Vaccines
Preventing Disease or Expanding the Bottom Line?

Debra Ball

When a foreign substance is introduced into the body the immune system produces antibodies to fight the invader. The vaccination theory postulates that when a milder form of a virus is introduced into the body through inoculation the immune system produces antibodies to the virus. When coming into contact with that virus at a later date the body is already prepared to battle the intruder. Vaccine production is a multi-billion dollar business. A conference held in England in May of 2009 estimated that globally $25 billion was spent on vaccinations in 2009 with profits expected to rise to $100 billion by 2024.[i] Egg and cell based vaccines are being replaced by gene and plant based vaccines. Combination inoculations, which offer as in the case of the rabies vaccination sterilization features, are on the rise. Smaller bio-tech companies are on the cutting edge of development. Their products are sold to large pharmaceutical companies. For manufacturers cost-effectiveness plays a key role in producing a safe and effective vaccine for an increasingly global market. How did it all begin? Just how safe are vaccines?

The history of vaccination begins with Dr. Edward Jenner. Dr. Jenner observed that milkmaids infected with cowpox did not contract smallpox. Dr. Jenner, in 1796, introduced pus from a cowpox lesion into an eight-year-old boy's arm. Six weeks later he exposed the child to smallpox. The boy was unaffected by the disease. He followed this up with twelve other experiments. Satisfied that his theory was sound he published *Inquiry into the Causes and Effects of the Variolae Vaccine.* Dr. Jenner's idea of introducing an animal based disease into humans is the forerunner of today's vaccinations cultured in animal mediums. His brainstorm was not without critics. The introduction of foreign matter, especially matter from a different species, into humans was lambasted by intellectuals of his day. When Louis Pasteur established the rabies vaccine in 1885[ii] the idea of vaccination came to include all inoculating agents[iii]

The Beginning of Animal Vaccination

The origin of the canine distemper virus is not known; however, it makes its first documented appearance in Europe in the seventeenth century. Distemper is highly contagious and closely related to human measles. Due to the fact it is a systemic disease it may at first be confused with other illnesses. Symptoms include fever, gastrointestinal upsets, respiratory difficulties, lethargy, depression, muscle twitching near the mouth and in the legs, seizures, paralysis, and death. Hardening of foot and nose pads is one unique sign of distemper. The virus is transmitted through exhalation and body secretions. Immature and weakened immune systems are the most vulnerable to the disease. The viral nature of the disease was discovered in 1905, but it was not until the 1920s that virus extracted from the brains of diseased animals and treated with a dilute formaldehyde solution was found to convey immunity.

Hunt clubs were especially affected by the virus as large numbers of dogs were housed together. In 1923 money was raised for The Field Distemper Fund. The objective was to

develop a viable canine distemper vaccine. Pathologist, Patrick Laidlow and veterinarian, George Dunkin working with ferrets developed a canine vaccine in the late 1920s which went into commercial development in 1928. Unfortunately many of the batches of virus were found to be contaminated with other agents and had to be discarded. Also the vaccination was not found to be consistently reliable. Some dogs did not receive immunity at all and others contracted the disease from the immunization. Passing the virus through several generations of ferrets R.C. Greene developed a strain of the virus which was virulent for ferrets but produced a mild form of the disease in dogs. Cultural studies using tissue from infected dogs began in the 1930s. Differing strains of the virus evolved. The 1950s saw the advance of modified live viruses grown in the cells of chick embryos. A consistently reliable vaccine had finally emerged.

The 1950s also saw a boom in the development of other vaccines. Drs. Herald R. Cox and Hilary Loprowski using chicken embryos introduced a new rabies vaccine. Before this breakthrough the rabies vaccine contained brain or spinal cord tissue. Vaccines grown from these tissues had the potential to cause paralysis in newly vaccinated animals. Also the new vaccines had a much longer shelf life lasting up to 18 months. Combining vaccines began as well in the 1950s. The first canine combination vaccine was a live virus distemper and killed canine hepatitis. It was then believed that live virus vaccinations were safer than killed.

Vaccines, the Unseen Dangers

Live virus vaccines are made from attenuated or reduced virulent viruses. This is accomplished by culturing the virus in a medium to which the virus cannot easily adapt. The virus is passed through these cultures many times until hopefully it will no longer be able to produce the disease. Because the virus is alive it can be contaminated with pathogens inadvertently introduced into the cell culture. Mutation of the virus is another possible drawback to live viruses. Once injected into the body modified viruses reproduce over time stimulating the immune system to produce antibodies. With killed vaccines the replicating ability of the virus is destroyed through heat or chemical treatment. These chemicals include formaldehyde, beta-propiolactone, or formalin. Since the virus no longer has the ability to reproduce a much larger dose of antigen must be injected into the body to produce immunity. Also if the treatment to destroy replication fails the disease itself may be introduced into the body. Killed virus vaccines are the least expensive to create, the safest because they are unlikely to become virulent or shed into the environment but are less efficient at producing the desired immune response. They contain adjuvants designed to increase the immune response.

Whether modified live or killed all vaccines have chemical additives. They include stabilizers, preservatives, suspending fluids, and chemicals introduced to improve immune response. Suspending fluid may be something as simple as sterile water or saline. It may also contain protein which forms an ideal environment for pathogen growth. Adjuvants stimulate an earlier and stronger response to the injected pathogen. They also reduce the number of vaccinations needed to produce immunity. Adjuvants are selected for their cheapness, biodegradability, and shelf-life as well as their ability to promote good immune response.[iv] Aluminum adjuvants such as aluminum hydroxide or phosphate are most often found in today's vaccines. Thimerosal which contains mercury is used in multiple antigen vaccine vials to prevent the growth of bacteria. Single dose vials eliminates the need for ingredients like thimerosal; however, cost, storage, and transportation expenses often determines the available of single

dose vials. Light, heat, humidity, and acidity can all alter vaccines. Monosodium glutamate[v] and 2-phenoxy-ethanol are used to combat these effects. Antibiotics are used to stop the growth of germs. Egg proteins are found in some vaccines as the virus is cultured in this medium. Formaldehyde is used to kill unwanted bacteria and viruses.[vi]

The Center for Disease Control asserts that the adjuvants are safe. One argument for aluminum is that it occurs naturally in the environment and that the body is efficient at eliminating it from the system. Other studies contradict this showing that it can accumulate in the body from repeated exposure. It is stated that reactions are localized usually resulting in inflammation of the tissues around the injection site, however, in one study aluminum was found in the brain tissue of mice three days after receiving vaccinations. Mice injected with saline experience no such reaction.[vii] Aluminum adjuvants may cause inflammatory reactions at the injection site as well as "stimulating the non specific proliferation of lymphocytes".[viii] Since it is a heavy metal it may trigger auto-immune diseases especially in individuals already prone to allergies. The truth of the matter is scientist do not fully understand the long term influence of aluminum adjutants on the body.

The US Food and Drug Administration concluded concerning the safety of thimerosal "the benefits of vaccination are proven and the hypothesis of susceptible populations is presently speculative, and that widespread rejection of vaccines would lead to increases in incidences of serious infectious diseases."[ix] A study published by the *Royal Society of Medicine Press* concluded "An association between neurodevelopmental disorders and thimerosal-containing DTaP vaccines was found."[x] Another study found mice developed severe edema at the injection site when thimerosal was used.[xi] The sad fact is that the drug companies have known about the toxic skin effects of thimerosal since 1931.[xii] The drug company Pittman-Moore as early as 1935 found that half the dogs which they injected with thimerosal vaccines became ill.[xiii]Yet another problem is that some blood cells are becoming thimerosal dependent leading to immunity problems.[xiv] Dr. Boyd Haley of the University of Kentucky states, ""You couldn't even construct a study that shows thimerosal is safe."

The Food and Drug Administration also states there is no reasonable hazard to consuming monosodium glutamate at levels now allowed.[xv] However, injected MSG causes brain damage in baby chicks and rats. The younger the animal the more severe is the damage. Studies link MSG to obesity, increase in insulin secretion, damage to developing fetuses, ocular damage, liver damage, and epilepsy.[xvi] 2-phenoxy-ethanol has anti-bacterial properties and is used not just in vaccines but in cosmetics, ointments, and in the preservation of cadavers. It is not as effective as thimerosal in curtailing the growth of fungus and yeast. It is linked mainly to skin and eye irritation. Formaldehyde is used to kill unwanted bacteria and viruses.[xvii] Formaldehyde exposure causes gastrointestinal and liver problems. It damages the immune, reproductive, neurological and respiratory system. It is also a skin irritant and is ranked in the top 10% of hazardous chemicals.

Combination Vaccines

As the number of vaccines increased it became apparent that a solution was needed to prevent multi-vaccine injections with the discomfort and costs that this would entail for the client. Combination vaccines evolved. There are several drawbacks to combination vaccines. Different antigens could prove chemically incompatible. Immunologic interference is also possible. One study conducted in the late 1980s found combining canine distemper virus with

canine adenovirus types I and II viruses suppressed white blood cell count.[xviii] Another issue is using vaccines from different manufacturers. Vaccines may not be interchangeable and differing vaccines might contain overlying antigens or the patient may already have immunity to parts of the vaccine. And although the CDC sees no risk in administering modified live vaccines to a patient that already exhibits immunity, it does point out because of a adjuvants one should weigh the risk of allergic reaction when administering killed virus vaccines.[xix] Documentation of all vaccines given should include manufacturer as well of date of vaccination.

Weighing the Risks

Whether one chooses to vaccinate one's animal or not is a personal choice; however, is it judicious to accept any treatment without weighing the risks? Consider. Vaccinations are given to puppies before their immune systems have matured. Researchers found that the immature immune systems of mice were not producing a strong memory-cell response to antigens.[xx] If this is true and it carries over to other species than early vaccination may prove ineffective. Vaccines given before the mother's immunity has dissipated are also ineffective. Why then give vaccinations at such early ages, vaccines which include not just the virus but adjuvants such as mercury and aluminum? An article in the *Israel Journal of Veterinary Medicine* reports on the blot-Elisa technique. This is a kit by which a veterinarian, with no special training or equipment, can vaccinate a dog and concurrently assess immunization levels. Vaccinations can now be customized for each individual dog.[xxi] Why is this kit not available in the United States? And why are clients not advised of the risks associated with vaccinations? Following the new vaccination protocols and demanding titers to assess immunity levels rather than simply accepting unnecessary vaccinations are avenues open to owners. One should expect neither the pharmaceutical companies nor the government to safeguard one's animals. With billions of dollars at stake it is unlikely that the vaccination dilemma will change anytime soon; therefore it behooves each individual owner to educate oneself concerning the risks involved in accepting vaccinations for one's pets.

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[i] Conference on Vaccine Manufacturing, *PR Log (Press Release),* Feb 05, 2009.

[ii] Louis Pasteur's rabies vaccine did not prevent rabies but was a treatment post contamination.

[iii] B. Hansen, "America's First Medical Breakthrough: How Popular Excitement about a French Rabies Cure in 1885 Raised New Expectations for Medical Progress," *American Historical Review* 103, no. 2 (1998): 373–418.

[iv] N. Petrovsky and J. César Aguilar, "Vaccine Adjuvants: Current State and Future Trends," *Immunology and Cell Biology* (2004) **82,** 488–496

[v] MSG is known to cause allergies in some individuals when used as a food additive. When injected into lab mice it produces nerve damage in the brain.
[vi] "Ingredients of Vaccines - Fact Sheet," The Center for Disease Control, www.cdc.gov, accessed 3/4/2010.
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[xx] McCarthy, M., "Closing vaccination's "window of vulnerability" *The Lancet*, Vol. 357, Iss. 9261, Mar. 31, 2001, p 1022.
xxi Waner, J., Mazar, N., Mazar, S., "Post-vaccination Evaluation of the Immunization Status of Puppies for Canine Parvo-And Distemper Viruses Using an In-clinic Elisa Test," www.isrvma.org, accessed 3, 10, 2010.