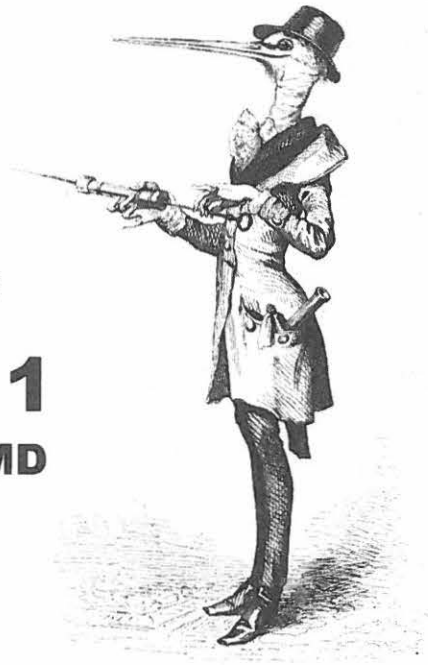
Vaccination:
An Updated Analysis of the Health Risks – Part 1

by Gary Null, PhD, and Martin Feldman, MD



A major controversy is brewing in the United States as people question whether the vaccines we give to children are safe and effective. In this three-part series, we explore the vaccine controversy to help separate the myths from the facts. We have conducted an extensive review of the scientific literature to examine the safety and efficacy of vaccines and the health effects of these often-mandated medical procedures.

Does the process of vaccination represent good science? What is the proof that the numerous vaccines given to infants are safe? Do the manufacturers and physicians who provide them support conjecture or sound scientific practice? Our society rarely looks at the safety and efficacy of the products of medical manufacturers that have enormous power to influence the decisions of the Centers for Disease Control and Prevention (CDC), the US Food and Drug Administration (FDA), and the National Institute of Allergy and Infectious Diseases (NIAID).[1-8] Although the public rarely hears of the tragedies and side effects associated with vaccines, we do hear that vaccines promise to prevent a new condition (such as cervical cancer and genital warts[9]).

The reality is that we are inundating the developing baby's body with a growing list of vaccines,[10] often overwhelming the immune system with resultant negative effects. A full picture of the effects of immunization has not emerged due to a deep-seated under-reporting of the adverse events associated with vaccinations.[11-13]

Our Acceptance of Vaccines

Public health officials have long put forth the basic assumptions that vaccinations are safe and effective.[14-16] The public and our legislators have, by and large, accepted these assumptions as true. We think of vaccinations as panaceas and look to science to develop new ones for many illnesses. Vaccines are now in the Research and Development (R&D) pipeline for diseases such as chlamydia, herpes simplex type 2, hepatitis C, West Nile virus, Epstein-Barr virus, and others.[17] The World Health Organization (WHO) notes that intensive efforts also are underway to develop effective vaccines for malaria, tuberculosis, dengue, and other diseases.[18]

Jamie Murphy, author of *What Every Parent Should Know About Childhood Immunization,* attributes society's acceptance of vaccinations largely to state laws that dictate children must receive vaccines to attend school.[19] Each state determines which vaccines it will mandate for daycare and school entry, and state officials often rely on the recommendations of the CDC's Advisory Committee on Immunization Practices (ACIP) and other advisers in the process of mandating specific vaccines.[20]

The Growing Roster of Childhood Vaccines

The CDC's 2007 recommended immunization schedule includes more than two dozen doses of vaccines, targeting 14 diseases for children under the age of two. These diseases are diphtheria, tetanus, pertussis, *Haemophilus influenzae* type b, pneumococcal, polio, hepatitis B, measles, mumps, rubella, varicella, influenza, hepatitis A, and rotavirus. The CDC recommended the latter two – hepatitis A and rotavirus – for routine vaccination of children in 2005 and 2006, again expanding the vaccination protocol for young children.[21]

By contrast, vaccines for seven diseases were included in the CDC's first childhood immunization schedule in 1983. The vaccines (for diphtheria, tetanus, pertussis, polio, measles, mumps, and rubella) were recommended for children up to 18 months of age.

In addition to the vaccines received in the first two years of life, children aged four to six receive vaccines for diphtheria, tetanus, pertussis, polio, measles, mumps, rubella, and varicella (chickenpox). This second dose of chickenpox vaccine is new, recommended by the ACIP for all children in 2006.

Recently Approved Vaccines

As noted, a new rotavirus vaccine (RotaTeq) was recommended by the ACIP for all infants in 2006. In addition, the government has recommended several vaccines for adolescents in the past few years: a diphtheria, tetanus, and acellular pertussis (Tdap) vaccine; a meningococcal conjugate vaccine (MCV4); and the first human papillomavirus (HPV) vaccine (Gardasil), which is approved for females nine to 26 years of age. Gardasil is designed to protect against HPV types 16 and 18, which cause approximately 70% of cervical cancers, and types 6 and 11, which cause about 90% of genital warts.[22] For adults, the FDA approved in 2006 the first vaccine to prevent herpes zoster, also called shingles. This vaccine (Zostavax) is approved for people 60 years of age and older.

Types of Vaccines

Four main types of vaccines are used in the US, each with its own strengths and weaknesses. As described by Kurt Link, MD, in his book *The Vaccine Controversy*, these types are as follows:[23]

Live Virus Vaccines

These vaccines contain an attenuated strain of the wild virus that causes a disease. Live viruses can trigger a strong and long-lasting immunity, but they may cause serious infections and even death in people who are immune-compromised and sometimes may cause serious infections in people who are apparently healthy. Live virus vaccines include measles, mumps, rubella, chickenpox, and oral polio (the live polio vaccine is no longer used in the US).[24]

As noted by Dr. Link, today's vaccines not only contain material from animals, such as monkeys, chicks, horses, and cattle, but also toxins and chemicals such as formaldehyde, aluminum salts, and antibiotics. In the future, we hope to have DNA vaccines that are free of impurities. With these purified vaccines, genetic material from a microbe will be inserted directly into a person's cells, prompting them to produce the vaccine and mobilizing a long-lasting immune response. (Theoretically, there is a downside: if vaccine DNA is integrated into a person's genetic makeup, the adverse effects could include cancer and autoimmune diseases.)[28]

> ...different people will react to the same vaccine in different ways. Each person's reaction depends on a variety of factors, including his or her genes, history of infections and vaccinations, and general health.

Killed Whole Vaccines

This type of vaccine cannot cause an infection, because the infectious organism has been killed with heat or substances such as thimerosal or phenol. Multiple initial doses and booster doses are needed to stimulate and maintain immunity. This category includes vaccines for pertussis, polio (the inactivated version), and anthrax.[25]

Purified Vaccines

These vaccines contain relatively pure chemical components of an infectious microbe and cannot cause an infection. The hepatitis B vaccine, in particular, is manufactured with a recombinant technology in which the hepatitis surface antigens are produced in yeast cells. Like killed whole vaccines, purified vaccines may require multiple doses and boosters to sustain immunity. In addition to hepatitis B, purified vaccines include pneumococcal pneumonia and haemophilus influenza.[26]

Toxoids

In this case, a toxoid causes the body to produce antibodies against toxins secreted by a type of bacteria, not against the organism itself. Diphtheria and tetanus are examples of toxoid vaccines.[27]

Challenging Our Assumptions

As the list of vaccines used in the US grows, we must take a close look at our assumptions and ask: are we seeing the full picture? The reasons we should challenge our beliefs about vaccination include the following:

Vaccine Safety Issues

Significant adverse effects have been reported with every type of vaccine.[29,30] These reactions may occur soon after vaccination or several months to years later.[31] Delayed reactions are more insidious and less obviously linked to vaccination and thus necessitate large-scale epidemiological studies to be proven.

The recent history of immunization demonstrates the perils associated with vaccines. In 1999, a vaccine for infants was ➤

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removed from the market due to its serious adverse effects. RotaShield was approved by the FDA in 1998 for the prevention of rotavirus in infants but was withdrawn after reports to Vaccine Adverse Event Reporting System (VAERS) and a subsequent review showed the vaccine was associated with intussusception, a bowel disorder.[32] In 1991, an experiment with a high-titer measles vaccine in infants was halted when studies found an increased mortality rate among female recipients compared with those receiving the standard measles vaccine.[33] And in the past few decades, some studies have found that an increased risk of certain cancers is associated with polio vaccines given to children from 1955 to 1963 that were contaminated with a monkey virus.[34]

The CDC recently studied the safety of immunization by analyzing reports made to VAERS during the first 11 years of the system's operation, from 1991 to 2001. There were 128,717 reports made, 14.2% of which described serious adverse events that "by regulatory definition include death, life-threatening illness, hospitalization or prolongation of hospitalization, or permanent disability." The CDC concluded that reviews of VAERS reports and studies based on those reports during the 11-year period "have demonstrated that vaccines are usually safe and that serious adverse reactions do occur but are rare."[35]

It should be noted that VAERS is a passive surveillance system and that only an estimated one-tenth of reactions are reported (by some estimates, this figure is even greater).[36,37] The result is that reported data greatly underestimate the real incidence of vaccine-associated complications. Furthermore, associations are not made when adverse events occur long after the time of vaccination.[38] Indeed, a 1998 study in the *Lancet* and a recent review claim that *no* link exists between the MMR vaccine and subsequent long-term health events such as autism or bowel obstruction.[39, 40]

One would think that before injecting children worldwide with hundreds of millions of doses of vaccines, enough clinical trials would be performed to determine exactly what the effects of this large-scale human experiment would be. Lack of funding is not the problem. Each year, Congress appropriates more than $1 billion[41,42] to federal health agencies to develop, purchase, and promote the mass use of vaccines in the US, but not to fund independent researchers to investigate vaccine-related health problems.

Dr. Link points out that different people will react to the same vaccine in different ways. Each person's reaction depends on a variety of factors, including his or her genes, history of infections and vaccinations, and general health. "The same vaccine will be totally ignored immunologically by one individual, but create immunologic chaos in another," he writes. Reactions also differ for the very young and very old.[43]

The people who suffer adverse reactions to vaccines often are infants and children; 45% of reports to VAERS concern children age six and under.[44] The problems incurred as a result of vaccination go far beyond sore arms and transitory fever. Adverse events such as anaphylaxis, Guillain-Barre syndrome, brachial neuritis, thrombocytopenia, poliomyelitis (caused by the oral polio vaccine, no longer used in the US), acute encephalopathy, and hypotonic/hyporesponsive episodes have been linked to vaccines.[45-48]

Some research also has suggested that sudden infant death syndrome (SIDS) is associated with vaccinations.[49-51] A study by FDA researchers of reports to VAERS from 1991 to 1994 found that most of the reported deaths were attributed to SIDS. The researchers concluded, however, that "the peak age of deaths at ages one to three months could be expected on the basis of prior studies showing that sudden infant death syndrome deaths peak at that age."[52] Similarly, the CDC's study of VAERS data from 1991 to 2001 found that the majority of deaths reported were ultimately designated as SIDS. This report also concluded that the age distribution and seasonality of the infant deaths reported to VAERS matched those of SIDS. The CDC cites other research discounting an association between vaccinations and untimely deaths of infants.[53, 54] Critics have noted, however, that a comparison with the background rate of SIDS among vaccinated populations, rather than comparable unvaccinated groups, is not meaningful.[55]

Unsound Principles of Vaccination

When children contract a disease such as measles or mumps, they generally develop a permanent protection against that disease. Such is not the case with vaccines. As Jamie Murphy observes, "The medical profession does not know how long vaccine immunity lasts because it is artificial immunity. If you get measles naturally, in 99% of the cases you have lifelong immunity. If you have German measles, you will have lifelong immunity [with rare second infections].... However, if you get a measles vaccine or a DPT vaccine, [it does not give you 100% assurance that] the vaccine will prevent you from getting the disease."[56]

The Vaccine Controversy notes that by vaccinating infants and children, we shift upward the age at which people may become ill from an infectious disease. "Mild illnesses of children can be devastating in the adult," the author states. "This is an issue far from resolved."[57] Widespread outbreaks

of pertussis and mumps in the past few years bear out the notion that waning immunity from childhood vaccines can leave adolescent and adults vulnerable to infection.[58, 59]

Walene James, author of *Immunization: The Reality Behind the Myth*,[60] believes the full inflammatory response is necessary to create real immunity.[61] James summarizes the work of Dr. Richard Moskowitz, past president of the National Institute of Homeopathy, as stating: "Vaccines trick the body so that it will no longer initiate a generalized inflammatory response. They thereby accomplish what the entire immune system seems to have evolved to prevent. They place the virus directly into the blood and give it access to the major immune organs and tissues without any obvious way of getting rid of it. These attenuated viruses and virus elements persist in the blood for a long time, perhaps permanently. This, in turn, implies a systematic weakening of the ability to mount an effective response, not only to childhood diseases but to other acute infections as well."

Studies of vaccines show that they prompt the body to produce antibodies to a particular antigen, called seroconversion. However, as Alan Phillips, co-founder of Citizens for Healthcare Freedom, writes in "Vaccination: Dispelling the Myths," it is not clear whether the production of antibodies constitutes immunity. "For example, a-gamma globulinemic children are incapable of producing antibodies, yet they recover from infectious diseases almost as quickly as other children....Natural immunization is a complex phenomenon involving many organs and systems; it cannot be fully replicated by the artificial stimulation of antibody production....[Our] immunological reserves may thus actually be reduced, causing a generally lowered resistance."[62,63]

Phillips also questions so-called "herd immunity," in which the immunization of enough people in a community confers protection to all. "There are many documented instances showing just the opposite – fully vaccinated populations do contract diseases. With measles, this actually seems to be the direct result of high vaccination rates...," he states.[64,65]

The Natural Evolution of Disease

A CDC fact sheet states that vaccination programs in the US have significantly reduced or eliminated many infectious diseases. However, this communication does not discuss factors besides vaccination that coalesced to improve public health in the twentieth century.[66]

A working paper from the National Bureau of Economic Research (NBER) makes the following points about the rates of mortality in the twentieth century:[67] ➤

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Mortality rates declined steadily and rapidly throughout the century. As stated by David Francis in a summary of the research, "Except for a ten-year period between 1955 and 1965 when the mortality rate was essentially flat, mortality rates have declined at the relatively constant rate of approximately one to two percent per year since 1900."[68] If vaccines are responsible for the decline of disease, then shouldn't mortality rates have fallen more rapidly in the latter half of the century when more and more vaccines were required?

In the mid-twentieth century, the continuing decline in death from infectious diseases was due more to medical measures such as penicillin, sulfa drugs, and antibiotics. As Francis states, "These help the elderly as well as the young, thereby reducing mortality across the age spectrum. By 1960, 70% of infants could be expected to survive to age 65."[69] Vaccinations were not mentioned in this paragraph.

In one analysis of health trends among Americans in the twentieth century,[70] the authors state that nearly 85% of the "spectacular" reduction in child mortality occurred before World War II, and nearly 90% of the decline in child mortality from infectious diseases occurred before 1940. Few antibiotics or vaccines were available during that time. The major declines in child mortality in the first third of the century, they say, have been credited to public health measures involving water treatment, food safety, organized solid waste disposal, and education regarding hygienic practices. Housing improvements and less crowding in cities also played a part.[71]

Given the factors involved in declining death rates, are vaccinations the magic bullets we believe them to be? Dr. Harris Coulter, an expert on the pertussis vaccine and co-author of *A Shot in the Dark*,[72] concludes otherwise.[73] Regarding infectious diseases of the past, he states, "The incidence of all of these infectious diseases was dropping very rapidly, starting in the 1930s. After World War II, the incidence continued to drop as living conditions improved. Clean water, central heating...these are the factors that really affected people's tendencies to come down with infectious diseases much more than vaccines. The vaccines might have added a little bit to that downward curve, but the curve was going down all the time anyway."

Toxic Vaccine Ingredients and Processes

Walene James cautions parents to consider the content of vaccines that enter a child's body without benefit of the digestive or liver functions. She says there are three main types of vaccine ingredients:

- Cultured bacteria and viruses

The medium of cultivation may include "dog kidney tissue, monkey kidney tissue, chicken or duck egg protein, chick embryo, calf serum, pig or horse blood, and cowpox pus."

James notes that these foreign proteins, which are injected directly into the body, contain the genetic material of animal cells. Live viruses in a vaccine may pick up the genes of these cells and implant alien genetic material into the human system.

- Stabilizers, neutralizers, carrying agents, and preservatives

These include toxins such as formaldehyde (a carcinogenic material used to embalm corpses) and aluminum phosphate.

This last category also includes some thimerosal, the mercury preservative that has been removed from vaccines commonly given to young children (with the exception of the influenza vaccine, which may still contain mercury). Thimerosal also may be found in some vaccines used in children above age six and in adults, such as DT, Td, TT, and influenza vaccines. According to the FDA, all new vaccines licensed since 1999 do not contain thimerosal as a preservative.[74]

In *What Every Parent Should Know About Childhood Immunization*, Jamie Murphy seconds the views of James: "What could formaldehyde, aluminum, phenol...or any number of other deadly chemical substances used in vaccines possibly have to do with preventing disease in children? The fact that they are needed at all in the vaccine formula argues that the product is toxic, unstable, and unreliable with or without their presence."[75]

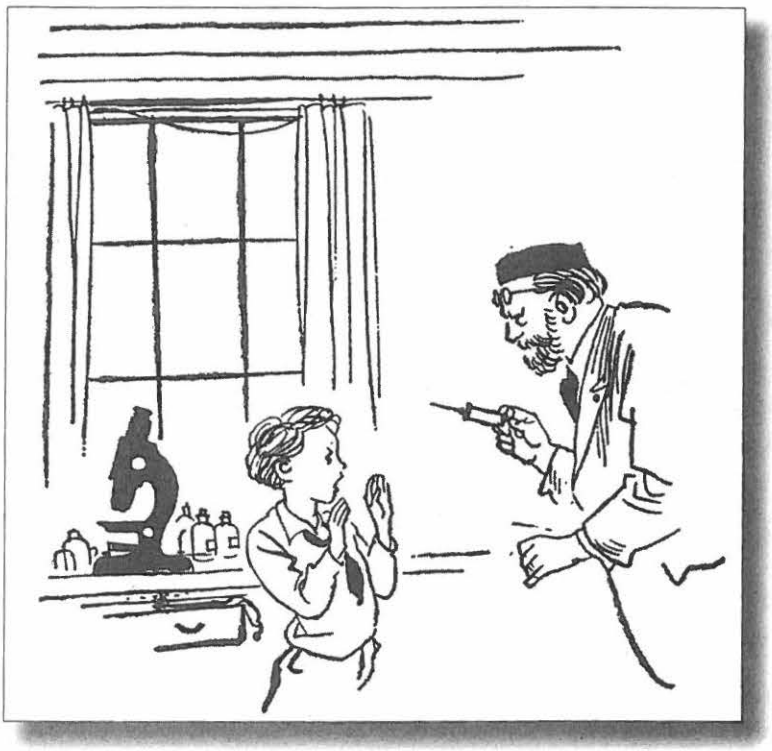
The Use of Thimerosal in Vaccines

One aspect of vaccination that has fueled considerable controversy is the use of thimerosal (which is approximately 50% ethylmercury by weight) as a preservative. This substance was contained in vaccines for many decades before the US Public Health Service (PHS) and the American Academy of Pediatrics (AAP) issued a statement in 1999 urging its removal.[76] Although the PHS agencies and AAP said this step was being taken as a precautionary measure – not because the mercury in vaccines had caused harm – the fact remains that as more vaccines were being mandated for children, the cumulative level of mercury to which some infants were exposed through vaccination exceeded that deemed safe by a federal guideline.[77,78]

Thimerosal has since been eliminated from or reduced to trace amounts in all the vaccines routinely given to children age six and younger, reports the FDA. The only exception for this age group is the influenza vaccine, for which a limited supply of a preservative-free version was available in 2006.[79] (Trace amounts of thimerosal may remain in some vaccines given to children, because it is used in the

manufacturing process, not from its use as a preservative). With the new vaccines (excluding influenza), the maximum cumulative amount of ethylmercury an infant would be exposed to in the first six months of life through routine vaccinations is now < 3 mcg. This exposure is down from a maximum of 187.5 mcg previously.[80]

While this change is certainly welcomed, we should ask why a neurotoxin such as mercury was allowed to be used in vaccines in the first place. Mercury exposure has been associated with nerve cell degeneration,[81] adverse behavioral effects,[82] and impaired brain development.[83] It also has been linked to degenerative chronic conditions such as Alzheimer's disease. The developing fetal nervous system is the most sensitive to its toxic effects, and prenatal exposure to high doses of mercury has been shown to cause mental retardation and cerebral palsy.[84]



At the center of the debate over the use of mercury in vaccines is whether this substance has contributed to an increased incidence of autism in the US. An analysis of VAERS and the Vaccine Safety Datalink found that mercury exposure from thimerosal-containing vaccines (TCVs) was a significant risk factor for neurodevelopmental disorders (NDs).[85] Other research, as discussed by David Kirby in *Evidence of Harm*, has suggested an association between mercury in the body and autism.[86-89] However, a number of population studies have found that there is no association between TCVs and the incidence of autism spectrum disorders.[90-92] The Institute of Medicine determined in a 2004 report that "the body of epidemiological evidence favors rejection of a causal relationship" between TCVs and autism and between the MMR vaccine, in particular, and autism.[93]

Concerns about the safety of mercury in vaccines continue. In 2006, Washington State passed a law banning the use of thimerosal in vaccines given to young children and pregnant women. This law made Washington the seventh state – after Iowa, California, Delaware, Illinois, Missouri, and New York – to limit the use of mercury in vaccines. More than a dozen other states have introduced similar legislation.[94]

A study published in 2006 provides the first epidemiological evidence that the number of neurodevelopment disorders has decreased in the US as thimerosal was removed from vaccines. This study analyzed certain NDs – including autism, mental retardation, and speech disorders – reported to VAERS from 1991 to 2004. It found "significant reductions in the proportion of NDs reported to VAERS as thimerosal was [beginning] to be removed from childhood vaccines in the US from mid-1999 onwards."[95]

A continuing concern is the use of thimerosal in vaccines that may be given to children age seven and older (such as some flu and tetanus-diphtheria vaccines) and to adults who are elderly or immune-compromised. The CDC recommended in 2004 that children six to 23 months of age receive the flu vaccine each year, and in 2003, it approved the "first live attenuated influenza vaccine licensed for five- to 49-year-old persons."[96] As late as the 2004-2005 flu season, however, two types of influenza vaccines were still on the market: some contained thimerosal as a preservative, and some were preservative-free. The CDC said then that the amount of preservative-free flu vaccine would continue to increase as the capabilities of manufacturers grew.[97] However, one wonders how many children are still suffering the effects of mercury-toxic injections from past flu seasons.

The FDA, for its part, says that with the maximum cumulative exposure to mercury for children under six months reduced to less than 3 mcg, "an infant could receive a thimerosal-containing influenza vaccine at six and seven months of age." The FDA reasons that the maximum exposure from routine vaccinations would be 28 mcg, which is "well below the EPA calculated exposure guideline for methylmercury of 65 micrograms for a child in the 5th percentile body weight during the first six months of life."[98] ➤

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Vaccine Failure and Waning Immunity

The medical literature documents many cases in which vaccines have failed to protect recipients from the targeted disease, either due to primary failure (a lack of seroconversion) or secondary failure (the waning of protection over time). In recent years, for example, large outbreaks of pertussis and mumps among both fully vaccinated and unvaccinated people have brought these two "vintage bugs," as *Newsweek* referred to them in 2006, back into the news.[99-103]

Pertussis is the only vaccine-preventable disease that is increasing in the US.[104] It is re-emerging even though estimated rates of childhood vaccination coverage with three or more doses have exceeded 90% since 1994.[105] Reported cases of pertussis reached 25,827 in 2004, compared with a low of 1,010 in 1976[106] – two years *before* the DTP vaccine was mandated for school admission. This represented the largest pertussis outbreak in more than 40 years, and the actual incidence is likely higher due to underreporting. The majority of reported cases are now occurring in adolescents, who the CDC says become susceptible to pertussis some six to ten years after receiving their childhood vaccines,[107] and in adults. But younger children who have been vaccinated against pertussis may be affected as well.[108]

The re-emergence of pertussis is not limited to the United States. Canada, Australia, and some European countries also have experienced a resurgence of this disease. A 2005 report concludes that "pertussis is far from being controlled in Europe."[109] Another analysis from the same year states that "an increased incidence of infant, adolescent, and adult pertussis has been observed worldwide since the introduction of widespread vaccination."[110]

Like pertussis, mumps also has had a resurgence in the US. The largest outbreak of mumps since the late 1980s occurred in 2006, when 5,783 cases were reported to the CDC between January 1 and October 7. Although the CDC does not have complete data on vaccination status in this nationwide outbreak, vaccination coverage for 1,798 patients in Iowa, where the outbreak started, was 49% for two doses of the MMR vaccine and 14% for one dose. The vaccination status of 30% of these patients was not known.[111] Other outbreaks of mumps have occurred in vaccinated populations.[112,113]

Another vaccine that may fail to protect recipients during an outbreak is the varicella (chickenpox) vaccination. Numerous studies have found that vaccinated schoolchildren are still at risk of contracting this disease.[114, 115] In an outbreak of 25 cases of chickenpox at a daycare center, the authors concluded that "vaccination provided poor protection" (44% against varicella of any severity) and that "breakthrough infections in vaccinated, healthy persons can be as infectious as varicella in unvaccinated persons."[116] In other studies of chickenpox outbreaks, the numbers of vaccinated people among infected individuals were: 29 of 54 cases,[117] 26 of 83 cases,[118] 43 of 49 cases,[119] 18 of 21 cases,[120] and 14 of 41 cases.[121] Vaccine effectiveness against varicella of any severity in these studies ranged from 59% to 87%.

The Use of Unproven Vaccines

A contentious area of vaccination is the use of experimental vaccines in the US military, particularly with personnel of the Gulf War of 1990-91, without their informed consent. Approximately 150,000 service members deployed to the Gulf received the anthrax vaccine.[122] Some Gulf troops also received the botulinum vaccine. In addition, the anthrax vaccine has been given to hundreds of thousands of military personnel since 1998,[123] when the Department of Defense (DOD) began a mandatory mass vaccination program to inoculate all 2.5 million members of the military against a potential attack with anthrax.[124]

Although the FDA licensed the anthrax vaccine in 1970, it was not approved for inhalation exposure. The DOD's mandatory anthrax vaccine program was ruled illegal in 2004 when a federal judge said the FDA had not followed its licensing regulations for the vaccine. The DOD was directed to "stop giving the experimental vaccine to military personnel without their

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voluntary, informed consent," according to the National Vaccine Information Center (NVIC), which recently launched the Military and Biodefense Vaccine Project to provide information on related vaccines. However, the FDA issued a Final Order in December 2005 stating the anthrax vaccine was safe and effective, and the DOD's anthrax vaccination program was again made mandatory in October 2006.[125]

The NVIC reports that when the FDA issued its Final Order in 2005, it "failed to provide evidence the vaccine was effective against inhalation (weaponized) anthrax and failed to address published research studies and 5,000 adverse event reports received by FDA demonstrating that anthrax vaccine is causing serous health problems."[126]

The anthrax vaccine is one possible cause of what is commonly referred to as Gulf War syndrome, the collection of chronic symptoms (such as fatigue, joint pain, headaches, skin rashes, and cognitive problems) that have been reported by veterans of this war. According to the Institute for Molecular Medicine, which studies chronic diseases, it is likely that a variety of exposures are responsible for the illnesses experienced by veterans with Gulf War Illness. These exposures include chemical mixtures, such as organophosphates, antinerve agents, and possibly nerve agents; radiological sources, including depleted uranium ammunition and possibly fallout from destroyed nuclear reactors; and biological sources, such as bacteria, viruses, and toxins.[127] (It should be noted that the Institute of Medicine stated in September 2006 that there is no unique cluster of symptoms that comprise a Gulf War syndrome.[128])

Regarding vaccines, a study of Kansas Gulf War veterans found that veterans who were vaccinated during the war but were not deployed to the region "may experience some of the same health problems" as veterans who served in the war. Among nondeployed veterans, 12% of those who received the vaccines had Gulf War illness, compared with four percent who did not receive the vaccines.[129] This researcher cites other studies that have found that vaccines against biologic warfare agents (such as anthrax and plague) and multiple routine vaccines in Gulf War veterans were associated with multisymptom illness as classified by the CDC.[130,131]

Next month, this article will continue with Part 2, a discussion of the health effects of vaccines for diphtheria, tetanus, pertussis, polio, chickenpox, hepatitis B, measles, mumps, and rubella.

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