

Smoke and Mirrors

The Problem with Leptospirosis

By Patricia Jordan, DVM

Over the years I have attended numerous lectures on vaccines, detailing the most current information from leading immunologists such as Dr. Ronald Schultz and experts on infectious disease such as Dr. Richard Ford. It is surprising to many that these researchers do not include Leptospirosis amongst recommended vaccines.^{1,2} In fact, Dr. Schultz resides in a *Leptospira* endemic area of the country and not only does he not recommend the vaccine for others, he does not vaccinate his own dogs for Leptospirosis.³

Intrigued with the concept of foregoing Leptospirosis vaccination, I began to focus on how best to create a prevention program for our veterinary clinic. I began with the CDC website on the disease of Leptospirosis as it stands here in the United States. The most current CDC fact sheet reveals that Leptospirosis in humans is not a reportable disease in the United States. The few cases that do occur are mostly traced to Hawaii which is not a part of the continental United States. The disease does occur more in tropical climates and is reported to have a human fatality rate worldwide of between 1 and 5%. With most of the cases in the US occurring in Hawaii or in travelers returning from tropical destinations, I began to put the exposure of Leptospirosis in the US into proper perspective.⁴

Shortly afterward, I travelled to Massachusetts for a lecture promoting Leptospirosis vaccination for dogs. While there, I requested the epidemiological information on Leptospirosis in the Commonwealth of Massachusetts and found that Massachusetts had never had a single case of Leptospirosis reported in humans since they began reporting Leptospirosis.⁵ There were no confirmed documented reports of Leptospirosis in dogs for the Commonwealth of Massachusetts.

I then decided to focus on the areas of the world which are trouble spots of *Leptospira* exposure, notably Okinawa, Philippines, Sri Lanka, Malaysia, Indonesia, Brazil, Cuba, Guatemala and Borneo. Most of the areas that suffer from this disease in a natural setting have a number of common environmental parameters. One is standing water or flooding including post hurricane flooding and tropical areas of increased water fall. In fact, US military personnel have seen infections with *Leptospira* when at duty in stations in such locations. Another factor associated with increased Leptospirosis exposure is the presence of rat infestations. Such infestations can be commonly found in areas such as the slums of

Brazil, the crowded alleys of the NY Bronx, and the rat infested prisons of Malaysia. Not surprisingly, Chinese sewer workers are frequently exposed to Leptospirosis.

Exposure to Leptospirosis is also of greater threat in the autumn. Back here in the United States, Leptospirosis may infect ponds and smaller lakes: hunters and swimmers who use these selected reservoirs may be exposed to pathogenic serovars of *Leptospira*. People who work with animals, such as butchers and slaughterhouse workers, veterinarians and farmers are also at increased risk. Interestingly, a dairy maid in the UK lost a pregnancy at 23 weeks due to the first known case of human intrauterine exposure to Leptospirosis.⁶ A newly reported reservoir of *Leptospira* in bats is also a matter of study.⁸ California sea lions and harbor seals have been found to carry *Leptospira* and Japan has found *Leptospira* in flying squirrels imported from the United States as pets from Texas.^{9,10}

In the United States, it is clear that exposure to a pathogenic serovar of this organism is not a considerable risk for the typical dog, especially as the risk of exposure is clearly defined and easily avoidable. Despite this, Leptospirosis has been labeled as the most rapidly growing zoonosis in the world.

With the exception of a few weak references of sewer workers and agricultural workers in Asia, people who are at a higher risk for *Leptospira* infection are simply not vaccinated against Leptospirosis. The reasons are:

1. the disease is treatable
2. the vaccine is ineffective
3. the vaccine is associated with adverse events¹⁴

TREATMENT

Leptospirosis is easily treated. Doxycycline is the antibiotic of choice and has the ability, even in renal compromise, to effectively rid the urinary tract of *Leptospira* infection. Doxycycline can be safely administered to dogs with renal insufficiency and will clear the organism from the kidneys, making it effective in both the infection of the blood and urine.²⁶

Last year, the predictable season of post hurricane flooding and *Leptospira* exposure in Cuba was readily handled with the use of homeopathy. The success of this public health program is well documented with over 2.4 million people in Cuba administered two doses of homeoprophylaxis in 2007 by the Ministry of Health in Cuba. The doses of *Leptospira* nosode had been prepared at the Finlay Institute, a center dedicated to development and production of vaccines. Finlay Institute is a WHO qualified facility dedicated to research, production and development, which produces high quality homeopathic products in addition to vaccines.¹¹ Understanding that there are much safer ways to address exposure to *Leptospira* in the example of a chemoprophylaxis also is important when the record of adverse events from *Leptospira* vaccines are discussed.^{12,13}

VACCINE EFFECTIVENESS

There are over 230 serovars of *Leptospirosis*, only a few which are pathogenic.¹⁵ *Leptospirosis* vaccines are serovar specific and several factors are impacted by this information.¹⁶ Any vaccine administered for specific serovars will only create agglutinating antibody to those specific serovars.¹⁷

What is important to note is that once vaccinated, the patient's serum can no longer be a useful record for diagnostic tests. The reason is the serum antibody titer from the vaccine cannot be distinguished from antibody caused by natural infection. This leads to interpretation problems when trying to diagnose the presence of infection or disease.¹⁸

Multivalent vaccines lead to test results of antibody generation against serovars that were not even included in the vaccine to begin with.¹⁹ This leads to problems using the MAT titer test to determine which serovar is the serovar of infectivity, if any.²⁰ Due to molecular mimicry with antigens, the unsettling factor for disease presence is complicated by cross reactivity of the antigens with many different disease organisms such as Syphilis, Lyme, Legionnaires, HIV and autoimmune disease.²² Put simply, this means that it is difficult to distinguish between antibodies within this range of diseases. Testing for *Leptospirosis* is currently performed with the PCR DNA test for the actual organism retrieved from either blood or urine. Oregon State Veterinary Diagnostic laboratory and IDEXX now both advertise this PCR testing on the DNA of the actual organism.^{23, 24}

Another major problem with the test is that any treatment prior to obtaining test samples will skew the test results: even one dose of antibiotics is able to turn a positive case to negative on the PCR test.²⁵ Treatment of any sort will also render a test taken at a later date as negative.

Vaccination with *Leptospira* is fraught with problems. Of major concern is the fact that *Leptospira* vaccines do not protect the dog from infection with *Leptospira* or of renal colonization. *Leptospira* vaccines have little effect on the maintenance and transmission of the disease in the animal populations in which they are applied.³⁰ The ineffectiveness of the vaccine is due in part to the many *Leptospirosis* serovars and variability of pathogenic strains which are not addressed with vaccines.

Alarming, *Leptospira* can become a source of infection for the humans in contact with any dog vaccinated for *Leptospirosis*.³¹ There are several cases of which I am personally aware where I could say beyond any doubt that a *Leptospira* vaccine administered to the dog was the cause of subclinical infection and therefore transmission to a human. *Leptospira* can and will shed in a vaccinated dog and in turn, infect any humans living in the same household! *Leptospira* vaccines and the over-use of vaccines in our dogs is a direct obstacle to public health.³² There is a reported case of a duck hunter contracting a case of *Leptospirosis* in California: the resulting epidemiological field study undertaken by the state resulted in an inability to recover any *Leptospira* from the bodies of water he frequented. The question that needs to be answered is whether the man became infected through transmission of the *Leptospira* from his vaccinated dog.³³

There is great cost associated with monitoring the environment to continue to assess the extent of any purported *Leptospirosis* serovars causing disease in a given population. To date there are no such programs in existence because the scarcity of the disease economically does not make *Leptospira* a “priority” disease. Note that this also means there is currently no need for human vaccination epidemiological investigation.³⁴

The crux of the problem is, veterinary doctors do not typically know that the *Leptospirosis* vaccine does not confer immunity. Challenge studies are rarely done and the most studies are ineffective in measuring immunity in vivo^{35, 36} Production of *Leptospira* vaccines is expensive and labor intensive for the drug companies and the vaccines are already on the market: why would they spend precious monies on further testing?

Further confusing the dog owner, most information available from self proclaimed “dog experts” on the internet is false. The marketing misinformation that recommends this vaccine is everywhere.

Unfortunately this includes most of the advice found in veterinary run websites on the internet as well as that found in veterinary office brochures. I found one very fair column on the subject of Leptospirosis written by a retired veterinarian in Oklahoma and a great article that actually listed the contraindications for the Leptospira vaccines in dogs by a veterinarian in Bali: an island with a serious Leptospirosis problem.^{37, 38} Why is this information not better understood? The truth is that too many veterinarians are painfully inept at discussing Leptospirosis because the bulk of their information comes from the very drug companies that stand to profit or at least recoup the many monies this troubled vaccine has cost their corporations.

Of serious concern is that veterinarians are actively marketing for the drug companies. I have seen misinformation published not only in the local newspapers but also on the worldwide web. A Reidsville, NC veterinary facility which promoted the Leptospira vaccine in partnership with Pfizer is just one example.³⁹ The advice of our professional medical experts is seriously compromised and devalued when they do not perform due diligence before advocating this marketing material. Where is truth in advertising?

VACCINE DANGERS

There are many other important issues to consider when discussing the safety of vaccination in general. There is now a plethora of research implicating vaccines in the creation of immunopathology. The immune response to the chemical soup delivered through in vaccines results in autoantibody production.⁴⁰ Microbial antigens can also elicit autoantibody production.⁴¹ Indeed vaccines are now found to be responsible for autoantibody production, autoimmune disease, and cancer! The immunogenetics of autoantibody and autoimmune diseases are under genetic control; however the vaccine itself elicits genetic response in its wake.⁴² Vaccination leads to mutations of the genome: autoimmune disease in one generation will create genetic disease in the next. Thus, vaccines generate a genetic impact that not only determines the severity of the immune response in natural infections but also dictate the expression of autoimmune disease with repeated exposure to antigens with subsequent vaccine administration. The histocompatibility markers on the tissues are also reactive to the vaccine.

The genetic compromise that occurs to the genome has never been researched by the vaccine manufacturers that produce vaccines. This should be a requirement for vaccine safety and efficacy claims but has never been determined by government regulatory agencies that license and approve these products for the unsuspecting population.

Research shows that the histocompatibility sites of human and animal tissues are reacting with vaccine antigens which in turn are responsible for a plethora of adverse and potentially lethal disease pathology.⁴³ In fact, there are documented examples of the antigen for both Leptospira and Lyme disease vaccines producing the same pathology as the natural infection itself.^{44, 45, 46} Simply stated, these vaccines can cause the very disease that we are attempting to vaccinating against. In some cases, viral vaccines can even result in the viral disease itself.

This is summarized in Judith A. DeCava's book 'Vaccination Examining the Record' She states "a person not vaccinated has ONE RISK, catching the disease, where a vaccinated person has TWO RISKS; catching the disease and damage from the vaccine".⁴⁷

The exaggerated reactivity to vaccines is easily seen in the spectrum of adverse events and diseases which commonly follow vaccine administration.⁴⁸ Anaphylaxis, anorexia, fever, dehydration, autoimmune disease, digestive issues, limping, loud vocalization following vaccination, acute organ failure, renal failure, liver failure, pancreatitis, death, dermatitis, puritis, cancer, degeneration of soft tissue: all of these have been reported following administration of the Leptospira vaccine.

In dogs that present with Leptospirosis, the severity may be associated with vaccine history and less likely, previous natural exposure which can create an exaggerated humoral immune response.⁴⁹ Every single vaccination will impact the genetic environment by overly sensitizing the T cells and immune complex against the Leptospirosis antigen, making future vaccination for Leptospirosis and even natural exposure of grave danger due to the creation of this "super antigen"⁵⁰. Vaccinations prime the immune system for over-reaction which leads to dangerous cytokine cascade and tremendous immunopathology. In the rare case of exposure to Leptospirosis, this "super antigen" reaction has the potential for lethal consequences from renal failure. The same danger exists with each and every vaccination and the likelihood and severity of reaction increases exponentially with every shot given (which in the case of Leptospirosis, may be twice a year). In fact, some dogs who are vaccinated with

Leptospirosis die of renal failure within 48 hours: the same type of pathology that the actual disease could create. Dr. Ronald Schultz recognizes this risk and advises that **you better be sure of the reason you are injecting because any time you inject, you could kill the patient.**

It appears that Microbiologist Antoine Bechamp was correct about disease and the theory of “terrain”. Terrain theory states that it is the individual’s system that determines disease and the individual response to antigen within the patient’s immune cells. Multiple administrations of vaccines over sensitize the patient to a real crisis, and when antigen and immune cells collide, disease results.

Pfizer sponsored “scientific” papers on *Leptospira* are sponsored with “educational” grants in order to produce recommendations for vaccination of the dog without proof that the vaccine is safe or effective. They use words like “likely” and “appears” to expotentialize the nonexistent benefit of vaccination. They are reaching in their efforts to provide a reason for vaccine use. They say these vaccines “appear” to be effective. They write off any adverse events from the vaccines stating “published data to validate these concerns are lacking because there is no independent mechanism to report vaccine reactions in the US”.⁵² The drug companies and the veterinarians can all hide behind this statement and adverse reactions to vaccines continue to go unreported.

Pfizer states that they “would advise to strongly consider vaccination” because “they appear to work”, yearly boosters “appear to be necessary”. They admit that the weak spot is “vaccine development” and “diagnostic assays” and that reemergence of this disease could very well be the result of vaccine programs!⁵³

When I pressed for the proof from Merial that their *Leptospira* vaccines did indeed provide an entire year of “immunity” they finally sent me an article that did not even test their vaccines. The company forwarded work from Intervet in the Netherlands. Intervet is the source of much conflict in the UK for mounting yearly marketing campaigns in order to advocate yearly vaccinations of pets, despite the fact this is not a recommendation from the World Small Animal Veterinary Association or our AVMA or AAHA, or in Australia. The paper that was supposed to prove the worthiness of the *Leptospira* vaccines was failed to properly test vaccinates in a method that would prove immunity. Merial vaccines were not even used in their study, performed by the Dept. of Bacteriological R & D for Intervet International BV in

the Netherlands.⁵⁴ A Shot in the Dark accuses drug companies of conspiring to format a market for their product with only anecdotal evidence of the existence of any Leptospirosis problems.⁵⁵

Drug companies create a market for their product even though the risk for the disease is practically nonexistent and the vaccine is highly dangerous for animals. Human medicine is not exempt from this travesty with the Glaxo Smith Kline Hepatitis B vaccine, the Merck Gardasil vaccine, the Bird Flu and the Swine flu vaccines all resulting in a call for investigations and criminal charges to be brought against the WHO.^{56, 57} WHO Vaccine Advisor, Juhane Eskola made over 6 million Euros researching vaccines for the recent swine flu “pandemic”. Similarly, the CDC Childhood Vaccine Advisor, Dr. Paul Offit made so much money with Merck making a rotavirus vaccine that he said “it was like winning the lottery”. US courts ordered the recall of the Lymerix vaccine based on adverse events and subsequently stated that federal employees should never be allowed to consult in areas where they set federal policy. In veterinary medicine, many researchers are paid employees of the pharmaceutical companies. Despite being on faculties of our leading veterinary institutions, many have their research grants supplied to them from the pharmaceutical industry. Vaccine adverse events will remain anecdotal so long as government and industry continue to protect vaccine use. Vaccine safety and efficacy continue to be determined by those who stand to profit from their sale and use.

In light of this, the vaccine manufacturers continue their marketing efforts for ‘better’ and ‘safer’ vaccines. Pfizer provides ‘immunization support guarantees’ and this says, ‘buy ours, it is the best’. The temper this with talk about “serovar shifts” and the fact that “diagnostic assays are wrought with problems” and they cannot explain how high MAT titers are obtained against serovars not contained in the vaccines and that the vaccine itself can produce disease in dogs. Indeed, there are many ways to beat their ‘immunization guarantee’.⁵⁹

Cornell states they have a more effective Leptospira vaccine and they warn that the aluminum adjuvant used for five decades is now known to be ‘unreliable’. Aluminum is contained in all the Leptospira vaccines even now; despite the fact that it causes cancer. Cornell states aluminum “destroys the antigen’s structure” and “degrades amino acid sequence”.⁶⁰ This is apparently the case as the WHO in 1999 declared these adjuvants (which are found in children’s vaccines), as “carcinogenic” in the IARC.⁶¹

Cornell wants to take a whack at putting yet another Leptospira vaccine out there. Cornell's Baker Institute of Animal Vaccines will make yet another type of vaccine and this one will be better. This one is made with genetically engineered bacteria genes from E. coli and this one will be safer: try this one.⁶² (January 25, 2010)

Despite the vast amount of money spent of vaccine research, there is still no proof that vaccines create immunity. Vaccines are however, proven to create generations of immune reaction diseases that now plague highly vaccinated populations. As my colleague Dr. Stephen Blake has said over and over, "**never before in the history of man has there ever been a greater medical assumption more responsible for the death and disease than the use of vaccines as we know them today**".

In summary, know the risks for natural Leptospirosis infection and seek immediate treatment if your dog becomes ill. Familiarize yourself with the symptoms of Leptospirosis and save your dog from the risk of vaccine induced renal failure or years of dermatitis and puritis.²⁷ Antibiotic treatment is quickly effective for Leptospirosis,²⁹ or the use of homeopathy in prevention.

You must realize however that the germ is not the problem: the individual's immune system is the determinant. Optimal nutrition is the key to immune health and prior genetic damage from vaccines is also of consequence. In regard to the Leptospira vaccine, the new genetically engineered products will not be proven any safer than earlier products. They will unleash this vaccine without really knowing if the vaccine is safe or effective, just as they have for all the vaccines that have come before.

Intervet Schering Plough is revving up for their annual vaccine marketing campaign in the UK, promoting their vaccines on the questionable need for the vaccine in the first place.⁶³ The only protection from this marketing mania is to know the lack of science behind both the manufacturing and administration of these vaccines:. Although drug companies are responsible for vaccine safety, they are not held accountable and there will be no recourse against these marketing giants you pet becomes ill: a practice which Dr. Ron Schultz calls indefensible.

References

1. Schultz R, Everything You Need To Know About Vaccines. Seminar Danbury, CT, June 15, 2007.Sponsored by Cavaliers of the Northeast.

2. Ford R DVM MS Diplomate ACVIM, Vaccines and Vaccination Building the Protocol- Implementing the Guidelines. Framingham, MA July 25, 2007.Sponsored by Merial.
3. Schultz R, Everything You Need To Know About Vaccines. Seminar Danbury, CT. June 15, 2007.Sponsored by Cavaliers of the Northeast.
4. CDC Leptospirosis Information Sheet
<http://www.cdc.gov/ncidod/dbmd/diseaseinfo/Leptospirosis>
5. Hershey-Grove D MPH, Commonwealth of Massachusetts, executive Office of the Health and Human Resources, Department of Public Health, bureau of Communicable Disease Control, Office of Integrated Surveillance and Informatics, William A. Hinton State Laboratory Institution,305 South Street, Jamaica Plain, MA 02130.
6. Aker N, James ED, Johnston AM et al, Leptospirosis in pregnancy: an unusual and relatively unrecognized cause of intrauterine death in man. Journal of Obstetrics and Gynecology 1996 May, 16; (3):163-165.
7. Vashi NA, Reddy P, Wayne DB, Sabin B, Bat-associated Leptospirosis. J Gen Intern Med. PMID: 200112224 PubMed [Epub ahead of print].
8. Stock D, Children's Pool, LaJolla, California Nov 8, 2009:1-2
9. Masuzawa T, Leptospirosis in squirrels imported from the United States to Japan. US National Center for Infectious Diseases 2006.
10. Campa C, Varela LE, Gilling E et al., Homeoprophylaxis Homeopathic Immunization and Nosodes against epidemics: Cuban experience in Nosodes 2008 International Meeting Proceedings Havana, Cuba 10-12 Dec 2008.<http://www.finlay.sld.cu/nosodes/en/ProgramaNosodes2008.pdf>
11. McClain JBL, Ballon WR, Harrison SM, Doxycycline therapy for Leptospirosis. Ann Intern Med 1984 100:696-698.
12. Takafuji ET, Kirkpatrick JW, Miller RN et al., An efficacy trial of Doxycycline chemoprophylaxis against Leptospirosis. NEJM. Feb 23 1984; 310 (8):497-500.
13. Levett PN and Haake D, Leptospira: Species (Leptospirosis) Elsevier
<http://www.elsevierjapan.com> page 5.
14. Smythe LD, Smith IL, Smith GA et al., A quantifiable PCR (Taqma) assay for pathogenic Leptospira spp. 2 BMC Infect Dis 2002 July 8;2(1):13.
15. Koizumi N, Watanabe H, Leptospirosis vaccines: Past, Present and Future. J Postgrad Med 2005; 51:210-4 (page 210).
16. Goldstein RE, Leptospirosis Epidemiology Pathogenesis and Zoonotic Impact on Veterinary Practitioner. Insights in Veterinary Medicine 2007 Aug; 5(2):3.
17. Goldstein RE, Leptospirosis Epidemiology Pathogenesis and Zoonotic Impact on Veterinary Practitioner Insights in Veterinary Medicine 2007 Aug; 5(2):5.
18. Goldstein RE, Lin RC, Lanstron CE et al., Influences of infecting serogroup on clinical features of Leptospirosis in dogs. J Vet Intern Med.2006: 20(3):489-494
19. Levett PN, Usefulness of serologic analysis as a predictor of the infecting serovar in patients with severe Leptospirosis. Clin Infect Disease 2003;36; 447-452.
20. Schultz R, Everything You Need To know About Vaccines .Danbury, CT, June 15, 2007. Sponsored by Cavaliers of the Northeast.

21. Bajani MD, Asford DA, Bragg SI, et al., Evaluation of four commercially available rapid screening tests for diagnosis of Leptospirosis. J Clin Microb. 2003; 41:803-809.
22. Oregon State University of Veterinary Diagnostic Laboratory Leptospirosis Real Time PCR DNA for acute onset of illness <http://oregonstate.edu/vetmed/vdl/vdl.htm>
23. IDEXX Introduces Real PCR^{TCM} Test for canine Leptospirosis <http://www.idexx.com/pcr>
24. Goldstein R, Canine Leptospirosis. Department of Clinical Sciences, College of Veterinary Medicine Cornell University, Ithaca, New York. Email rg225@cornell.edu
25. Goldstein RE Leptospirosis Epidemiology and Pathogenesis and Zoonotic Impact on Veterinary Practitioners. Insights in Veterinary Medicine Aug 2007;5 (2):4.
26. Schultz R, What Every Veterinarian Needs to Know About Canine and Feline Vaccines and Vaccination Programs with an emphasis on recombinant Vaccines, Warwick, RI April 16, 2008 Sponsored by Merial.
27. Goldstein R, Canine Leptospirosis epidemiology and Pathogenesis and Zoonotic Impact on Veterinary Practitioners. Insights in Veterinary Medicine Aug 2007;5(2):4.
28. Takafuji ET, Kirkpatrick JW, Miller RN et al., An efficacy trial of Doxycycline chemoprophylaxis against Leptospirosis NEJM Feb 23 1984;310(8):497-500.
29. Levett PN Leptospirosis. Clin Microbial Rev 2001; 14:296-326.
30. Feigin RD, Lobes LA, Anderson DM, et al., Human Leptospirosis from vaccinated dogs. Am Intern Med 1973;79:777-785.
31. Berkelman RN, Human Illness Associated with the use of veterinary vaccines. Emerging Infections CID 2003 (1 August); 37:407-414.
32. Meites E, Jay MT, Deresinski S, et al., Reemerging Leptospirosis, California. Emerging Infectious Diseases March 2004; 10(3):406-411. <http://www.cdc.gov/eid>
33. Srivastava SK, Prospects of developing Leptospira vaccines for animal. Indian Journal of Medical Microbiology. 2006; 24(4):331-336.
34. Klassen HL, Molkenboer MJ, Vrijenhoek MP, Kaashoek MJ, Duration of immunity in dogs vaccinated against Leptospirosis with a bivalent inactivated vaccine. Vet Microbiol 2003 Aug 29; 95 (1-2):121-132.
35. Wohl JS, Canine Leptospirosis in the Compendium Nov 1996; 18 (11):1215-41.
36. Fauks WF, Dog owner worries about Leptospirosis vaccine reaction. The Edmond Sun http://www.edmondsun.com/features/local_story_285200506.html
37. Bali Dogs, Leptospirosis no longer recommended for household urban dogs <http://kertabesung.blogspot.com/2009/02/leptospirosis-in-dogs.html#links>
38. Reidsville Veterinary Hospital partnering with Pfizer http://www2.godanriver.com/gdr/news/local/rockingham_news/article/leptospirosis
39. HogenEsch H, Azcona-Olivera J, Scott-Moncreiff C, et al., Vaccine-induced Autoimmunity in the Dog. Adv Vet med 1999; 41:733-744.
40. Kuo P, Kowal C, Tadmor B, et al., Microbial Antigens can elicit autoantibody production a potential pathway to autoimmune disease in Annals of the NY Academy of Science 1997;815 (B):230-236.
41. Olsen NJ, Chen PP, Immunogenetics of auto antibodies and autoimmune disease. Current Opinion in Rheumatology 1991 Jun; 3(3):391-7.

42. Oldstone MBA, Relationship between major histocompatibility antigens and disease. Bull World Health Organ, 1975; 52:479-486.
43. Latov N, Wu A, Chin R et al., Neuropathy and cognitive impairment following vaccination with the Osp A protein of Borrelia burgdorferi. Journal Peripheral Nerve Society, Inc., 2004; 9 (3):165-167.
44. Otto A, Lyme Vaccine Linked to Autoimmune Arthritis. Pharmacy Today January 2001;7(1):10
45. Rathinam SR. Ocular Leptospirosis. Curr Opin Ophthalmol 2002; 13:381-6.
46. DeCava J, Vaccination Examining the Record. Selene River Press, Fort Collins, CO 2005 page 30.
47. Moore GE, Guptill LF, Ward MD et al., Adverse events within 72 hours of vaccination. JAVMA 2005 Oct 1; 227 (7):1102-8.
48. AO batulkachi RC, Daher EF, Camargo ED et al., Leptospirosis severity may be associated with intensity of humoral immune response. Rev Int Med Trop Sao Paulo 2002; 44:79-83.
49. WHO Memoranda Virus associated immunopathology; animal models and implications for human disease2. Cell mediated immunity autoimmune disease genetics and implications for clinical research. 1972;47 (2)
50. Person DA, Leptospirosis in the Pacific; Tripler Army Medical Center. Medical Surveillance Monthly Report; 4:12-14.
51. Goldstein R, Canine Leptospirosis epidemiology and Pathogenesis and Zoonotic Impact on Veterinary Practitioners. Insights in Veterinary Medicine Aug 2007:5(2):4.
52. Goldstein R, Canine Leptospirosis epidemiology and Pathogenesis and Zoonotic Impact on Veterinary Practitioners. Insights in Veterinary Medicine Aug 2007:5(2):4.
53. Klassen HL, Molkenboer MJ, Vrijenhoek MP, Kaashoek MJ, Duration of immunity in dogs vaccinated against Leptospirosis with a bivalent inactivated vaccine. Vet Microbiol 2003 Aug 29; 95 (1-2):121-132.
54. Cohen Hsiu-Yi, A Shot in the Dark. Dogs Today Nov 2008:15-19 www.dogstodaymagazine.co.uk
55. Girard M, WHO recommendations scientific flaws or criminal misconduct. Journal of American Physicians and Surgeons 2005; 11:22-23.
56. Wodarg W. Faked pandemics, a threat to health. PACE Plenary session social affairs Council of Europe to investigate WHO Jan 25-29, 2010.
57. O'Driscoll C, Complaint letter against Intervet Ltd's National Vaccination Month to Advertising Standards Authority in London, UK. 4 Mar 2008.
58. Fort Dodge Dear Doctor News updates and practice tips for today's veterinarians Oct/Nov. 2004; 1(3).
59. WHO IARC International Agency for Research on Cancer; Summaries and evaluations surgical implants and other foreign bodies 1999 Feb 23; 74:24305-310.
60. Ramanujan K, Study; new vaccine delivery system may be more effective .Provided by Cornell University <http://www.physorg.com/news183663284.html>
61. Intervet Ltd-National Vaccination Month Campaign

Post Leptospirosis Vaccination Pathology