their babies. There was anecdotal evidence both pro and con. The Center for Disease Control proclaimed that the virus was a danger to some and nearly harmless to others. According to an article in the New Yorker millions had died from the flu and was one of the top causes of death.

There was a growing general mistrust of government, authority and institutions and two wars that seemed to benefit only the military industrial complex. The economic collapse was financially destroying millions. Eula decided to have her son inoculated against the flu but was placed on a month's long waiting list for the vaccine. The debate over the safety of the vaccine had not died down. There were rumors that a dangerous substance called "squalene" was contained in the vaccine. Others said that squalene was just in the European version of the vaccine, not the American one.

A vaccination is intrusive. It breaks the skin and sends a foreign substance into our bodies. Presidential candidates of 2008 Michele Bachmann and Rick Santorum were against young girls being forced by the government to be inoculated with the vaccine against human papilloma virus. The vaccine was administered in an effort to reduce the spread of sexually transmitted diseases.

Throughout the nineteenth century vaccinations left scars that were sometimes referred to as the devil's mark or the "mark of the beast." In sermons a vaccination was likened to the injection of sin. Connections were made in ancient lore between vaccines and vampires. The novel Dracula was terrifying because his "disease" was contagious. While there is no longer fear that vaccinations will leave marks, there is concern that they could cause debilitating disease, most particularly autism. Other conditions that result from immune dysfunction including diabetes and asthma are also feared to be connected to inoculations. There is concern that multiple vaccines administered together will weaken the immune system and thus lead to some of these diseases.

Activist Jenny McCarthy has spread the concern that vaccines contain dangerous elements like mercury or ethylene glycol (antifreeze) that are actually poisons if ingested or injected. Neither is found in any vaccines. Only one of Eula's son's vaccines was administered late according to the standard schedule – the Hep B inoculation. She was initially advised not to get the Hep B inoculation because it was designed for inner city kids. However, due to widespread Hep B vaccinations, the infection rate declined leading to the recommendation that babies be vaccinated against Hep B.

The last national epidemic of smallpox occurred in 1898. It was believed by some at the time that only blacks and Hispanics were susceptible to the disease. Debates over vaccinations cast shadows on science and research. There were forced vaccinations in Britain in 1853 and in parts of the U.S. during the 1898 smallpox epidemic. Those who resisted vaccination were often afraid of the impact that the vaccine would have on their bodies which they considered exceptionally vulnerable to contamination. While children are considered highly vulnerable in contracting disease, they also spread disease. Unvaccinated children are most likely to be white with an older well-educated mother and live a middle or upper-middle class home. Under-vaccinated children are most likely black, have an uneducated mother and live in poverty. The vaccination of white children in wealthy and upper-middle class children will make the under-vaccinated black children less vulnerable.

Eula's son learned in pre-school that germs were tiny and very dirty and that they made people sick. While it's true that germs cause people to fall ill they also play a positive role. Without exposure to germs a child's immune system cannot properly develop. The "hygiene hypothesis" refers to being too clean and too free of disease.

Viruses fall into a subgroup of "germs." There is a profusion of viruses within our world. There are literally millions of viruses in a teaspoon of water which is evidence that the vast majority is not harmful. One virus – the variola virus that caused smallpox – has been made extinct through comprehensive vaccination. But viruses are constantly morphing and reinventing themselves. Viruses are not alive and do not reproduce until they enter a host body. Viruses become permanent parts of human physiology as evidenced by the ancient viral debris that is found in the human genome.

Analysis

Eula describes the stories her father, a physician, told her about Achilles and other literary figures that were part of her childhood and that focused on immunity. When she became a young mother, she had a natural interest in her child's health and safety which included the issue of childhood vaccinations.

There was a great debate about the safety of childhood vaccinations that was on-going and which has never had resolution. There were feelings that the many vaccinations and boosters were not necessary especially in a relatively short period of time. The biggest fear was that the vaccinations, especially the MMR inoculation, caused autism. Those fears largely originated from parents whose children were later diagnosed with autism.

Eula dug in and did vast research about inoculations over the centuries. She learned that there had never been consensus about vaccinations. There were always voices that were anti-vaccine feeling that they presented a risk to their children and other who thought they were excessive.

Eula also describes the long record of success that vaccinations have enjoyed. The last national epidemic of smallpox occurred in 1898. The disease has virtually been eliminated in this country due to the widespread use of the smallpox vaccine. Most experts agree that those parents who decide to not have their children vaccinated place the community at large at risk in addition to their children.

Vocabulary

ominous, vulnerability, prophecy, decipher, influenza, inconsolably, pandemic, emblematic, treatise, promiscuity, dregs, bourgeois, daunting, eschew, matriarchal, labyrinth, retrospect, carcinogen, archaic, pathogens, genome, placenta

Chapters 7 through 12

Summary

The issuance of the flu warnings by the CDC during Eula son's first year resulted in a proliferation of antibacterial soap and sanitary wipes. She didn't fully get on the bandwagon because her father had taught her about the good side of germs. Triclosan was one of those "good-bad" germs. Measles can naturally lead to incidents of encephalitis. Without vaccination, one in every one thousand cases of measles results in encephalitis. The number of cases that result in groups of vaccinated subjects is so miniscule that it is impossible to definitely connect it to the vaccination.

A committee of medical experts formed in 2011 reviewed 12,000 vaccinations cases for the Institute of Medicine and were unable to link the MMR inoculation to autism. Despite this report and other evidence, people - especially those with autistic children - refuse to believe these conclusions and cling to their belief that the MMR inoculation caused their child's condition.

Alternative medicine has many advocates and focuses on cleansing instead of cure. Allowing children to contract a disease "naturally" is appealing to those who believe that vaccines are more dangerous and "unnatural." Vaccines exist in the hinterland between nature and man. The "cure" from a vaccine is ultimately natural in that the antibodies from which immunity is spawned are created by the body, not by the vaccine; the vaccine merely sparks their development. A vaccine does not infect the patient with disease nor does it produce it. Germs and viruses are everywhere. Everyone is probably infected with disease most of the time but the diseases are weak and warded off by healthy immune systems.

The influx of Europeans beginning with Christopher Columbus in 1492 brought viruses to the New World. Prior to their arrival, there was no viruses that caused smallpox, influenza, or hepatitis and there were no bacteria that caused other diseases such as diphtheria, cholera and typhus. The first swine flu epidemic in the New World occurred in 1493. Within the next two centuries, 75% of Native Americans perished from disease brought to them by the Europeans. While the purity of the America before 1492 can never be fully restored, effective vaccinations is a method that will restore it at least in part. Rachel Carson's book, Silent Spring, brought attention to the dangerous herbicides and pesticides that were been dispersed in the environment. Her book led to the banning of DDT and the establishment of the EPA.

Vaccinations are not an advancement of modern man. In 1774, during a smallpox epidemic in Great Britain, a farmer used a darning needle to inject the pus from a cow infected with cowpox into his wife's and son's arms. The woman fell ill and recovered later but the boys only had a mild reaction. The boys were exposed to smallpox many times over their lives but never contracted it. Country doctor Edward Jenner

experimented with similar “vaccinations” and concluded that the process worked in that it kept people from contracting smallpox but he didn’t know why it worked.

The process of variolation in which a person was intentionally infected with a mild case of small pox was brought to America from Africa in the early eighteenth century. Small children had been routinely infected with small pox in Africa for years. A Boston doctor experimented with variolation during a small pox outbreak in 1721. He inoculated more than 100 people with good results. Many more died from the epidemic who did not receive the vaccine than those who were inoculated. The inoculation process was introduced in England around the same time with similar results. The princess of Wales had the variolation process tested out on prisoners who were scheduled for execution. The prisoners lived and were freed for their role in advancing the process. The princess inoculated her seven children. Voltaire believed that had France taken up the practice when England did, some 20,000 people would have survived the 1723 epidemic.

The behavior of the immune system is often described in terms of “communication” and “interpretation.” Some immunologists theorized that cells might use a system of signs and symbols to communicate. A group of immunologists turned to Umberto Eco’s A Theory of Semiotics, the study of how signs and symbols are used and interpreted, in hopes of enhancing their work in immunology. Their focus was on how the body, not the mind, works in interpreting symbols. Immunologists use words that humanize cells by using such terms as memory, individuality and self. Atoms and cells, of course, have none of these characterizations and cannot read or interpret signs or symbols.

Some immunologists uses the metaphor of war to describe the functioning of the immune system. Some dislike the connotation that is associated with such a comparison. According to anthropologist Emily Martin it natural to compare the functionality of the immune system to war since it “fights” against disease. Others preferred to the imagery of the ebb and flow of the tide rather than using militaristic terms. Many scientists preferred to view that the immune system was seeking the body’s harmony and balance. The term “immune system” was coined in 1967 by immunologist Niels Jerne in order to bring together immunologists who focused on “specialized cells” versus those whose focus was on antibodies. The immune system is highly complex; it begins at the skin level and involves many bodily systems including the circulatory, digestive, respiratory, and urogenital systems.

Analysis

Eula provides the most conclusive evidence that the MMR inoculation that is so suspect in the anti-vaccination movement is not dangerous. She cites an extensive review of 12,000 cases for the Institute of Medicine. To underscore the lack of bias, Eula points out the diverse group of medical experts and scientists who conducted the review. Although Eula puts forth no definitive conclusion herself, by including this large study that took more than two years she is tipping the scale in favor of the inoculation having far more benefit than it does risk.

Anyone who was a new mother at one time can understand the near obsession that Eula had over the care of her child. Having a father who was a physician and who she often tapped for information, she was in a position to have a bit more knowledge behind the decisions she made concerning the care of her baby. Most lay people see the air as clear and pure; Eula new that viruses and bacteria – mostly harmless – were literally everywhere. Her father had taught her the important lesson that there are good and bad germs and the importance of a well-functioning immune system.

As a testament to the hard work she did to find answers and solutions, she provides the history of the Americas and how it was free of serious disease until the Europeans invaded. She cites Rachel Carson's book and its influence in the banning of dangerous pesticides and herbicides like DDT and in the establishment of the Environmental Protective Agency which adds another layer of protection over and above healthy behavior which includes following the recommended vaccine retinue.

Vocabulary

proliferation, heretic, antimicrobial, encephalitis, autism, luminal, ambiguous, immunologist, intrepid, variolation, pathogens, gastronomic, stridor, triage, archaic

Chapters 13 through 18

Summary

Eula provided a brief summary of the history of vaccines and inoculations and the often bizarre reactions to the methodologies as well as to their operatives. Modern mothers like Eula don't worry about clean water but do have concern with the toxins that are sprayed in public parks and other recreational areas where they take their kids. There are also toxins in everyday products like shampoos and even corn syrup. A woman in Baltimore blamed the leukemia that her infant son contracted on pollutants in the vaccines that he was inoculated with.

While there are man-made toxins, most are produced in the body. Pertussis toxin can cause whooping cough to linger long after the bacteria have been destroyed. A toxoid is an element that through a process is no longer toxic. Confusion about the safety of vaccines could be due in part because they are sometimes referred to as toxoids. The quest for bodily purity, an impossible goal to achieve, led to the eugenics movement that called for the sterilization of women who were blind, black or poor. A baby is polluted at birth. The purpose of the many chemicals found in the umbilical cord is unknown but causes the impurity of newborn babies.

Eula had a difficult time after the birth of her son. She suffered from postpartum depression, experiencing unnatural fears and bizarre thoughts and images that flashed through her mind. She was obsessed with vampires that had become prominent in pop culture although she didn't read the books or see the movies. She suffered from a serious after-birth condition that required emergency surgery and a blood transfusion. During recovering she had IVs injecting her with antibiotics to prevent after-surgery infection. Eula realized she had acquired a new fear -- the fear of death. She compared her experience in the hospital – the birth and then the surgery – with metaphors that were political in nature: invasion, occupation and even colonization. She came to recognize that what she liked about modern vampires was that their quest was not for blood it was for power over their own body.

Eula's father had a scar on his arm from a smallpox vaccination. The vaccine had completely eradicated the disease. The last known case of smallpox occurred in 1977. The last remnants of the virus exist in test tubes in Russia and the U.S. These stores have not been destroyed. The U.S. wanted more time to develop a superior vaccine. The virus is no longer an active disease but these stores could be used as weapons. There are many unknowns about smallpox most particularly why it was such a virulent disease. If it should happen to resurrect itself, it would be wise to have an advanced way of stopping its reemergence. The study of the disease was ramped up after the terrorist attacks of 9/11 when there was fear of the virus being used as a weapon. The new study revealed that the vaccine was unacceptable in modern standards. Vaccinations have proven to be largely beneficial. The smallpox vaccination caused death in only one in a million. In prior years there were few who questioned the value

and safety of vaccinations. Many parents happily volunteered the Salk vaccine that was developed to eradicate polio. These parents were eager to protect their kids.

In 2012, the Taliban leader in North Pakistan banned the vaccination campaigns until the U.S. stopped drone strikes fearing that the campaigns were used as Trojan horses to gain access to their territory. The U.S. gave the Taliban reason to believe in the conspiracy theory because the CIA had used a vaccination campaign as a ploy in its quest to hunt down Bin Laden. Conflicts between the Taliban and vaccine campaign workers ended in violence and tragedy. During the time that Pakistan suspended the polio vaccine program, it had spread to Egypt, Gaza and Israel.

A global treaty banning and controlling mercury was agreed to in 2013. It was named the Minamata Treaty due to a recent outbreak of mercury poisoning in Minamata, Japan. The AAP recommended that thimerosal be temporarily banned while more study was taking place. But the element had been used since the 1930s and there was never any evidence that it presented a danger. The AAP issued their final conclusion in 2012. It has found no link between the vaccines and mercury poisoning. It is estimated that in the 120 countries that use vaccines containing thimersol some 1.4 million lives are saved. The AAP would not have suspended its use if thorough research had been available at the time. Despite the effectiveness of the vaccines, there is still debate about the use of thimersol.

After the economic collapse, many families were hurting feeling as though a vampire had sucked the life not only out of their personal finances but also out of capitalism. When the 2009 H1N1 pandemic ended with far fewer victims than predicted, there were accusations by the health committee of the Council of Europe that the WHO had conspired with pharmaceutical companies in creating a false pandemic in order to profit from the sale of H1N1 vaccines. An independent investigation revealed no such conspiracy. The report revealed that WHO was preparing for an H5N1 outbreak, an especially virulent strain of the H1N1 virus.

The suspicion that the World Health Organization was tempted by profit over saving lives indicated just how deeply the concept of capitalism had been entrenched into the global psyche. There is more than sufficient evidence to make a person believe that his livelihood and health are secondary to corporate profits. Refusing the concept of vaccination damages a system that is not typical of capitalism. Vaccines are products made under the umbrella of capitalism but are contrary to its fundamentals. In a capitalistic society, there is little requirement to justify the cost and inherent risks in war while measures to protect the health and safety of a society’s most vulnerable require complex justifications. In a capitalistic society, it is logical to believe that the ultimate focus of vaccine developers is the bottom line. There was widespread speculation that the HIV virus was a creation of the U.S. military to kill enemy noncombatants.

Analysis

Eula describes the worries about new mothers in today's world. Of course, some new mothers in developing countries have to worry about water sources, in America that is largely in the past. The recent lead poisoning of the water source for Flint, Michigan, is an exception to that standard. This occurrence was a manmade disaster. To save money, the state and city government decided to change water sources for drinking, cooking and bathing without taking the necessary steps to ensure that the water is safe. But mothers in the U.S. and other first world nations do have concerns about the pesticides and herbicides sprayed in parks and play areas. They also have concerns about the chemicals that are contained in food and personal and household products.

Eula discusses the stores of smallpox virus that still exist in test tubes in Russia and in the U.S. There have been discussions to destroy those stores but coming to agreement was difficult. The U.S. wanted to experiment with the virus to develop a vaccine superior to the commonly used one. Neither nation will dispose of the virus unilaterally because the other nation that possesses the very last remnant of the virus could be use it against the other nation in biological warfare. The U.S. and Russia both having a test tube of the virus creates a king of fail-safe status.

The CIA used a fake vaccination campaign in Afghanistan and Pakistan as a ploy, a sort of Trojan horse, to gain access to interior elements of the nations. Some individuals and groups have accused the World Health Organization of conspiring with pharmaceutical companies to create false pandemics for profit. Eula attributes this distrust to the capitalism that we live under that exists purely for profit.

Vocabulary

empirical, commodify, toxicology, coalesce, eugenics, ominous, mundane, eradication, virulent, endemic, equanimity

Chapters 19 through 24

Summary

There has been a noticeable loss of paternalism among medical practitioners. Part of that loss is due to changes in societal mores but part is due to the vanishing of bedside manner. Eula experienced distrust in the anesthesiologist assigned to her son's surgery for the removal of his adenoids. He was cold and distant and didn't want Eula to stay with her son while was being put under. Her son recovered well but it would be a long time before Eula would forget the treatment she received from one of his doctors; it was totally lacking in paternalism.

Eula was interested in a blood cord bank for her infant son. Storing the cord could be helpful for the baby later in life if he developed certain diseases. She read about the process in an article by Robert Sears who wrote The Vaccine Book, a comprehensive study of the issue that provides arguments on both sides and alternative schedules to standard ones. The protracted schedule according to Sears was the best of both worlds – preventative and safe. She did not agree with his opinions about diseases that babies were not likely to contract. He was not definitive about whether vaccines caused autism. He does not make the distinction that a child who experiences a high fever seizure after an inoculation probably experiences the same seizures from a high fever caused by an infection.

A young patient of Sears' returned from a trip abroad with measles. The baby infected eleven other young children. The parents had decided against inoculation. Most pediatricians will not treat an unvaccinated child because it can infect other patients in their waiting rooms. He recognizes that the vaccination process makes not only the individual safe but the entire nation as well. Sears also acknowledges that without vaccinations diseases like polio would return.

Going back to other generations in her family, Eula learned that babies, toddlers and teenagers had died of infectious disease. Her father had been vaccinated against five childhood diseases; she had been vaccinated against seven; and, her son had been vaccinated against fourteen. One slogan of the anti-vaccine activists was "too many, too soon," a sentiment that could be applied to many other areas of modern society. The smallpox vaccine that her father was inoculated with as a child contained far more immunizing proteins than current vaccines and presented a greater challenge to the child's immune system than the twenty-six vaccines administered in fourteen inoculations today. The proteins in vaccines are what stimulate the immune system.

Experts point out that nature's bacteria and viruses that a newborn fights off on a daily basis are far more virulent than the relatively weak antigens found in vaccines. Paul Offit a pediatrician who has been an outspoken proponent of vaccines has been accused of being a vaccine profiteer, has received death threats and has been compared to the devil. In his book Autism's False Prophets, Offit has laid out a detailed

account of the evidence disproving a link between vaccines and autism. As a young intern, he became a believer when he watched an infant die of rotovirus. He joined the research team that was working toward finding a rotovirus vaccine. At the time over 70,000 children were hospitalized in the U.S. from the virus; worldwide 600,000 children were dying in developing nations. The team worked more than 25 years before the vaccine was developed, tested and found to be safe and effective. Merck Pharmaceutical expended $350 million for the first trial run. Generally speaking, vaccines take many years to develop and perfect and generate only modest profits. Some companies opt out of vaccine production because there is more profit from producing other medicines.

Eula was surprised when she learned at her son's one-year checkup that he would need a chicken pox vaccination. Eula thought it was excessive since it wasn't a deadly disease. The term "conscientious objector" originally referred to an individual who rejected vaccination. Those who opted to not have their children inoculated preferred to be called conscientious objectors because it was a step up from "negligent parents." The phrase "clear and present danger" has been used to defend mandatory vaccination during epidemics. Great Britain's Compulsory Vaccination Act of 1853 called for the vaccination of all infants but was widely unpopular and resisted by many. Since what is contained in the human conscience is not provable, being a conscientious objector was difficult to defend or prosecute.

George Washington had survived smallpox as a child. He struggled with whether to require his soldiers to be inoculated. In 1775, a third of the Continental Army fell ill from smallpox causing the army to retreat. The British soldiers held up better because most of them had immunities from having survived childhood smallpox. Washington was convinced that inoculation was essential when he learned that the British planned to use smallpox in biological warfare.

Early legal challengers of inoculations has resulted in the decline of forced vaccinations. In Jacobson v. Massachusetts in 1905, the Supreme Court defended the petitioner's right to refuse inoculation. The case has subsequently been used in defense of warrantless searches and the arrest of American citizens. The U.S. has never had a federal mandatory vaccination law although some states have. The term "immunity" was not originally connected to vaccine inoculations; it was used in reference to those who were excluded from adhering to laws. Morality has been a part of the inoculation debate since it first began.

The number of unvaccinated children that will tip the scale of herd immunity is only known when it has been surpassed. Playing with this number can fall in the category of "moral hazard" a reference to unwise and/or unnecessary risk. Is it moral to exempt one's child from inoculation figuring that enough children around him have been inoculated and will protect him?

While the human being is independent, his body is part of a larger body which is comprised of many bodies making up a village or a community. Man is both independent and dependent and has a responsibility to that larger body. A vaccine can

create a body politic that has a system of immunity that protects them all. All analyses conclude that vaccination benefits both the body and the body politic. There is a natural resistance to inoculation in that the individual wants to rule his body.

Analysis

Physicians have changed over the years just as the treatment and advice they give. Paternalism is a casualty in modern medicine which is partly due to the insular walls that doctors sometimes build around themselves in fear of malpractice suits or complaints to medical boards that in previous years were not even given a thought. But the patient has become more educated, more opinionated about his treatment and more suspicious. Doctors will sometimes provide tests that he feels aren't necessary but a patient has read up on the exam and wants to have it. Having unnecessary tests drive up medical and insurance costs. Patients have become more aggressive and in the yin and yang of the world, doctors have become more passive.

Due to the AIDS scare, private individuals began to store pints of their own blood in case a surgery was necessary or there was a loss of blood from an accident. Eula looked into a blood cord bank for her son in case he needed a transfusion in later years. Eula had gained enough knowledge that she was able to challenge conclusions made by pediatrician Robert Sears who noted that a child can have a high fever seizure after a vaccination. What he failed to state was that same child probably had a high fever seizure after any illness he had because he was prone to do so.

Eula is convinced about the value of vaccinations when she looks back several generations in her own family to learn that a number of babies, toddlers and teens had died from infectious disease. Celebrated pediatrician Paul Offit laid out the case disproving any link between vaccination and autism. He received death threats and was referred to as the Devil for his trouble.

Vocabulary

aternalism, autonomy, anomaly, lymphatic, equivocal, proliferation, virulent, manifest, elixir, mandatory, rhetorical, altruism, metaphoric

Chapters 25 through 30

Summary

In the spring following the H1N1 epidemic when Eula's son was one-year-old, the Deepwater Horizon oil rig exploded killing eleven workers and ultimately spilling 210 million gallons of oil into the Gulf of Mexico. Among the young mothers that Eula socialized with the gargantuan assault against the environment symbolized how little anyone had control over anything and especially how little control mothers had over the health and well-being of their children.

The body's employment of strategies to avoid causing damage to itself in immunology is called "regulation" and is a function of the immune system. Vaccines became one of the most heavily regulated products produced in the nation and is overseen by the CDC and FDA. The immune system is designed to stand-up to these invisible dangers. The term "immune system" connotes a complex and highly functioning regulatory mechanism. While it is powerful, it still is dependent on the efficacy of other systems and the community and environment around it. The body politic is an overarching system that creates interdependency.

Everyone is born to be well and to be sick. We all want to live in the world of the well and want to claim the identity of being healthy. The AIDS epidemic was in full swing when Eula was in high school. The students were taught that by being careful they could avoid disease. Innocent children receiving blood transfusions were victims. It was inferred that others who were infected were not so innocent. The epidemic had an impact on vaccinations since one of the ways the AIDS virus was passed to innocents was through inoculation. The concept of the immune system being overwhelmed originated with the AIDS epidemic. There were fears that blood and human cells wound up as debris in vaccines. Boosting one's immune system with supplements became an obsession. Despite the strength of one's immune system, however, one can still spread disease. Those with robust immune systems who do not contract a disease can pass still pass it on and need vaccinations to protect others with compromised immune systems.

Eula compared her efforts to learn everything she could about immunizations and the immune system to Alice in Wonderland falling into the rabbit hole. There was so much more to her journey than she had ever expected. While the Internet is the richest source of information even known to man, it can be confusing and misleading. Whether fact or fiction, reports live on the Internet forever and it is sometimes difficult to tell which is which. Science is a self-correcting discipline. New studies of a subject correct old studies that contained errors or inaccurate conclusions. Focusing on just one system of the body – like the immune system – in a cause and effect investigation is next to impossible. A scientist is never certain of his conclusions because he knows the nature of science.

Bubonic plague is no longer a global danger. Heart disease and respiratory ailments take the most lives each year in modern times. The only current disease that was considered a plague was AIDS. In order to be considered a plague, there must be fear and dread associated with the disease. Plagues of yesteryear were frightening because people were dying by the scores and no one knew why. When AIDS first emerged into society, it followed the same model. One concern that could be of epic proportions in the future is the antibiotic-resistant bacteria strains that have evolved from overuse of antibiotics. These bacteria and the emergence of other new diseases are the biggest threat to public health in today's world.

There have been three major influenza pandemics in the past century. The 1918 Spanish flu epidemic killed more victims than died in World War I. WHO predicts that another pandemic will soon sweep the globe because of these novel diseases that suddenly appear. Although influenza is deadly, it does not strike fear in the hearts of the global population because its symptoms are similar to the common cold and it is not disfiguring in any way.

There are different incentives that encourage people to give blood. Some blood banks offer the chance to win a prize like $1,000. However, statistics show that most people give blood because they want to help those who need it. It is an unpleasant experience and sometimes cause donors to feel faint but is largely without risk. While Eula was giving blood, another donor mentioned that he was often called by the blood bank because he had the rate type O blood which Eula had herself. Since the AIDS epidemic, people have been storing their own blood in case they need surgery and sexual moralism has been reinforced.

Plagues and epidemics can cause dangerous societal ramifications. The Black Death that killed half of the people in Europe in the fourteenth century led to rioters burning Jews alive. The rioters believed that the plague was a Jewish conspiracy against Christians. Jews were linked to vampires – Dracula in a 20th century movie wore a Star of David. The devastation of the plague resulted in biases against immigrants, amputees and those with scarred faces. Gay men were banned from giving blood in 1983 because of the AIDS epidemic. The ban has lasted far beyond what was necessary which can attributed to fear and bias. Informing a patient that a vaccination will protect him from the flu has found to be more prudent than telling them that they are being injected with a small amount of the virus. Eula describes the concept of the immune system's ability to determine self from nonself.

Immunologist Polly Matzinger in her 1994 book, The Danger Model, suggested that patterns or signals may launch a response by the immune system. Matzinger theorized that the immune system may be more protective of the potential danger that may exist than merely a foreign body that it is presented with. It doesn't come down to a reaction to "self" or "non-self" rather the immune system focuses on which entity presents risk.

The birth channel is the newborn's first inoculation. As he passes through to begin his life he collects microbes that will stay with him for years to come. The failure to amass these essential microbes can have prolonged ill effects.

Analysis

Despite Eula's herculean efforts to keep her son safe from disease and harm, she came to recognize that there are limitations in what a parent can do to protect her child. All a mother can do is her best and the rest is up to nature, happenstance and destiny. The immune system uses regulation to limit harm to self.

Likewise there is heavy regulation of vaccines that enter the body by governmental agencies including the CDC and the FDA. Like "herd immunity" the immune system doesn't exist in a vacuum. It is dependent on the successful functioning of other systems that communicate with the immune system. Modern times has not seen Black Death or the Plague but it has been terrified by the AIDS epidemic which seemed to have come out of nowhere but was deadly and merciless.

Eula describes the many infectious diseases that have been eradicated or brought under control through the vaccination process. Man mimics nature in its use of inoculations. When a baby is born, he passes through the birth channel where he picks up microbes that launch his naïve and fragile immune system.

Vocabulary

emblematic, meandering, neutrinos, malevolent, placid, hemophiliac, corollary, proliferating, insularity, incarnation, repartee, dismemberment, modernity, narcolepsy, altruism, auspices, insurrectionary

Important People

Eula Biss

Eula Biss is the author of On Immunity – An Inoculation. Her book focuses on vaccines and children's inoculations but it is also a memoir of her experience as a young mother who wanted to find the answers about vaccines. There were many in her circle of young mothers who doubted the benefit of inoculations or felt that the ore than 20 inoculations that were recommended was overkill. There was a raging debate and loud voices who claimed that vaccines - especially the MMR vaccine - was responsible for autism.

Eula describes how she and her husband were scared to death when they brought their infant son home. They were both obsessed with his care and health. They would do anything to protect him. The questions about inoculations, of course, came up – in fact it redounded in her ears every day. She made it her mission to find the truth or something very close to it.

Eula was at the advantage because she had a physician father that she learned very much from and could tap for his opinion any time she faced a blind alley. Her mother was a poet who passed on her liberal and open mind to her daughter, making her open to believe anything as long as the evidence held out.

Eula studied the history of inoculations and vaccines which was quite a storied one. She learned that parents were always concerned about the safety of inoculations even going back centuries. In the end Eula came to conclusions that she was comfortable with but was keeping the door ajar for any new information about immunology and the safety of vaccines.

Paul Offit

Paul Offit is a respected pediatrician, a professor of pediatrics at the University of Pennsylvania and head of the Division of Infectious Diseases at the Children's Hospital of Philadelphia. Offit is also an outspoken advocate of childhood vaccinations, the co-inventor of a vaccine, the author of several books on vaccination and a former member of the CDC's advisory committee on immunization processes.

Offit came to focus in particular on the infant immune system. He studied the capacity of the system which he already knew to be quite robust and highly functioning. The fetus is protected in the womb and largely free of viral and bacterial debris. However, as Offit pointed out, through the birth process the newborn is exposed to an onslaught of bacteria as he passes through the birth channel and lands in the atmosphere where he takes his first breath. Babies are immediately challenged with a daily fight with viruses and bacteria that target him for infection which, according to Offit, is a much more daunting challenge that dealing with the relatively weak antigens found in immunizations.

Due to Offit's vocal support of vaccinations and the work he has devoted to the development of vaccinations, he has been labeled the Devil's servant and "Dr. Profit" by anti-vaccination activists. He has also received death threats from some fringe groups who also believe that the Holocaust was a hoax.

Eula's Parents

Eula Biss depended on her physician father for many answers to questions she encountered in her research on the history and present state of vaccines and inoculations. Her mother was a poet who read Eula from Grimm's fairy tales when she was a child and who inspired Eula to be open-minded to whatever she may encounter in life or in her quest for answers about vaccines.

Ruth Carson

Ruth Carson was the author of Silent Spring in which she warned of the dangers to the individual as well as to the environment from the widespread use of pesticides and herbicides. DDT, one of these chemicals, was contaminating fish and killing birds. Carson's book led to the establishment of the Environmental Protection Agency (EPA) and the ultimate ban of DDT. She did not coin the phrase "ecosystem" but preferred calling it the "intricate web of life."

Achilles

Eula Biss' physician father told her the story of Achilles when she was a young girl. The story of Achilles is a metaphor for immunization. Achilles' mother tried to make him immortal by holding him by his heel and dipping in into a River Styx which separated the world from the underworld. Achilles was strong except on the heel that his mother held him by while she dipped the rest of his body in the river. He was eventually killed from a blow to his heel. A person's Achilles heel refers to his vulnerability and weakness of character.

Graham Rook

Graham Rook is a microbiologist who developed the "old friends" hypothesis which asserts that a healthy immune system is not achieved through exposure to disease in childhood as commonly believe. He believed that the health of the immune system is dependent on ancient pathogens or "old friends" that have been passed on genetically since hunter-gatherer days. This theory is sometime referenced in those who believe that infectious diseases should not be eradicated.

Carl Zimmer

Carl Zimmer is a science writer who wrote the book, A Planet of Viruses and the article, “Tending to the Microbial Garden” which appeared in the New York Times. Eula Biss used both of these works as resources for her book, On Immunity. Zimmer made the statement about man and viruses that “there is no us or them,” believing that the immune system borrows its technology from viruses that invade the body.

Paul Slovic

Paul Slovic is the author of The Perception of Risk. In the research he conducted for his book, he asked people to compare various causes of death. From this study, he learned that people believe that accidents are the cause of more death than disease. Further, people tended to believe that homicides far outweighed suicides for causes of deaths investigated by law enforcement. However, statistics bear out that more people die from disease and that more people commit suicide than are murdered. He was able to conclude that people prefer to think that nature has less impact on man’s demise than man himself.

Voltaire

When Voltaire wrote “On Inoculation,” the definition of the word inoculate can be likened to the process of grafting, like cultivating an apple tree by grafting the stem of one tree to the root of another. During these pioneering days of inoculation there were a variety of methods including the snuffing of dried scabs up the nose or the sewing of an infected thread through the skin between the forefinger and thumb. In England, a flap was made in the skin under which infected tissue was placed.

Polio Pioneers

The Polio Pioneers were 650,000 children from all over America whose parents volunteered them to test the polio vaccine. There was such a fear about contracting the disease that it far outweighed any fear they may have had about the vaccine. The test was arranged after Jonas Salk, main developer of the vaccine, had tested the vaccine on himself and his own three sons.

Jacobson

Jacobson was a minister who defended himself in the 1905 case State of Massachusetts v. Jacobson. He refused to be inoculated, which was mandatory in the state, because a prior inoculation had damaged him. The case went to the U.S. Supreme court which upheld the state law but henceforth required the states to provide

exemptions for those who would be treated unfairly under the law or suffer from oppression because of it.

Objects/Places

Immune System

The immune system is a complex bodily function that protects the body from disease. Specialized cells are produced in bone marrow designed to kill off infected cells. Cell-to-cell communication is accomplished by free-floating molecules while chemical signals travel through the blood. This complicated system is fully in place in full-term infants although it is referred to as “naïve” since it has not been exposed to disease that will stimulate the produce of antibodies. Infant inoculations teach the immune system how to react to pathogens that it has not yet encountered. The many childhood colds, sore throats and ear aches help advance the functionality of the immune system. The body and viruses are locked in a perpetual game of chess. One out of ten babies who were born in 1900 died. After the advancement of vaccines, a later report included the expectation that infant mortality would decrease.

The theory of semiotics suggests that there is a system of signals and symbols that assists the immune system in its functioning. It is also conceptualized that the immune system is able to determine self from nonself and that the threat of danger is what triggers the immune system not the presence of a “nonself.” The immune system does not attack a fetus even though it is a nonself. This non-response is due to the immune system’s assessment that the fetus is not harmful to self.

Scientists believe that the immune system may someday respond to danger by nurturing good bacteria to fight off the bad. An article entitled, “Tending the Body’s Microbial Garden” suggests that the ideal state is living in balance with many other organisms. Our internal garden is host to both good and bad bacteria, fungi and viruses. It is a wilderness that is rife with roses and thorns. Our garden is a shared space that all men tend together.

Intuitive Toxicology

According to Paul Slovic, author of The Perception of Risk intuitive toxicology refers to the way people assess the risk of chemicals that they encounter. The lay person does such assessment in a black and white manner – safe or dangerous. A toxicologist thinks more in terms of degree. Over-hydration killed a runner in the 2002 Boston Marathon. In that case, water was lethal because it was too much of a good thing. The average person perceives the exposure to a chemical as harmful even though the exposure was too brief to have any effect.

DDT

There are manmade threats to health like the wide-spread spraying of the herbicide DDT which was eventually banned because of its lethality. Rachel Carson’s book, Silent

Spring, led to the banning of DDT as an herbicide. It also was key in establishing the Environmental Protection Agency in 1962 that was designed to protect the atmosphere from damage caused by chemicals and harmful manmade products and processes. Silent Spring also introduced the concept that human health depended on a healthy environment, later referred to as an ecosystem. During the time when protests rose against DDT, there was conjecture that it caused cancer. However, that link has never been proven. While DDT is not sprayed on farms and large pieces of property, it is used in developing nations to fight malaria.

Metaphor

Eula Biss uses metaphors throughout On Immunity. She makes many references to vampires as blood suckers who depend on the blood of others to live. Metaphorically, the health of a child is dependent on an external element beyond “self” to be healthy and safe from deadly infection.

In 1881 a handbill called, “The Vaccination Vampire” warns that vaccinations pollute babies. The use of vampires drove home the risk to parents by interjecting the imagery of the undead. There were also hints that there was a sexual element to vaccination and that the diseases that the vaccinations were designed kill were sexually transmitted. Doctors were even thought to be part of the dark conspiracy since they profited from vaccinations.

In the introduction to her book, Illness as Metaphor, Susan Sontag wrote that everyone resides in the kingdom of the well and in the kingdom the sick. Although the latter kingdom is avoided at all cost, efforts to reject it will ultimately fail. Sontag was speaking from personal experience; she was being treated for cancer at the time of this writing.

The Croup

Croup is an inflammatory disease that affects the larynx and trachea. The resultant cough has an echoing, ringing quality that distinguishes it from the coughs of other diseases. The croup that children contract in modern times is a milder version of the croup that was caused by diphtheria prior to the 1940s. That strain has virtually disappeared in first world countries.

Eula later learned that the babies in a play group that she and her son were part of all came down with croup at the same time. Her son was fine in a few days but she had not recovered from the worry about the disease and how it had struck all the babies in the play group. Eula thought of how her son may have died if they had lived a hundred years before. She read about mothers dying of grief after losing their children in epidemics.

Compulsory Vaccination Act of 1853

In providing the history of vaccine inoculations, Eula Biss provides an example of how the government at times intervened in the process. Britain's Compulsory Vaccination Act of 1853 called for the vaccination of all infants with no exception. The law was very unpopular and many resisted adhering to it. But the British government saw the great benefit of vaccinations and eventually Parliament passed legislation that called for stiff finds and even imprisonment for those who failed to comply with the act.

In 1898, a conscience clause was added to the act which allowed parents to opt out of the inoculation process. But the exemption was abused and misused resulting in some counties the exemption of the majority of babies.

AIDS

The most recent epidemic that caused real panic in American society was the AIDS epidemic. "AIDS is everyone's problem," said the vice president of the Red Cross in 1987. However, as it turned out the average American became a witness to the epidemic and most people were safe from infection. However, initially fear and panic set in until there was more understanding about the disease and how it was spread. Prejudice against gay men was at an all-time high during the epidemic. Some conservative voices expressed the concept that God created AIDS as a punishment for homosexuality, promiscuity, and addiction. Gay men were banned from donating blood for many decades; a stigma remained for many years on gay men and the danger of associating with them.

The Universal Donor

Eula's father was an advocate of organ donation. He had type O blood which he donated as frequently as possible because it was in great demand for surgeries. A person with type O blood is referred to as a universal donor because he can donate his blood to anyone while he can only be infused with type O blood.

Herd Immunity

"Herd immunity" is a process in which most people in a group or community are vaccinated against a disease making the few who are not vaccinated safe because there is little or no passing of bacteria among the "herd." There is resistance to the concept of herd immunity because it's confused with herd mentality which has spawned events like lynching and rioting and because some feel it makes a comparison between humans and cattle. Group thinking can benefit from the wisdom of all rather than the wisdom of one. In March 2003, after the outbreak of SARS that killed five people in China, the World Health Organization assembled research teams in ten different

countries to work on a vaccine. They shared their progress on a regular basis and were able to isolate the virus. No one person or team took credit for the breakthrough.

Hepatitis B Inoculation

The Hepatitis B shot was originally designed to protect the inner city kids of drug addicts. It was the opinion of many pediatricians that babies outside that world would not need it. Opinions like this were later seen as racist. There was a misconception about vaccinations and the poor. Some believed that multiple shots were scheduled for poor mothers because they may not return for subsequent appointments – but that was not the case. The recommended inoculation of babies presented a daunting schedule for mothers belonging to all socio-economic groups. Those who do not support the Hep B inoculation believe that it is a sexually transmitted disease. However, it can also be passed from close contact with infected individuals many of whom are initially symptomless. When the high risk group was originally targeted for the Hep B vaccination, rates of infection did not decline. However, when vaccinations were widespread among the entire population, the infection rate went down. This decline led to the recommendation that all babies be vaccinated against Hep B.

The Loss of Paternalism

Paternalism has become less important in health care. Once the physician was seen as the ultimate authority as a kind of father or mother figure. But it is seen by some as interference in the liberty of another. Some examples of paternalism in society are traffic lights, gun control and environmental regulations – all designed to protect the people of a community. Interfering with the parenting of an obese child can lead to many problems including the child’s humiliation. Targeting a family at risk for obesity can be perceived as an act of discrimination. Patients are sophisticated and often ask for certain medical tests and evaluations based on their own research leaving the doctor in a kind of assistant status. Professionalism can be lost in the face of consumerism. Some physicians may give a patient what he asks for even if it’s not what he would recommend. Bottom line, caretaking is not a threat to one’s liberty. But in order to receive the optimum care, the patient must trust the physician.

Themes

Inoculation Debate

Fear and paranoia are the driving forces behind the debate over the danger or benefit of childhood inoculations. Theorist Eve Sedgwick observed that paranoia is contagious and replaces thinking that is more measured and reasoned. A paranoid response is often naïve and pious and rooted in suspicion that in the end proves to be without merit. The fear of contamination is based on the belief that a dangerous and foreign substance can threaten us on contact. While there are dangerous contaminants the vast majority of viruses and bacteria that a person encounters present no threat.

In the opinion of many that the contaminants that exist in the atmosphere and the air we breathe present a constant threat to man's health. Pro-environmental activists fear that the man-made chemicals that have polluted the atmosphere present a greater health risk than natural chemicals that exist in our world. Toxicologists do not consider man-made chemicals inherently more dangerous than those created in nature but the fear that drives the environmental activists does not allow them to accept this conclusion even though it is the considered opinion of a scientist. The fear and paranoia does not allow the activists to accept that some dangerous chemicals are created by nature and that there is nothing that man can do to control their existence. It is less scary to blame man, despite evidence to the contrary, than to think that nature is not always benevolent.

It is difficult for even experts in the field to dissuade a person of the fears he possesses if the fear responds to an inherent need. Some parents with autistic children prefer to believe that childhood inoculations caused their child's condition than to believe that it was nature that inflicted their child with the debilitating condition. Anti-vaccine parents fear the dangers of inoculations for their children yet drive them around in cars, let them ride bikes and allow them to lead a sedentary life – all much riskier behaviors for their children than being administered childhood vaccines. But their fear has convinced them that injecting their child with a tested and proven vaccine could make their child autistic. Their paranoia compels them to decide not to have their child vaccinated which ironically renders their child unprotected and the community he lives in more vulnerable to infection.

There is suspicion among some fringe anti-vaccination activists that profit is the true driver behind the vaccination process. An autism advocacy group called SafeMinds waged a campaign against the exemption of thimerosal in the Minamata treaty, suggesting that the exemption was bought and paid for. The mercury-based preservative thimerosal provides for the rapid production and distribution of vaccines which would be essential in the event of sweeping pandemic. The ban on thimerosal would have done the most damage to developing nations that had little or no in-country development of vaccines.

The debate over inoculations embraces a “troubling dualism” in which nature is pitted against science, mother against doctor, logic against emotion. But man exists in a world of nature and technology and neither can be dismissed. In a sense, man is a cyborg in that he relies on technology to complete him in areas that nature has failed to do.

Good and Bad Germs and Triclosan

A germ is an organism that once contracted can cause disease. It is also a part of the body that is able to build new tissue. Therefore, germs are good and bad though oddly enough the same word is used for something that destroys and something else that builds. Without “good” germs, a child’s immune system will not develop adequately and fail to function properly.

Triclosan was found in the breast milk and urine of new mothers and in the cord blood of new born babies. Triclosan is an antimicrobial substance found in toothpaste and cleaning products among other common everyday items. It is also found in nature – in streams, wild fish and earthworms to name a few. It can prevent good and bad germs from reproducing and in higher concentrations can kill both. Its relevance in the ecosystem is not known.

Triclosan has been thoroughly tested and has no apparent harmful effect on humans; however, the impact of its long-term use is not clear. Triclosan is added to antibacterial soap and other products because they promise to “kill germs.” Due to its widespread use, triclosan’s ability to kill “good” germs poses more of a threat than elements in vaccines that some feel are dangerous. Research is contradictory on triclosan with reports ranging from the finding that it is totally harmless to the conclusion that it is ruining the environment and slowly poisoning the people.

Alternative Medicine and Risk

Alternative medicine is a whole new world down to its language. Instead of cure it speaks of cleansing. The answer to toxins is detoxification. If one is lacking he seeks a “supplement.” People who seek remedies from alternative medicine are looking for the ideal. Eula’s physician father points out that there is no such thing – that what cures you can also kill you in that overdosing on a good medicine can be fatal. There are risks in all remedies and medical strategies. Knowing this, people feel that abandoning traditional medicine will lead to a natural cure that will be far more beneficial than what the medical world can provide to them. A “natural” cure is pure and harmless. They do not address the obvious fact that the disease they are trying to treat originated in nature.

It is undeniable that there are some reactions to inoculations although most reactions would fall into the “mild” category. The MMR vaccination on rare occasion leads to a condition called “measles inclusion body encephalitis in people with compromised immune systems.” Inoculations can cause a subject to feel faint and muscle pain and experience allergic reactions. The chicken pox vaccine can on rare occasions lead to a chicken pox breakout among those with immune deficiencies. However, the results of

an unvaccinated society which was what existed prior to the inoculation era are deadly and devastating.

People are less afraid of riding in cars and drinking alcohol that have real, confirmed dangers than they are of sharks that they will probably never encounter and vaccines that have proven to pose no danger. There are different degrees of risk and risk aversion. Often it comes down to whether an individual believes that an action he wants to take is worth the risk and his unwillingness to live a life of avoiding danger. Fear and paranoia can drive a person to take precautions that are sometimes unnecessary despite the fact that statistics and research do not back up their decisions.

History of Vaccines

Voltaire wrote how the Caricassian women in 1723 inoculated their children by making an incision in the arm of one child and injecting a pustule in it from a sick child. In days of antiquity women provided most of the medical care for their families. Female healers were persecutors by the Church and by physicians. In Europe midwives were hunted down and burned at the stake as witches. Physicians studied the works of Plato and Aristotle yet knew little about the body.

Relief from labor pain and toothaches and herbs that prevented miscarriages largely fell to the wise women. In America in the late eighteenth and early nineteenth century, physicians “bled” their patients which fell into the category of “heroic” medicine. There was little success; Dr. Benjamin Rush, the father of American medicine, was accused by some of killing more patients through the bleeding process than he saved. Modesty and tradition kept male physicians away from the area of childbirth for many decades. Schizophrenia and homosexuality were blamed on overbearing mothers.

In the 1950s, autism was blamed on “cold” and distant mothers. In 1998, British physician Andrew Wakefield blamed it on pharmaceuticals which led to the concerns about the MMR vaccine, a controversy that rages well into the twenty-first century. However, subsequent studies failed to prove the doctor’s theory. Wakefield was deemed unethical by the British Medical Council in 2007. He lost his license to practice in Great Britain and migrated to the U.S. He insisted that Great Britain and suppressed his research. American women clung to the weak science that Wakefield presented as a way to explain the horrible tragedy that had consumed their families.

In the nineteenth century, smallpox was considered a disease caused by filth and contracted mainly by the poor. It was thought that filthy conditions caused the air to be contaminated which caused the contagion. Filth was also connected to immorality. That theory was replaced by the germ theory which had more credence. Raw sewage running in the streets and into water sources certainly spread disease. Smallpox was not spread that way but typhus, plague and cholera all were. Improved sanitation conditions especially for drinking water greatly reduced the spread of these diseases.

Infectious Diseases

Prior to the European invasion, the Americas were exempt of infectious disease. There was no smallpox, no influenza, no hepatitis and no measles. The bacteria that cause diphtheria, tuberculosis, cholera, typhus, and scarlet fever were unknowns in the Western Hemisphere. The first epidemic recorded in the Americas was in 1493 with an outbreak of the swine flu.

The risk of death after smallpox vaccinations was one in a million. Many parents volunteered their children to test the Salk vaccine which was developed to fight and eliminate polio. It was astounding to think that parents so readily volunteered their children for an experimental vaccine compared to many parents today who are wary of childhood inoculations of vaccine with proven results. Polio in the U.S. was ultimately eradicated by the vaccine. Eradicating polio was a bigger challenge than wiping out small pox. Many people were carriers of the polio virus but never displayed any outward signs of the disease, especially the paralysis that is associated with the disease.

Polio is now only endemic Pakistan, Nigeria and Afghanistan. Muslims in Nigeria feared that the West was intentionally contaminating the vaccine with the HIV virus in a power grab connected with the U.S. invasion of the Muslim countries of Iraq and Afghanistan. They also suspected that large amounts of estrogen were added to the vaccine to decrease the Nigerian birth rate. The Nigerian government urged their people not to allow their children to be vaccinated. After refusing the polio vaccine, the disease broke out in Nigeria which became the new center for transmission of the disease. By 2004, the disease had spread to seventeen other countries. The Nigerian officials reversed their stand and allowed the vaccine to be produced in country by a Muslim company.

In 1956, a mysterious epidemic broke out in Minamata, Japan. The victims were unable to walk or talk and suffered from convulsions. Animals were also displaying convulsions and strange behavior. The culprit was the wastewater contaminated with mercury being dumped into the bay that contained fish and shellfish that the people consumed. Healthy mothers were giving birth to babies with severe neurological disorders. Mercury poisoning was the cause of the mysterious outbreak.

A global treaty banning mercury was named for Minamata in 2013. It called for the elimination and control of mercury in products and in disposal efforts. Excluded from the ban was thimerosal an ethyl mercury preservative that is used in some vaccines. Its exclusion was supported by the WHO and by the American Academy of Pediatricians because the benefits of the vaccines far outweighed any risk. Later several member of the AAP reversed their decision leading to accusations that the US was trying to poison the world.

There was widespread fear that cancer was caused by the formaldehyde in vaccines and that the mercury and aluminum they contained caused other conditions. Formaldehyde is produced by the human body. It is safe except if large quantities are produced. A child will get more mercury from his normal environment than he will from a

vaccine. Aluminum is a common element in fruits and cereals and even breast milk. These elements are all found in miniscule amounts.

While chicken pox isn't a potentially dangerous disease, it can lead to dangerous staph infections as well as pneumonia and encephalitis which are deadly diseases. Once chicken pox is contracted, the varicella virus stays in the nerve roots for the rest of the individual's life. This virus can cause other conditions later in life most notably painful shingles that can develop from it. The virus contained in the vaccine is too weak to cause shingles and other conditions to manifest. Booster shots are recommended in later life to combat problems from the varicella virus.

Some people want their kids to get measles so they can build up natural immunities. A group was distributing lollipops licked by children in order to spread chicken pox but was stopped by a federal prosecutor who cited laws that prohibited the shipment of viruses through the mail. It was a bad idea because the chicken pox virus wouldn't last but more serious diseases like Hepatitis B could be transferred in that fashion.

Styles

Structure

On Immunity by Eula Biss is a memoir the main focus of which is her quest to learn everything she could about childhood inoculations after giving birth to her first child, a son. Her story flashes briefly back to her childhood when her oncologist father taught her about good and bad germs and using the story of Achilles to introduce her to the concept of immunity. In her later efforts to have resolution about childhood inoculations and the benefits and risks they present, she was greatly influenced by both her parents. Her father was always available to respond to her questions when she ran up against brick walls in her research. Her mother, a poet, also inspired her to be open to all opinions and to not have preconceived notions.

The story of Eula and her quest to learn the truth about infectious disease and manmade vaccines that were developed to fight them touches briefly on the AIDS epidemic which struck when she was in high school. Although she and her family were not directly infected by the virus, it had a great impact on her and she recalled the experience later when she learned about the panic communities experienced in the face of pandemics and epidemics in past centuries.

The majority of the story focuses on her concerns about her baby's health and the measures she took to learn about the safety of the many inoculations that the medical field recommended for babies and toddlers. Although she tended to trust in these recommendations she was in the company of other young mother who had more doubts about the safety of vaccines. When her child was first born, the debate over whether the MMR vaccine caused autism was raging. This controversy was one of the major challenges that she had to wade through on her way in finding resolution. Eula Biss dutifully referenced the sources she used in the research she conducted in writing her book.

Perspective

Eula Biss narrates her story about her fears and beliefs about the benefits and potential dangers of childhood inoculations. The subject matter is a hot topic in today's world and there is ongoing controversy about what impact inoculations have on autism. Eula Biss tells her story from the standpoint of a young mother who tries to find out everything she can about vaccines and as the daughter of a physician.

Eula writes about the doubts and fears she has as every new mother has. While getting the recommended vaccinations for her newborn son is certainly protecting him, is she at the same time putting him in any jeopardy?

Eula digs into the history of inoculations that surprisingly actually go back centuries. While the modern-inoculations are, of course, advanced from those early days, there

were beliefs even then that exposing a body to a small bit of a disease will protect it from contracting the full-blown disease. Eula relies on her father's experience, wisdom and training to help her in her journey but there are mysteries about the body's immune system and its response that results in the lack of definitive conclusions that new parents seek for their young children.

Although Eula often uncovers more questions than questions, she struggles on to find answers. Her goal is to protect her son from the invisible dangers of bacteria and viruses but in the end knows that parents are not all-powerful in keeping their children safety and healthy.

Tone

While author Eula Biss describes herself as a nervous new mother when her first child, a son, was born, she was also a dedicated researcher who wanted to dig deeply into the subject of inoculations and childhood vaccines and find answers about their safety and benefit. She was an open book and ready to hear the good and bad about them. Her tone is respectful throughout. She displays a generous degree of introspection in her struggle to make the right decisions for her son's welfare.

She had the benefit of having a father who was an oncologist who had taught her when she was a child about good and bad germs and that germs were everywhere. When Eula was confronted with conflicting information which she often was, she would go to the best scientist and source she knew, her father.

Although Eula comes down on the side of the pro-vaccine crowd, she gives space to those who oppose the use or overuse of vaccinations. Her positive tone is respectful to every side of the issue. There is no sign of condescension even though she was able to pull the "physician card" with her father always available as a final authority.

After the research she ultimately decides to have all the recommended inoculations administered to her infant son. As thorough as Eula was in her research, she recognizes that there is always more to learn about immunity and vaccines.

Quotes

Dracula is as much about this problem, the problem of evidence and truth, as it is about vampires. In proposing that one truth may derail another, it invites an enduring question —do we believe vaccination to be more monstrous than disease?”
-- Author (chapter 3 paragraph 16)

Importance: The author uses the metaphor of Dracula to describe the inoculation debate. Is being inoculated more perilous than contracting the disease which it is designed to defeat? Despite the evidence there are those who believed in vampires. And despite evidence to the contrary, some believe that inoculation is dangerous. In essence, it is what chooses to believe more than what the proof demonstrates.

If we imagine the action of a vaccine not just in terms of how it affects a single body, but also in terms of how it affects the collective body of a community, it is fair to think of vaccination as a kind of banking of immunity. Contributions to this bank are donations to those who cannot or will not be protected by their own immunity.”
-- Author (chapter 4 paragraph 8)

Importance: This statement refers to the concept of “herd immunity.” If most in a community are inoculated against a disease, the few who are not will be protected by the others. However, if only a few are inoculated, those who opt out of the process will put the others in the community at risk.

I was already aware, before I became pregnant, of some fears around vaccination. But I was not prepared for the labyrinthine network of interlocking anxieties I would discover during my pregnancy, the proliferation of hypotheses, the minutiae of additives, the diversity of ideologies.”
-- Author (chapter 5 paragraph 23)

Importance: Eula naively believed that she would be able to conduct research into the pros and cons of childhood inoculations. However, once she began digging into the mountain of information, she discovered that it was a complex issue and that resolution about the topic was elusive.

Unvaccinated children, a 2004 analysis of CDC data reveals, are more likely to be white, to have an older married mother with a college education, and to live in a household with an income of $75,000 or more—like my child. Unvaccinated children also tend to be clustered in the same areas, raising the probability that they will contract a disease that can then be passed, once it is in circulation, to under-vaccinated children.”
-- Author (chapter 5 paragraph 27)

Importance: The Center for Disease Control developed the profile of the unvaccinated child who resided in an upscale neighborhood that was more than likely made vulnerable to disease because unvaccinated children were clustered in the same area.

The lack of vaccinated children in a segment of a community makes others included under-vaccinated children at risk.

Perceptions of risk—the intuitive judgments that people make about the hazards of their world,' the historian Michael Willrich observes, 'can be stubbornly resistant to the evidence of experts.' We do not tend to be afraid of the things that are most likely to harm us. We drive around in cars, a lot. We drink alcohol, we ride bicycles, we sit too much. And we harbor anxiety about things that, statistically speaking, pose us little danger. We fear sharks, while mosquitoes are, in terms of sheer numbers of lives lost, probably the most dangerous creature on earth.'"
-- Author (chapter 7 paragraph 10)

Importance: This quote underscores the irony in the things we fear and how we stick our heads under the sand to real dangers. The shark that we will never encounter is much scarier than mosquito that could infect us with a number of diseases. It is scarier to think of the remote possibility of an inoculation harming our child than to proceed with the inoculation that could save him from a potentially deadly infectious disease.

Most people are just wrong about risk. But risk perception may not be about quantifiable risk so much as it is about immeasurable fear."
-- Author (chapter 7 paragraph 12)

Importance: This underscores that humans are poor at risk assessment. These errors in judgment are attributable to unwarranted fear that overwhelms reason.

Obviously,' the naturalist Wendell Berry writes, 'the more artificial a human environment becomes, the more the word natural becomes a term of value.' If, he argues, 'we see the human and the natural economies as necessarily opposite or opposed, we subscribe to the very opposition that threatens to destroy them both. The wild and the domestic now often seem isolated values, estranged from one another. And yet these are not exclusive polarities like good and evil. There can be continuity between them, and there must be.'
-- Wendell Berry (chapter 8 paragraph 3)

Importance: This statement makes the point that people tend to believe that the natural solution is the best. Activists who oppose inoculations believe that nature has the answers to disease. However, they often fail to recognize that nature was the source of infection. Being able to rage at a pharmaceutical company and blame it for a child's autism provides a parent more satisfaction than raging at nature.

We are all 'cyborgs, hybrids, mosaics, chimeras,' as Haraway suggests in her feminist provocation, 'A Cyborg Manifesto.' She envisions a cyborg world 'in which people are not afraid of their joint kinship with animals and machines, not afraid of permanently partial identities and contradictory standpoints.'"
-- Donna Haraway (chapter 9 paragraph 9)

Importance: Those who believe that nature doesn't have all the answers and that

manmade solutions are part of a successful life are open to the many possibilities listed in the quote. Vaccines developed in labs to fight infectious disease fall into the category of manmade solutions.

Those who went on to use [Andrew] Wakefield's inconclusive work to support the notion that vaccines cause autism are not guilty of ignorance or science denial so much as they are guilty of using weak science as it has always been used—to lend false credibility to an idea that we want to believe for other reasons."
-- Author (chapter 13 paragraph 9)

Importance: A parent whose child is diagnosed with autism can vent direct his anger a pharmaceutical companies by cherry-picking articles that he interprets as proof that they are to blame. The parent ignores the overwhelming evidence that what he wants to be true is not.

With smallpox taking fewer lives, unorganized opposition to vaccination became an anti-vaccination movement led by activists like Lora Little, who offered empowering advice: 'Be your own doctor. Run your own machine.' In some places, armed mobs drove vaccinators away. 'Vaccination riots,' the journalist Arthur Allen writes, 'were not at all uncommon.'" Location 1403
-- Author/Lora Little (chapter 23 paragraph 7)

Importance: Ironically the decline of smallpox infection sparked the anti-vaccination movement. Activists urged followers to be their own doctors. The fervor and passion of these activists sometimes turns into violence. The violence is a result of the frustration that these activists suffer because they know that the evidence is against their stance. However, for whatever reason they choose to ignore the overwhelming proof that vaccinations are for the most part beneficial.

As the medical researcher John Ioannidis has observed, 'most published research findings are false.' The reasons for this are many, and include bias, study size, study design, and the very questions the researcher is asking. This does not mean that published research should be disregarded, but that, as Ioannidis concludes, 'What matters is the totality of the evidence.'"
-- Author/John Ioannidis (chapter 27 paragraph 9)

Importance: Anti-vaccination activists latch onto misinformation issued by the scientific community as proof that every conclusion made by scientists is suspect. It is example of the distorted logic that every school-age child learns about in school: Fido is a dog; all dogs are black; Fido is black.

As Jean-Paul Sartre put it, 'Freedom is what you do with what's been done to you.'"
-- Jean-Paul Sartre (chapter 28 paragraph 15)

Importance: The French philosopher makes the point that man has very little control over what happens to him. He can only act independently in reaction to what befalls him.

Topics for Discussion

1

What is the tale of Achilles? Why did Eula's physician father tell her that tale when she was a young child? How does it relate to the book's topic, immunization?

2

What was the CDC's conclusion/warning about the H1N1 virus? What is a pandemic?

3

What was the focus of Rachel Carson's book, The Silent Spring? What impact did her book have on the U.S. and what governmental organization was established as a result of it?

4

What is the process of variolation? In what nation or continent was this process first advanced? How did the variolation system impact the US and European countries?

5

Who has the last remnants of the smallpox vaccine? Why hasn't it been destroyed? How could it be used for the good and for the bad?

6

What is the Minamata Treaty of 2013? What sparked the creation of the treaty and what did it call for?

7

Describe the loss of paternalism among physicians. What has cause the change in the way doctors approach their patients? What are the pros and cons of this change?

8

What was the outcome of Jacobson v. Massachusetts? Why were the soldiers of Washington's Continental Army more vulnerable to infection from smallpox than the British soldiers they fought? What convinced George Washington to have his soldiers inoculated against smallpox?

9

How have plagues and epidemics impacted society? What elements are necessary for the spreading of a disease to be termed a pandemic?

10

What prediction does the World Health Organization make about pandemics? What are the most dangerous bacteria that are emerging in modern times and how did they evolve?