

Vaccine Skepticism: Adverse Effects and Alternatives

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To my clients and friends: I wrote this paper during my training as a Nurse Midwife. At the time, there was little balanced information available about the risks and benefits and alternatives to routine vaccinations. I wanted to be able to provide my clients with a fair and balanced way to consider the issues around vaccinations.

I have updated some sections and am presenting this to you as a resource to get you started in obtaining more information on this important choice.

The body of the paper and the Summary of Diseases are as they were originally written in 1995. Several currently recommended vaccines were not yet developed in 1995 and the information on effectiveness and risks is from 1995.

I have updated the resource section to include web sites and availability of printed material. Only 10 years ago, none of these organizations had web sites.

I still stand by the general considerations I outline in the text and I think the thought process I propose is still relevant today. I do not believe that there is one answer to the vaccination issue. Vaccines are an important part of our modern medical armamentarium and routine childhood vaccinations should be considered carefully by parents.

Fort Myers - July 2006

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INTRODUCTION

Although many health care practitioners and public health officials promote vaccinations as the single largest cause of improved health in the twentieth century, debate over the safety and efficacy of vaccines has raged since Edward Jenner first inoculated people with cowpox to prevent smallpox. The eradication of smallpox is widely celebrated as medical science's greatest triumph over nature, inspiring the development of vaccines against a host of childhood illnesses. Childhood vaccination is now mandatory before school admission in all fifty states as part of efforts toward global eradication of numerous diseases. However, some parents and health professionals fear that vaccines themselves can cause illness and death, and question the wisdom of sacrificing a small number of children so that society as a whole can live free of historically devastating diseases. There is a growing body of anecdotal and scientific evidence that vaccines may not be safe and effective and may, in fact, constitute a dangerous assault on the immune system, leading to autoimmune and other disorders.

The role of widespread vaccination in the increasing rates of leukemia, asthma, autism, chronic fatigue, lupus, and AIDS will probably never be answered to anyone's satisfaction. However, there are clearly documented dangers of vaccines, including brain damage and death. Research continues into safer and more effective vaccines, even as parents are forced to allow some admittedly dangerous vaccines be given to their children. Public health considerations often win out over parents' attempts to assure the safety of their children.

As midwives we stand at the gates to medical technology, protecting our clients from over-treatment and promoting individualized care. The vaccination debate takes on many of the same overtones as the debate over the safety of out-of-hospital and midwife-attended births. The medical establishment, in its zeal to protect people from what it perceives to be danger lurking even in healthy populations, uses the threat of morbidity and mortality to attempt to coerce compliance. If dire warnings don't work, persecution and harassment of parents who choose to reject standard medical advice usually follow. As midwives we should support parents' efforts to become educated and take responsibility for their health care decisions. Undoubtedly, questions about vaccines will come up in our practices. We should be prepared to give parents a more complete answer than "ask your pediatrician".

The aim of this paper is not to convince anyone one way or another on the question of whether or not to vaccinate. Ideally, reading this paper will stimulate thought and further research. There is a large gulf between vaccine proponents and opponents; both sides claim that parents who reject their advice will suffer horrendous consequences. There is no middle ground on this topic, primarily because the information needed to evaluate any individual's risk/benefit ratio is lacking. Issues surrounding vaccination will be discussed along with supporting scientific evidence. Resources for more information are available in the Appendices. The decision to delay or refuse vaccination is a highly personal one. For many parents the answers lie not in science, but in their philosophy of health care and individual perceptions of risk.

HISTORY

In the United States, the vaccine era began in earnest with the introduction of Diphtheria, Pertussis, and Tetanus (DPT) in the 1940's. Pertussis, commonly called whooping cough, is a respiratory infection characterized by the "whooping" sound that is made by infected persons suffering paroxysmal coughing spells. Diphtheria is an acute respiratory illness, wherein a membrane forms that can cover the throat, making breathing difficult. Tetanus is a life threatening complication of some wound infections. In 1955, Dr. Jonas Salk developed a vaccine designed to prevent polio, a viral disease that can progress to paralysis. Albert Sabin's oral polio vaccine was licensed in 1960. Measles vaccine was introduced in 1963 to combat the respiratory viral infection most commonly recognized by the pink spots that cover those infected. Measles vaccine was combined with Mumps and Rubella vaccines as MMR in 1971. Mumps is a usually benign infection in children, producing in 40-50% of those infected the classic swollen facial glands. Rubella, also called German Measles, is a benign disease of childhood. The only reason to prevent outbreaks is to protect fetuses; when pregnant women contract rubella, their child can be born deaf or blind. (Plotkin & Mortimer, 1994)

Haemophilus Influenza is the most common cause of bacterial meningitis, an inflammation of the brain and spinal cord. A vaccine designed to combat it was first licensed in 1985. Varicella, commonly known as chicken pox, usually causes a benign vesicular rash, although complications such as pneumonia and hepatitis occur in a small number of cases. A vaccine was developed in 1974; it has been accepted for widespread use only this year. Hepatitis B is a serious infection that attacks the liver. It primarily affects IV drug users and medical personnel who have contact with infected blood. People who do not fall into the above categories can be infected through sexual contact. Developed and used for limited, high-risk populations in 1971, the vaccine was recommended for general use in infants in 1991. (Plotkin & Mortimer, 1994)

The rates of all diseases targeted have declined dramatically since the turn of the century. Diphtheria once killed 5 out every 1000 children younger than five years old, now it is almost unheard of, with an average of one case reported per year (Plotkin & Mortimer, 1994) In 1953, paralytic polio struck 1 out of 5000 people, many of whom recovered only with the assistance of "iron lungs" to maintain breathing when their respiratory muscles were paralyzed. There has not been a case of "wild" polio in the United States in years (Plotkin & Mortimer, 1994) Measles is usually a benign disease, however, pneumonia can develop in as many as 6% of cases, and fatalities have occurred. From 1900 to 1979, the death rate for measles fell from 13 to less than 1 per 100,000 infected (Cherry, 1980).

For most of these diseases, the overall incidence has declined since introduction of targeted vaccines. However, disease and death rates had already fallen dramatically prior to widespread vaccination. Mortality from diphtheria was already reduced to 6 per 100,000 children in 1940, before the introduction of the vaccine (Plotkin & Mortimer, 1994). Mortality from measles was already less than 1 per 100,000 infected in 1955, eight years before the vaccine was produced (Plotkin & Mortimer, 1994). In both

cases, although the diseases had already become less deadly before the introduction of vaccines, overall incidence has continued to decline to present low levels.

Most of these diseases, like all infectious illnesses, are fostered by poverty. Crowded conditions, poor nutrition, lack of access to medical care, and unsanitary conditions all contribute to the development and spread of disease. The general rise in living standards in this country probably contributed as much, if not more than vaccines to the reduction in mortality from childhood diseases (Hutchins et al., 1988). Clearly, clean living is not available to all members of this society due to continuing high rates of poverty. Proper hygiene and diet will also not prevent all cases of these diseases. However, conscientious parents who are careful with their children's health may consider the risk contracting these diseases to be low, but not zero, even if they do not vaccinate.

THE ARGUMENT AGAINST VACCINES

Concern about the health effects of vaccines has existed since the first inoculations. In Jenner's time, some feared that syphilis was transmitted along with protection against smallpox. The early vaccines were crude and unstandardized; numerous people were injured in the attempt to protect them from disease. There were plentiful case reports of tumors and paralysis in inoculated limbs of recipients; some people succumbed to overwhelming excema and curious wasting diseases shortly after vaccination. Many prominent physicians spoke out against vaccines and people were slow to accept them. The development of safer vaccines, advances in medical education, and compulsory vaccine schedules increased public acceptance. (McBean, 1993)

The debate is not over, however. Both Jonas Salk and Albert Sabin have gone on record stating that each other's vaccine is not effective. Economic competition may be at the root of their debate, but each has scientific evidence to support their argument. Contemporary vaccine opponents point to the undisputed fact that rates of vaccine targeted diseases, like all infectious diseases, were declining prior to introduction of vaccines to argue that vaccines are probably unnecessary. Furthermore, rates of cancer, auto-immune, and allergic diseases have risen sharply since the turn of the century, which is taken by some as prima-facie evidence that vaccines cause harm to the immune system. (Miller, 1994)

It is not disputed that routine vaccination has shifted the incidence of former childhood diseases to adolescent and adult populations, where some illnesses, such as mumps and measles can have more serious consequences for the person who contracts the disease. It is also not disputed that vaccines have adverse effects, ranging from irritation at the site of inoculation to death from encephalitis, an inflammation of the brain. (Plotkin & Mortimer, 1994)

Far more controversial assertions include claims that vaccinations actually increase susceptibility to target and other diseases. There is concern about allergies and contamination by animal viruses from the tissue cultures in which some vaccines are grown, as occurred when a monkey virus known to cause cancer in animals was found in an earlier polio vaccine strain (Plotkin & Mortimer, 1994). The chemicals that act as stabilizers, adjuvants, and preservatives have been shown to cause allergy and irritation and even autism-like symptoms. The principle underlying vaccines, that one can stimulate immunity while

bypassing the body's normal mechanism of producing antibodies has also been disputed. (Scheibner, 1993)

No medical intervention is without risk and even rare adverse reactions increase in importance as target disease rates decline. Because of numerous confounding factors, it is very difficult to determine what the long-term effects of vaccines might be. Epidemiology, the study of diseases in populations, is at times, a very imprecise science. Controlled clinical trials of vaccines have primarily been limited to safety and efficacy testing required by the FDA prior to introduction of new vaccines. The widespread use of vaccines is essentially an enormous experiment using our children as test subjects. Whatever health consequences may derive from long term reliance on vaccines remains to be teased out of often murky epidemiological data, with little hope of determining cause and effect.

VACCINE EFFECTIVENESS

It is very difficult to come to any firm conclusions about the effectiveness of vaccines. There is some evidence that, after introduction of vaccines against a particular disease, medical personnel assumed the effectiveness of the vaccine to eradicate the disease in question and stopped diagnosing the disease, attributing the symptoms to another disease with similar symptoms. For example, in Los Angeles County in 1955, reported cases of polio numbered 273. Reported cases of aseptic meningitis, which has a clinical course similar to polio, were 50. The polio vaccine was introduced in 1956. In 1966, reported cases of polio had dropped to 50, however, cases of aseptic meningitis had inexplicably risen to 256. Was the vaccine effective against the disease, or did the definition of polio simply shift as physicians expected it to disappear?

Once vaccines were introduced and disease rates fell, it became difficult for physicians to diagnose illnesses they considered unlikely to occur. The diseases targeted by vaccines, like most diseases, have variable clinical courses and sub-clinical infections occur frequently. Confirmatory laboratory tests either didn't exist until recently, or physicians who are certain of their diagnosis didn't perform them. It is possible that now that vaccines are widely available, only infections with classical symptoms are diagnosed and counted in compiling disease rates, artificially lowering reported incidence. (Miller, 1994)

Vaccines are designed to protect populations, not just individuals, from diseases. Every individual who is vaccinated will not necessarily develop immunity. However, if enough individuals do respond to the vaccine in a given population, the organism, who's natural host is humans, will not be able to sustain itself in that population and outbreaks will not occur or will be limited. This concept is referred to as "herd immunity". It protects both immune and non-immune members of a community. If the percentage of immune persons in a population falls below a certain percentage, generally around 70-90%, outbreaks of the disease will occur more frequently (Plotkin & Mortimer, 1994).

This is the reason that governments claim an interest in mandating vaccines, so that the unvaccinated do not pose a threat to the vaccinated. If vaccines truly conferred individual immunity, it would be no one's business if any individual chose not to vaccinate. The risk we ask some individuals to

take on, when some vaccines have dangerous adverse effects, is that a few individuals are, in effect, sacrificed, so that the rest of society may survive disease free. Unlike the virgins sacrificed to the gods in primitive societies, the victims of vaccines are not informed beforehand of their brave duty to their community. Nor are they exalted for their sacrifice.

Vaccines are designed to stimulate the body to protect itself from disease in the same manner as the development of natural immunity, through the propagation of antibodies, primarily IGM. However, secretory IGA antibodies, which sit in mucous membranes and form the first line of attack on foreign organisms, are not stimulated by vaccines (other than oral polio) (Plotkin & Mortimer, 1994). sIGA antibodies are also passed on to children through the placenta and breast milk. It is not yet clear whether there is a reduction in the protection afforded children through breastfeeding when their mothers carry immunity from vaccines versus immunity naturally acquired from encountering the disease.

There is some evidence that vaccinations may temporarily lower immune function. Researchers found that T-cell ratios fell to low levels for up to two weeks after tetanus booster doses in apparently healthy persons (Eibl et al., 1984). The levels averaged those found in pregnancy, which is well documented to be a relatively immune-deficient state, with increased incidence of viral and bacterial infections (Blackburn & Loper, 1992). This may bolster claims by parents that their children are more likely to suffer ear infections just after vaccinations (O'Mara, 1992).

Ironically, research is being completed on a vaccine against streptococcus pneumonia, the organism primarily responsible for childhood ear infections (Holt, 1994). So, if you believe that vaccines promote ear infections, there will soon be a vaccine to prevent the vaccine-caused illness. Even more disconcerting, given the belief that vaccines contribute to allergic disorders such as asthma and excema (McBean, 1993), is the nascent research into an "allergy" vaccine that would inoculate children with known allergens, along with a substance that presumably prevents formation of the T-cells responsible for allergic response (Holt, 1994).

The length of protection conferred by vaccines is variable, often requiring numerous booster doses. No vaccine has been demonstrated to confer serologic immunity for more than 10 years (Plotkin & Mortimer, 1994). Natural immunity also wanes over time, however, exposure to pathogens in the environment re-stimulates naturally acquired antibodies, allowing for life-long immunity in most cases (Plotkin & Mortimer, 1994). Vaccine-derived immunity does not respond to such exposure, only booster doses of the vaccine will raise antibody levels. There is some evidence that booster doses might not have a lasting effect on waning vaccine-derived immunity (Cherry, 1980). Immune response naturally decreases with age. Could we see devastating outbreaks of former childhood illnesses in elderly populations as the vaccinated generations become older? Only time will tell.

There is also some highly speculative research into the health consequences of avoiding these diseases. One researcher found a higher rate of Parkinson's disease in older men who had not had measles as children (Sasco, 1985). It should be noted that these men reached adulthood long before vaccinations were available, so this cannot be a consequence of measles vaccination, although it remains to be determined exactly what the significance of this preliminary study will be. The authors speculate that

there is a side effect of naturally acquired measles that somehow protects against Parkinson's. Perhaps what doesn't kill us really does make us stronger.

The recently introduced Hib vaccine demonstrates some compelling issues around vaccine effectiveness. It is designed to prevent Hemophilus Influenza meningitis, which affected 20,000 persons annually prior to introduction of the vaccine. Peak incidence is in infants 6-12 months old; 75% of cases occur in children younger than 24 months. The first vaccine, PRP, was not effective in children younger than 24 months of age, but it was distributed anyway, in an attempt to reduce the disease rates in older children. It did not work. Surprisingly, it may have actually increased the risk of acquiring invasive H. Influenza disease among vaccinated children; one clinical trial reported an efficacy rate of minus 58%.

A newer version, PRP-D was introduced in 1987. It was also not designed to protect the children most at risk, as it was ineffective in children aged less than 15 months. Given that both vaccines were documented to cause a small number of cases of Guillain-Barre syndrome, a transient paralytic disease, the vaccines appeared to be not just ineffective, but unsafe. (Plotkin & Mortimer, 1994)

Several generations of Hib vaccine have finally resulted in forms effective when administered at 2, 4, 6, 12, and 15 months. It is commonly administered with the DPT shot, however, there is some evidence that combining these vaccines reduces the response of the pertussis portion (Clemens et al., 1992). This Hib vaccine causes reactions including fever and irritability in up to 25% of vaccinees (Stratton et al., 1994). The history of just this one vaccine makes clear why parents might be suspicious of claims about vaccine safety and efficacy.

ADVERSE EFFECTS OF VACCINES

What are the documented dangers of vaccines? Probably the most disconcerting is the risk of contracting the target disease itself from the vaccine. Live attenuated vaccines, such as oral polio, have the potential to revert to virulence. Currently, the average 10 annual cases of paralytic polio in the United States are caused by the vaccine; no cases of wild polio have been reported in years. The vaccine is shed into feces or resides in the throat of vaccinees for several weeks after administration and can infect the recipient or a close contact. (Plotkin & Mortimer, 1994) The risk of contracting polio from the vaccine or a recipient is estimated at 1 per 500, 000 (Stratton et al., 1994). This risk is highest for persons with weakened immunity from diseases such as AIDS or cancer, but there are, albeit very rare, documented cases of unvaccinated infants catching live polio from a recently vaccinated playmate.

The first Polio vaccine, designed by Salk, is a killed (biologically inactivated) vaccine. It shows no risk of causing the disease in recipients or contacts; it is also reasonably effective. It was supplanted by the Sabin live attenuated vaccine because the live vaccine is cheaper, somewhat more effective, and considered more acceptable to parents because it is administered orally. The live oral vaccine is also stable at a range of temperatures. The killed vaccine is administered as a shot and must be refrigerated. This difference is negligible in the modern United States, but eradication of polio in developing countries could not have been contemplated without an oral, temperature stable vaccine.

The risk of a recipient or contact acquiring polio from the oral form was known at the time the vaccine was developed, but the risk was considered acceptable when weighed against the possibility of implementing a widespread global vaccination program, which was not considered feasible with the Salk vaccine. (Plotkin & Mortimer, 1994) Parents in the United States might make a different calculation and not be willing to accept even a tiny risk of their child contracting polio from the vaccination.

Years of protests by parents and some in the scientific community finally resulted in new guidelines for polio vaccination in the United States. As of October, 1995, the recommendation is to administer two doses of the killed vaccine at 2 and 4 months, followed by two doses of the live vaccine, at 6 and 18 months. Theoretically, the killed vaccine will protect children from the risk of polio when they are later given the live vaccine. (New York Times, 1995) This vaccine has been used since 1983 in France, with no reported cases of vaccine strain polio (Drucker, 1991). However, contacts will still bear the same risk of contracting polio from viral shedding in children receiving the oral form. In recent years, this has averaged 5 cases per year, primarily affecting unimmunized parents and playmates. (Stratton, et al, 1994)

The other hotly debated vaccine is Pertussis, commonly administered at 2, 4, 6, and 15-18 months and again at school entry, in combination with Tetanus and Diphtheria (DPT). This vaccine is a whole cell derivative of the *Bordetella Pertussis* organism. Like other vaccines, repeated generations of vaccines have been produced to overcome adverse effects and low efficacy. The whole cell vaccine currently in use has been demonstrated to cause acute encephalopathy, leading in some cases to brain damage and death (Howson et al., 1991). After the deaths of several infants, age at initial vaccination was shifted to 24 months in Japan (Kimura & Kuno-Sakai, 1990). Sweden canceled Pertussis vaccination in 1979 because of low demonstrated effectiveness in comparison to the risk of adverse effects (Romanus et al., 1987). Rates of vaccination declined precipitously in the United Kingdom in the early 1970's. Parents concerned about widely reported vaccine injuries boycotted the vaccine in large numbers and some physicians stopped administering it, although it was still officially recommended (Mortimer, 1988).

Primarily because of lobbying by parents of children injured by Pertussis vaccine, in 1986, the National Childhood Vaccine Injury Act was enacted. This legislation not only set up a mechanism for compensation of potentially injured persons and the reporting of suspected vaccine injuries, but also demanded a scientific review of available evidence for vaccine safety. The committees examined case reports, epidemiological studies, and biological models. It was determined that causation of acute encephalopathy and "unusual shock-like state" were demonstrated for Pertussis vaccine, as well as anaphylaxis and "protracted, inconsolable crying". (Howson et al., 1991)

The debate over Pertussis vaccine has led to the development of an acellular vaccine, currently completing clinical trials in Japan, Italy, and Sweden. So far, the vaccine has demonstrated improved efficacy and fewer adverse side effects, such as febrile seizures and protracted crying (Miller et al., 1991). However, given that the estimated occurrence of serious effects such as encephalopathy may be as low as 1 per 100,000, the clinical trials, which have enrolled no more than 65,000 children, can not reasonably be expected to determine the true safety of the vaccine. Once again, only widespread use of the vaccine

will allow for monitoring of rare adverse events. It is little wonder that parents of vaccine injured children are not embracing this new vaccine.

Rubella vaccine has also been associated with serious adverse effects. Up to 15% of adult women administered the vaccine will experience transient or chronic arthritis (Howson et al., 1991). Rubella is administered to children along with Measles (Rubeola) and Mumps vaccine as MMR. The first Measles vaccine, introduced in 1963, was a killed vaccine. Numerous case reports have demonstrated that recipients of killed Measles vaccine can contract "atypical" measles, a more serious and often life threatening variant of the wild disease. Concern about atypical measles and low efficacy of the killed vaccine lead to the development of live attenuated strains, introduced in 1968. (Plotkin & Mortimer, 1994)

Interestingly, the live vaccine can also cause atypical measles, but less commonly (Cherry et al., 1972). The current MMR vaccine is also responsible for thrombocytopenia purpura, a transient bleeding disorder considered to be of auto-immune origin, in 1 out of every 30,000 vaccinations (Stratton et al., 1994). Transient gait disturbances, often proceed by fever and perhaps caused by encephalitis, have been reported to occur more frequently after MMR administration (Plesner, 1995).

Other adverse reactions with evidence supported by the Academy of Science committee include anaphylaxis, a potentially life-threatening allergic reaction, for DT (DPT without P), the MMR vaccine, and the Hepatitis B vaccine; brachial neuritis in 1 per 100, 000 Tetanus recipients; Guillain Barre syndrome from oral Polio vaccine (Stratton et al., 1994)

DECISION MAKING

Discussions about vaccine safety usually center around the dangers of the target diseases. Anyone alive in the 1950's remembers the hysteria surrounding outbreaks of polio. Parents who choose to delay or avoid vaccinations are admonished that they are putting their children at risk of serious diseases. The author of this article had a childhood playmate who contracted polio and lived in an "iron lung" for a year in 1968, showing that the fear of polio was not un-justified.

The one question no one knows the answer to is: what risk are parents who don't vaccinate taking for their children's health?

Even vaccine promoters will concede that rates of childhood disease were declining prior to widespread vaccination. Because proof of vaccination is required only for school entry, many children are not vaccinated until after they have passed the most vulnerable period for morbidity and mortality from childhood diseases. Despite low vaccination rates in the ages most susceptible to the diseases, rates of the target diseases remain low and serious sequelae are rare. (Hutchins et al., 1988)

There are several factors at work here. Firstly, much of the hysteria over these childhood illnesses may be unwarranted. Polio was seen as an enormous threat to children in the 40's and 50's. What few people know is that 90% of persons who contract polio do not progress to the dangerous paralytic form; paralytic polio incidence was 1 out of 5000 cases of polio in 1953, killing 5-10% of those infected (Plotkin & Mortimer, 1994). I do not mean to underplay the seriousness of paralytic polio, which certainly killed and

permanently injured many children earlier in this century. However, when disease rates are discussed, the distinction must be drawn between polio and its much more dangerous paralytic form.

Second, many vaccine proponents point to the continuing damage and death caused by childhood illnesses world-wide as proof that vaccines are essential for children in 1st world countries, such as the United States. However, analyzing rates of diseases in undeveloped countries with poor nutrition, lack of sanitation, and deficient medical care to attempt to determine the risk of these disease for children in this country, who live in clean homes with plentiful food and excellent medical care is specious at best.

Third, the relatively small number of parents who do not vaccinate in this country may, indeed, be protected by the much larger number that do. The concept of herd immunity explains how they can escape serious consequences, because the diseases now occur at such low levels.

Fourth, now that we have largely eliminated these diseases it is appropriate to start asking what price we are paying. When polio was permanently paralyzing hundreds of children a year and killing some of them, it seemed silly to worry about a few cases of vaccine-caused disease. Now that polio is on the verge of global extinction, the demonstrated direct adverse effect of the vaccine has become an appropriate topic for discussion.

It is not fair to ask parents to play a numbers game to attempt to determine the relative risk of injury from the disease versus the vaccine. Reading the literature for and against vaccinations, it sometimes seems we are asking parents what they would rather their children die from, the vaccine or the disease. Life is not a zero sum game, and risk/benefit ratios don't mean much to any individual.

The motto of one of the vaccine injured parents groups is "When it happens to your child, the risk is 100%". They have a point, but so do the people who died from these diseases and are no longer here to debate the topic. There are too many confounding variables related to diet, general health status, and probability of encountering the disease causing organism to state with any certainty what any individual child's risk of either a vaccine reaction or injury from the disease will be.

Unfortunately, issues of convenience and expedience often win out in the debate around vaccines. Why is it that we now vaccinate day-old infants against Hepatitis B, a disease passed through blood and body fluids of infected individuals? Children are only very rarely observed voluntarily engaging in sexual activity with others or injecting illegal drugs. It follows that children are only conceivably at risk of contracting Hepatitis in adolescence, at the earliest, from sexual or drug related contact? (Note: an exception is an infant whose mother is a carrier of the disease, but routine testing for Hepatitis in pregnancy identifies the vast majority of these infants) Proponents of the vaccine point out that children can get the disease through bites from infected playmates.

Immunity conferred by the Hepatitis vaccine is only demonstrated to last 5-10 years (Stevens et al., 1992). Therefore, we may be wasting our time, money, and possibly our children's health by targeting day-old hospitalized infants. It is admittedly more difficult to organize the vaccination of 15 year olds, but wouldn't a wiser course perhaps be to vaccinate at junior high school entry, which is a great time to provide boosters for all the other diseases that can affect adolescents and adults, such as MMR and Chicken Pox?

No one is calling for a moratorium on vaccinations. What responsible parents want is more information, safer vaccines, and choices about when and how to treat their children. Many parents of vaccine injured children seem most upset that not only were they not informed of potential dangers beforehand, but also their children's adverse reactions were often dismissed as improbable by their pediatricians.

The decision to forego or delay vaccination is a highly personal one. Vaccines do not necessarily protect against disease; avoiding them does not guarantee health. Parents will have to live with the consequences of their decision; their pediatrician is not raising their children. One author on this subject gives what seems to be good guidance: "Whatever your decision may be, make it one you will feel comfortable explaining to your child twenty years from now" (O'Mara, 1992)

ALTERNATIVES

Parents can legally refuse vaccination on medical grounds in all fifty states, if their child meets certain specified criteria. Additionally, religious exemption is allowed everywhere except West Virginia and Mississippi. Philosophical exemptions exist in 14 states. In New York, where philosophical exemptions are not allowed, a recent State Supreme Court ruling held that parents need not be members of any organized religion to refuse vaccination, essentially allowing articulate parents to fashion a philosophical refusal (Rozario, 1995).

Children in every state cannot be denied admission to a public school if they have one of these exemptions. Private schools and daycare centers are allowed individual policies and can, and typically do, refuse admission to unvaccinated children. However, if the child is protected by a religious or philosophical exemption, a private school could be sued by the parents for discrimination by refusing entry to the child. Apparently, few take this chance. Parents who do not vaccinate are commonly required by private schools and day cares to take their children out of school during periodic outbreaks of diseases. The irony of isolating their unvaccinated children to protect vaccinated children is not lost on parents who choose not to vaccinate. (Neustaedter, 1990)

Some parents choose to delay some vaccinations until the child is older and presumably better able to handle the stress on their immune systems, or the child is more likely to encounter the disease. Even medical practitioners are concerned about overwhelming children's immune systems with numerous simultaneous vaccinations (Clemens et al., 1992).

Delaying some vaccines could reduce the stress on the child and possibly increase the effectiveness of the vaccine. For example, Tetanus vaccine can reasonably be delayed until the child is walking and at risk of deep, dirty puncture wounds. Tetanus Immune Globulin is available and can be given immediately after injury and protects well against the disease in non-immune persons. Giving the Tetanus vaccine as acute treatment has no value. Parents should know the difference and be prepared to assert themselves with less informed medical practitioners.

A child who does not contract rubella in childhood can choose to be vaccinated as an adult or adolescent to protect themselves during pregnancy or to protect other pregnant women.

Chicken pox is such a benign disease in childhood that widespread vaccination is only considered cost effective if parents' lost days at work are calculated (CDC, 1995). Parents who are able to isolate their children for 15-21 days during the contagious period of Chicken Pox may choose to forego this vaccine. The same is true of mumps. Measles is a slightly more serious disease and consideration must be taken before lightly dismissing the vaccine. However, diet can have an impact on the seriousness of the disease.

Conscientious parents can decide to vaccinate their children against Hepatitis B in early adolescence when they are more likely to require the protection from this sexually transmitted disease. Diphtheria has been almost entirely eradicated, although it is a serious disease when it occurs. Parents must weigh their options carefully before foregoing the vaccine. The same is true of pertussis. It remains at endemic levels in this country, however, so vaccination will not necessarily prevent the disease. Unlike the other childhood diseases, there is no immunity to pertussis passed on through the placenta or breastmilk. There have been no deaths from either the vaccine or the disease in Japan in the fifteen years since vaccination was shifted to two years of age. It might not be an unreasonable course of action to choose to vaccinate with DPT at 18-24 months.

Parents who choose not to vaccinate against polio should consider that their children stand a very small chance of contracting the disease from playmates who receive the oral vaccine. They can consider administering the killed vaccine at 2, 4, and 6 months, or isolating their child from recent vaccine recipients for up to one month.

Parents must make a careful decision about haemophilus influenza (Hib) vaccine. This disease is most common between 6-12 months.

These are not decision to be taken lightly. Vaccines were developed to combat these diseases because they injured or killed children in large numbers. Parents must be well informed and must seek a sympathetic pediatrician. It has been reported that some pediatricians have turned non-vaccinating parents over to social services. Some pediatricians refuse to care for unvaccinated children. If children are not vaccinated, the parents and their pediatrician must know the symptoms of the diseases and supportive treatments must be initiated in a timely fashion if their child is infected.

What can parents who refuse or delay vaccinations do to safeguard their children's health? Diet seems to play a large role in vulnerability to these diseases. For example, vitamin A supplementation has been shown to reduce the severity of measles infections (Krobner et al., 1991). A startling relationship has been proven to exist between polio and excess sugar consumption. A North Carolina researcher observed this relationship and managed to convince most of the state to decrease children's intake of sugar for one summer during a polio epidemic in 1949. One million fewer gallons of ice cream were shipped to the state, Coca Cola sales plummeted, and polio rates dropped dramatically, from 2,498 in 1948 to 229 in 1949. By the next summer, the conclusions were no longer widely accepted, sugary treats were again widely available and polio rates returned to their former level. (Miller, 1994)

Clearly diet alone will not prevent outbreaks of these illnesses. Homeopathy, the principles of which are actually somewhat similar to medical vaccines, has long been out of favor in this country.

Homeopathy has nonetheless shown remarkable efficacy in treating and preventing communicable diseases. In controlled studies, homeopathic treatment demonstrated effectiveness against meningitis (Castro & Nogueira, 1975), polio (Eisenfelder, 1961), and pertussis (English, 1961). In homeopathic treatments a small amount of the organism or a component of its biologically active constituents is administered in an attempt to induce the body to fight off the disease. The treatments are administered orally so they more closely match naturally occurring immune response. Homeopathic treatments are also individualized to the person's symptoms. Parents may encounter some difficulty in locating a homeopathic practitioner if they do not live in a populous area. (Neustaedter, 1990)

Some parents subscribe to the concept of "natural immunity". They believe that organisms do not cause disease without certain conditions present, such as weakness and nutritional imbalances. Under this system of thought, vaccinations and even antibiotics are considered dangerous, because they weaken the bodies ability to fight off the disease. Living free of stress, consuming foods without additives, and avoiding environmental toxins are hallmarks of natural immunity. (O'Mara, 1992)

CONCLUSION

As stated repeatedly in this paper, there are no easy answers to the question of whether or not to vaccinate your children.

One final issue merits consideration: the responsibility of organized medicine and pharmaceutical companies in promoting vaccines. Because vaccination is mandatory, the pharmaceutical manufacturers have an enormous captive market for their products. Pediatricians can effectively compel billable office visits. Obviously, neither of these groups has any interest in researching alternative treatments or determining if vaccines actually work. As a matter of fact, as deadly vaccine targeted disease wane in incidence, new vaccines are developed for merely annoying illnesses, such as ear infections, that are harmful to only a small number of children. There is even research into a single vaccine against just about every pathological organism known to man.

The complicity between physicians and public health officials and the government in handing out multi-billion dollar contracts to pharmaceutical companies is disturbing, to say the least. Pharmaceutical companies are also unwilling to bear the costs of dangerous vaccines. They are now protected from liability by the federal compensation system, paid for by a surcharge on all vaccine sales. Pharmaceutical companies were the chief supporters of the National Childhood Vaccine Injury Act, so that they could preserve their profits on mandatory vaccines.

Parents who are skeptical of vaccines and the medico-legal industry behind them have a lot of resources available to them these days. Persons who tend to believe conspiracy theories will find company in the anti-vaccine movement. Distrust of big government intrusion into our personal lives combined with suspicion of the motives of multi-national pharmaceutical companies opens the door for all kinds of speculation, conjecture, and hypothesis masquerading as scientific evidence.

I would caution parents researching this issue to take all advice and evidence with a strong grain of salt, even the measured opinion promoted here. In preparing this paper, I read all the currently available

mass-market articles and books published on this subject. Some of the authors are so blinded by their bias against vaccines that their pseudo-evidence and pseudo-science are to be dismissed as untrustworthy by all but the most radical of parents. In the resource guide in the Appendix are listed publications and organizations where parents can find reliable information.

Obviously, responsible parents do not make important medical decisions based on conjecture and hypothesis. Parents who choose to examine this issue are generally sincere in their wish to seek the best health for their children, rather than what is often characterized as knee-jerk rejection of modern medicine. Parents who question routine vaccines or want to adjust the schedule of administration are sometimes compared to religious zealots who reject proven medical treatments in favor of faith, such as parents who prefer prayer to insulin for their diabetic child. This characterization of these questioning parents as ignoring the health of their children for political reasons is entirely unfair. If there was as much evidence of the effectiveness of vaccines as there is for insulin in the treatment of juvenile diabetes, reasonable parents would embrace vaccines as the healthiest choice for their children and consider them well worth any risk.

What really creates an opportunity for parents to question routine vaccinations is the limited effectiveness of the vaccines combined with the risks and side effects. If the vaccine can not be guaranteed to protect the recipient, why should the recipient accept the risks of the medication? What parents are never told is that many vaccines are not designed primarily to protect the recipient, but to create herd-immunity and prevent disease outbreaks. The shot may protect their individual child from the consequences of the disease or it may not. The shot might also create health problems for the child or it may not.

I think it is reasonable for parents to decline to potentially sacrifice the health or life of their child for the benefit of others. This might sound like a terribly selfish argument, but the right to individual autonomy in medical decision making (and proxy decision making by parents for their minor children) is a well established legal principle in this country. It is one of the bed-rock principles of our democracy, after all, that our citizens have the right to life, liberty, and the pursuit of happiness and that we should be free from aggressive government intrusion into our lives.

APPENDIX A: RESOURCES FOR PARENTS

Note: The mainstream scientific community has been slow to consider risks of vaccinations. Some of what is available as evidence against vaccinations has questionable scientific merit. Further research is needed to determine the true risk/benefit ratio. I have not read all of the available literature on vaccinations, but present here a list of sources of information. It took me weeks to collect all the sources I used for this paper, hopefully this list will shorten the search for others interested in becoming more informed.

MEDICAL TEXTS

Physicians Desk Reference

Available in most libraries. Contains package inserts with information about composition, indications, contraindications, and adverse effects of vaccines. You must know the name of the vaccine to find it in the PDR, or look in the index under "Biologicals". (It took me over an hour to find out how to find vaccines in the PDR)

Adverse Effects of Pertussis and Rubella Vaccines &

Adverse Events Associated with Childhood Vaccines. Institute of Medicine, National Academy Press.

Probably only available in medical libraries. Only appropriate for parents able to understand medical language. These reports were called for by the National Childhood Vaccine Injury Act. The most comprehensive review of scientific literature on vaccine safety to date.

Vaccines by Plotkin & Mortimer. W.B. Saunders Company.

Also only available in medical libraries. This is a medical reference book for physicians. It details exhaustively the history and manufacture of vaccines. Epidemiology of the diseases is discussed, as well as short-term adverse effects. Interestingly, the authors dismiss some of the findings of the Institute of Medicine reports. More readable for a lay person than the Institute of Medicine reports, but highly biased in favor of vaccines.

GENERAL INTEREST PUBLICATIONS (UPDATED 2006)

The Immunization Resource Guide: Where to find answers to all your questions about childhood immunizations. By Diane Rozario. Only available from Patter Publications. (800) 356-9315

<http://patterpublications.hypermart.net/index.html>

After introducing the basic debate over vaccinations, the author reviews most of the available literature on vaccinations. She provides publication information about resources pro and con, obtaining exemptions, and alternative treatments. Addresses for pharmaceutical companies, government organizations, parent's groups, and publishers are listed. Since many of these resources are not easily available, this guide is helpful for parents who are starting their search for information.

Vaccinations The Rest of the Story: A Selection of Articles, Letters, and Resources 1979-1992

Out of print (as of 2006)

Mothering Magazine is a holistically oriented periodical about pregnancy, childbirth, and parenting. Letters and articles by parents and medical providers cover the debate over vaccinations quite thoroughly. Although many of the articles are referenced, the collection is short on scientific evidence. The tone is balanced, with an emphasis on parents making an informed decision. A good book to start.

Vaccination: The Issue of Our Times. Mothering Magazine.

When this special issue was published in 1998, it was the most up-to-date and balanced look at the vaccine debate available at the time. It is currently out of print and not available at mothering.com, but a revised edition is scheduled to be published in October, 2006.

What Your Doctor May Not Tell You About Children's Vaccinations. by Stephanie Cave, Deborah Mitchell.

Warner Books

Provides detailed info on the various vaccines currently required/suggested by state and federal governments; reviewing in depth the history of the diseases and related vaccines, ingredients used to make and preserve the vaccines, background studies and recent research available on a variety of the vaccines and also a risk/benefit analysis per vaccination. What this book offers (that your doctor's office may not) is a look at both sides of the vaccination issue and gives you a well-rounded resource package so you can best decide when/what vaccines to give your child.

How to Raise a Healthy Child in Spite of your Doctor. By Robert Mendelsohn, MD. Ballantine Books.

The late Dr. Mendelsohn was a pediatrician for thirty years. He is highly critical of the medical establishment, stressing that most medical care is unnecessary and encouraging parents to take an active role in deciding when to take their child for treatment. He details common medical complaints and describes which symptoms are serious enough to warrant medical care. There is one chapter on vaccinations, which outlines, without references, the arguments against routine vaccination. A good guide for independent minded parents who would like to be less dependent on physicians.

The Immunization Decision: A Guide for Parents. By Randall Neustaedter. North Atlantic Books.

A fairly balanced look at vaccines and alternative treatments. Most of his conclusions are based on scientific research and he provides references. Some of his conclusions are a bit shaky, such as suggesting that low rates of these diseases justify refusing vaccines, ignoring any possible role of vaccines in reducing incidence. He discusses every common vaccine in a logical format, with historical and current incidence, adverse effects, and vaccine effectiveness detailed clearly and concisely.

Vaccines: Are They Really Safe and Effective. A Parent's Guide to Childhood Shots. By Neil Miller. New Atlantean Press.

A highly inflammatory rant against vaccines. Relying primarily on poorly referenced anti-vaccine books, he makes a persuasive argument that vaccines are dangerous and unnecessary. Along the way, he brings up valid points for consideration and further research. Be prepared to have any faith you have in the medical establishment shaken by this book.

Note: The following books are extremely biased against vaccinations. They contain exhaustive reviews of vaccine effectiveness and safety, with many conclusions based on conjecture. Expect to come away persuaded that vaccines are dangerous and unnecessary. The McBean book is difficult to find, but contains fascinating historical information, including the heated medical debate at the time of vaccine introduction.

Vaccination: 100 Years of Orthodox Research shows that Vaccines Represent a Medical Assault on the Immune System. By Viera Scheibner. New Atlantean Press (505) 983-1856

The Poisoned Needle: Suppressed Facts About Vaccination. By Eleanor McBean.

WEB RESOURCES (UPDATED 2006)

AUTHORS COMMENTS IN ITALICS

National Vaccine Information Center

Parents' group that supports informed choice, but leans heavily against vaccines. Comprehensive web site for general and state-specific information regarding vaccine reactions and parent/child choice regarding vaccines.

512 W. Maple Avenue, Suite 206 Vienna, VA 22180 800-909-SHOT Fax: 703-938-5768

www.909shot.com

Vaccine Awareness of Florida

Detailed information on Florida Law and Statutes regarding vaccinations and exemptions. Children in Florida can attend day-care, pre-school, private, and parochial schools and refuse vaccinations.

<http://www.know-vaccines.org>

CDC: Information on immunization, vaccines and the diseases they prevent.

www.cdc.gov/nip *Centers for Disease Control public information site on vaccinations. More interesting than informative for questioning parents. Recommended vaccination schedules for various populations.*

Immunization Action Coalition: Provides childhood, adolescent and adult immunization information and education materials.

www.immunize.org

Appearing to be an independent vaccine education site, it is actually funded by all the vaccine manufacturers and the CDC.

Institute for Vaccine Safety: Information on vaccines currently in the media including anthrax, hepatitis B, MMR, and thimerosal.

www.vaccinesafety.edu

Unabashedly pro-vaccinations, published by Johns Hopkins School of Public Health. Provides up to date scientific studies on vaccine issues, such as thimerosal and autism.

National Network for Immunization Information: Information about immunization including a guide to evaluate vaccination on the web.

www.immunizationinfo.org

Pretty much pro-vaccination, but provides detailed and unbiased, reliable scientific information free of hype or hysteria. Great place to read about the pro-vaccination argument for each disease. Will assist parents to make a truly informed choice. Not sponsored by government or pharmaceutical companies.

APPENDIX B: SUMMARY OF DISEASES AND VACCINES (COMPILED IN 1995)

Haemophilus b Influenza

Prior Incidence	Peak incidence 6-12 months Increased risk: Day care settings, low socio-economic status, African- and native-Americans, sickle cell disease Cumulative risk < 5 years old: 1/200
Current Incidence	Decreased by 71-94% in highly vaccinated populations
Organism	Bacteria
Transmission	Close physical contact Many people are colonized without developing the disease
Description	Invasive Disease: Meningitis (60% of invasive disease cases) Mortality 5% Neurological Damage 38% Bacteremia Pneumonia Septic Arthritis Epiglottitis Pericarditis Osteomyelitis
Treatment	Antibiotics Supportive Care Homeopathy
Vaccine	Hib
Preservative	Thiomerosal
Preparation	Cultured with non toxic diphtheria strain and yeast
Contraindications	Caution if previous vaccine reaction Caution if demonstrated allergy to any vaccine components Delay vaccine if acute or febrile illness is present
Adverse Reactions	HibTITER Fever < 101 2% Swelling, Redness, Warmth 3% ProHIBiT (used as booster 12-15 months or as primary at 15 months) Irritability 28% Drowsiness 20% Vomiting/Poor eating 10% Redness 4% Swelling 4% Tenderness 4% Other Adverse Reactions: Incidence not specified Urticaria Seizure Renal Failure Guillain-Barre syndrome Thrombocytopenia
Possible Alternatives	Because the incidence of this disease peaks at less than a year of age, delaying the vaccine is not advised. Parents should either give on the recommended schedule, or refuse the vaccine entirely.

Poliomyelitis

Prior Incidence	20 cases paralytic polio per 100,000 population 1953	
Current Incidence	10 vaccine strain cases/year (average 1986-91)	
Organism	Virus	
Transmission	Live (oral) vaccine Close contact, virus shed in feces and pharyngeal secretions High sugar diet may increase susceptibility Poor sanitation may foster transmission	
Description	Appears initially as mild flu-like illness, progresses to paralytic form in 10%. Paralytic polio causes transient paralysis of skeletal or respiratory muscles, permanent skeletal muscle damage possible, death from respiratory failure and superimposed bacterial infections possible.	
Case Fatality Rate	5-10%	
Treatment	Supportive Care Intubation Homeopathy	
Vaccine	Inactivated Vaccine (Injection)	Live Attenuated Vaccine (Oral)
Preservative	Formaldehyde 2-Phenoxyethanol	none
Preparation	Cultured on monkey kidney cells Neomycin Streptomycin Polymixin B	Cultured on monkey kidney cells Calf serum Neomycin Streptomycin
Contraindications	Hypersensitivity to any component of vaccine, including neomycin, streptomycin, polymixin B Anaphylactic reaction to previous dose Delay vaccine if acute febrile illness present	Do not administer to immune-compromised persons or to anyone living with such. Delay if acute febrile illness is present. Delay if gastrointestinal viral illness suspected (vomiting, diarrhea)
Adverse Reactions	Note-IPV is given concurrently with DPT, therefore, it is impossible to determine if any observed reactions were attributable to IPV alone. Fever <102 38% Redness 3% Pain 13% Drowsiness Fussiness Decreased appetite Spitting up feedings	Paralytic polio in recipient 1/1.2million first doses Paralytic polio in contact 1/1million first doses
Possible Alternatives	This is the alternative. The inactivated polio vaccine has not been demonstrated to cause polio. Polio is fortunately very rare at this time and appears to have been eradicated in this country; however, importation of cases is possible. Parents must determine for themselves whether to give the vaccine on recommended schedule, delay, or refuse the vaccine.	No vaccination. Administration of 2-3 doses of IPV prior to administration of 2-3 doses of OPV. Administration of IPV to non-immune or immune-compromised contacts. No recommendation can be made on delaying vaccination.

Hepatitis B

Incidence	<p>Lifetime risk (for persons not in high risk categories): 5%</p> <p>Infants contract Hepatitis B prenatally from their infected or carrier mothers, these infants are recommended to receive hepatitis immune globulin and hepatitis vaccine.</p> <p>Highest risk:</p> <ul style="list-style-type: none"> Medical and emergency services personnel Hemodialysis patients (or anyone requiring frequent transfusions) Subpopulations with a known high incidence of the disease (i.e. Asians, Haitians) Prisoners Users of illicit IV drugs Persons with high risk sexual practices (i.e. multiple partners, prostitutes, some homosexuals) <p>All others are at risk primarily through sexual contact</p>
Organism	Virus
Transmission	Blood
Description	<p>Acute and sub-clinical infections possible</p> <p>Acute illness characterized by:</p> <ul style="list-style-type: none"> fever, malaise, headache, and myalgia, jaundice <p>Possible sequelae:</p> <ul style="list-style-type: none"> liver necrosis and cirrhosis, chronic hepatitis, liver cancer
Treatment	Supportive Care
Vaccine	Engerix-B
Length of Immunity	5-10 years
Preservative	Thiomersal
Adsorbative	Aluminum
Preparation	<p>Manufactured by recombinant DNA process</p> <p>Cultured with yeast</p>
Contraindications	<p>Hypersensitivity to yeast or any other component of the vaccine</p> <p>Previous reaction to this vaccine</p> <p>Caution in pregnancy and lactation</p>
Adverse Reactions	<p>Redness, swelling, fever, headache, dizziness <10% doses</p> <p>Numerous systemic responses occurring <1% doses:</p> <p>Malaise, chills, weakness, flushing, tingling, hypotension, flu, URI, nausea, anorexia, vomiting, constipation, diarrhea, lymphadenopathy, arthralgia, myalgia, rash, drowsiness, irritability, agitation, insomnia, neuropathy, thrombocytopenia, eczema, visual disturbances.</p>
Possible Alternatives	<p>No Vaccine</p> <p>If a careful evaluation of risk factors reveals risk of contracting hepatitis to be primarily through voluntary adolescent or adult behaviors, responsible parents can reasonably delay this vaccine until at least 10 years of age.</p>

Measles-Mumps-Rubella

	Measles	Mumps	Rubella
Prior Incidence	40,000 cases per year 1970	100,000 cases per year 1970	20-60,000 cases per year
Current Incidence	3,000 cases per year (Up to 60% of whom were properly vaccinated)	3-13,000 per year 1980-87	200 cases per year 1988 1-3 cases of congenital rubella
Organism	Virus	Virus	Virus
Transmission	Respiratory (Airborne droplets)	Respiratory (Airborne droplets)	Respiratory
Description	Fever, malaise, cough followed by rash	Fever, headache, malaise followed by swelling of parotid glands	Very mild fever, rash, malaise
Case Fatality	0.1-1.0 per 1000 cases Highest mortality < 1 year of age Poor nutrition and sanitation may increase risk of death	Rarely fatal, but more likely to be fatal in adults	Unlikely to be fatal
Other Problems Associated with the Disease	Otitis Media 7-9% cases Pneumonia 1-6% cases Diarrhea 6% cases Encephalitis 1/1000 cases SSPE (degenerative central nervous system disorder which occurs many years later) 1/100,000 cases	Deafness Myocarditis Arthritis (most common in adults) Mastitis (women >15 years old) Encephalitis 4-6% cases (most common in adults) Orchitis 20-30% of adolescent and adult males who contract the disease (rarely causing sterility), increasing their risk of testicular cancer	Chronic arthritis Encephalitis Thrombocytopenia Congenital rubella: 20-50% of infants born to mothers who contract rubella in pregnancy will have birth defects such as deafness, blindness, and mental retardation
Treatment	Supportive care Vitamin A Homeopathy	Supportive care Homeopathy	Rarely needed
Vaccine	Each vaccine is available separately, but they are usually administered together as MMR		
Effectiveness	75-95%		
Length of Immunity	10 years		
Stabilizers	Sorbitol and Hydrolyzed Gelatin		
Preparation	Cultured on chick embryos (measles and mumps), human cells (rubella), prepared with neomycin		
Contra-indications	Pregnancy Anaphylaxis to neomycin Anaphylaxis to eggs Active untreated tuberculosis Caution with history of cerebral injury, febrile or non-febrile convulsions, or family history of convulsions Caution administering to lactating mothers May result in temporarily decreased response to tuberculin skin testing		
Adverse Reactions	Local reactions—redness, tenderness Malaise, sore throat, cough, rhinitis, headache, dizziness, fever, rash, nausea, vomiting, diarrhea, otitis media, conjunctivitis, lymphadenopathy, parotiditis, orchitis, nerve deafness, thrombocytopenia, polyneuritis, encephalitis, ataxia, Guillain-Barre syndrome, SSPE Arthralgia and/or arthritis <3% in children, 12-20% in adult women, usually transient.		
Possible Alternatives	No vaccination. Each of the three vaccines is available separately, so administration of one or more single vaccines can be an option. Mumps and rubella are usually minor illnesses, measles is a somewhat more serious disease. However, mumps and rubella infection during pregnancy can contribute to miscarriage and birth defects. The value of these vaccines is not their ability to protect the recipient, but their ability to reduce harm to fetuses by reducing the likelihood of adult women contracting the disease. Adult women who are not protected by antibodies will have less chance of infection if the rate of the disease is low in children. Parents will have to determine for themselves whether or not they consider this a valid reason to vaccinate. Rubella vaccine is available for administration to adolescent children before initiation of childbearing.		

Diphtheria-Pertussis-Tetanus

	Diphtheria	Pertussis	Tetanus
Prior Incidence	20,000cases/year 1921	120,000 cases/year 1,100 deaths 1950	?
Current Incidence	15 cases/year 1983	3,500 cases 1983 10 deaths/year 75% deaths <1 year old	90 cases/year 1983
Organism	Bacteria	Bacteria	Bacteria
Transmission	Close respiratory and physical contact	Close respiratory and physical contact	Neonatal: Unsterile birth conditions Children & Adults: Deep wounds contaminated by soil containing animal feces
Description	Low grade fever Membrane covering pharynx Can lead to asphyxia	Low grade fever Paroxysmal cough lasting 2-6 weeks Can lead to asphyxia	Painful and debilitating muscle spasms
Case Fatality Rate	< 2%	Rarely fatal	25%
Other Problems Associated with the Disease	Myocarditis Peripheral neuropathy	Pneumonia Acute Encephalopathy Subarachnoid Hemorrhage Nutritional Deficits	
Treatment	Antitoxin Supportive Care Tracheostomy Homeopathy	Supportive Care Intubation Homeopathy	Immune Globulin Supportive Care Muscle Relaxants Antibiotics Homeopathy
Vaccine	Usually given together as DPT or Tetramune: DPT + Hib Could also be combined with Inactivated Polio Vaccine Available separately or DT alone Pertussis available in whole cell or acellular form		
Length of Immunity	10 years		
Estimated Effectiveness	79-98%		
Preservative	Thiomerosal		
Adsorbative	Aluminum		
Contraindications	<p>Hypersensitivity to Thimerosal</p> <p>Febrile illness (mild URI not a contraindication)</p> <p>Any prior reaction considered to be a contraindication such as:</p> <ul style="list-style-type: none"> Underlying neurological disorder Seizure within 3 days of previous dose Encephalopathy within 7 days of previous dose <p>Any of the following occurring in a temporal relation, careful consideration before future dosing:</p> <ul style="list-style-type: none"> Anaphylaxis within 7 days Temp >40.5 C (105) within 48 h Collapse or shock like state within 48 h Persistent inconsolable crying within 48 h Convulsions with or without fever within 3-7days <p>Poliomyelitis Outbreak</p>		

<p>Adverse Reactions</p>	<p>DPT with acellular pertussis</p> <p>Data from clinical trials:</p> <table border="0"> <tr><td>Tenderness</td><td>26%</td></tr> <tr><td>Erythema and Induration</td><td>17%</td></tr> <tr><td>Fever > 100.4</td><td>7-19%</td></tr> <tr><td>> 102.2</td><td>2-7%</td></tr> <tr><td>Drowsiness</td><td>6-12%</td></tr> <tr><td>Fretfulness</td><td>17-20%</td></tr> <tr><td>Vomiting</td><td>2-3%</td></tr> </table> <p>In a group of 2,041 infants:</p> <table border="0"> <tr><td>Persistent crying</td><td>n=11</td></tr> <tr><td>Possible seizure</td><td>n=1</td></tr> <tr><td>Shock like state</td><td>n=1</td></tr> <tr><td>Lethargy</td><td>n=1</td></tr> </table> <p>Reported possible reactions not found in limited clinical trials:</p> <ul style="list-style-type: none"> Convulsions Encephalopathy Neuropathies Guillain-Barre syndrome 	Tenderness	26%	Erythema and Induration	17%	Fever > 100.4	7-19%	> 102.2	2-7%	Drowsiness	6-12%	Fretfulness	17-20%	Vomiting	2-3%	Persistent crying	n=11	Possible seizure	n=1	Shock like state	n=1	Lethargy	n=1	<p>DPT with whole cell pertussis</p> <p>Local:</p> <p>Redness, Swelling, Pain 10-50%</p> <p>Systemic:</p> <table border="0"> <tr><td>Fever >100.4, Fretfulness</td><td>50%</td></tr> <tr><td>Drowsiness</td><td>33%</td></tr> <tr><td>Vomiting, Anorexia</td><td><5%</td></tr> <tr><td>Persistent Crying</td><td>1%</td></tr> <tr><td>High Pitched, Unusual Cry</td><td>1/900</td></tr> <tr><td>Fever >105</td><td>1/330</td></tr> <tr><td>Collapse</td><td>1/1,750</td></tr> <tr><td>Convulsions</td><td>1/1,750</td></tr> <tr><td>Acute Encephalopathy</td><td>1/110,000</td></tr> <tr><td>Permanent Neurological Damage</td><td>1/310,000</td></tr> </table>	Fever >100.4, Fretfulness	50%	Drowsiness	33%	Vomiting, Anorexia	<5%	Persistent Crying	1%	High Pitched, Unusual Cry	1/900	Fever >105	1/330	Collapse	1/1,750	Convulsions	1/1,750	Acute Encephalopathy	1/110,000	Permanent Neurological Damage	1/310,000
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<p>Possible Alternatives</p>	<p>No vaccination or only selected vaccines Acellular pertussis vaccine. Delaying tetanus vaccine until 15-18 months (when child can walk and is at risk of dirty wounds). Careful consideration must be made before deciding to delay or refuse pertussis vaccine, as it still occurs frequently. Diphtheria is uncommon, but serious if contracted.</p>																																											
<p>Sources for Information in Tables</p>	<p>Physicians' Desk Reference, 1994 Vaccines (Plotkin & Mortimer) 1994</p>																																											

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