CURRICULUM VITAE
Terry F. McElwain

Education:

BS, 1978, College of Agriculture, Kansas State University, summa cum laude
DVM, 1980, College of Veterinary Medicine, Kansas State University, summa cum laude, valedictorian
PhD, 1986, College of Veterinary Medicine, Washington State University

Clinical Specialty:

Diplomate, American College of Veterinary Pathologists, 1985

Professional Experience:

1980-1981	Clinical practice, Crestview Animal Clinic, New London, Pennsylvania.
1981-1983	Resident in Veterinary Pathology and PhD Candidate, Department of Veterinary Microbiology and Pathology, Washington Animal Disease Diagnostic Laboratory, Washington State University.
1983-1986	NIH Postdoctoral Fellowship, Department of Veterinary Microbiology and Pathology, Washington State University.
1987-1989	Assistant Professor of Immunology, Department of Infectious Diseases, Center for Tropical Animal Health, Joint Assistant Professor of Pathology, Department of Comparative and Experimental Pathology (1988-89), College of Veterinary Medicine, University of Florida.
1989-Pres	Assistant Professor (1989-1993), Associate (1993-1996), and Professor (1996-2012, currently Adjunct Professor) of Pathology, Department of Veterinary Microbiology and Pathology, Washington Animal Disease Diagnostic Laboratory, College of Veterinary Medicine, Washington State University.
1993-Pres	Director (1993-2001), Executive Director (2001-Pres), Washington Animal Disease Diagnostic Laboratory.
1995-Pres	Director, Animal Health Research Center, College of Veterinary Medicine, Washington State University.
June, 1998-1999	Interim Dean, College of Veterinary Medicine, Washington State University.
Jan - July, 2000	Visiting Professor, Department of Microbiology and Immunology, School of Medicine, University of Melbourne, and Walter and Eliza Hall Institute of Medical Research, Melbourne, Victoria, Australia.
2011-Pres	Associate Director, Paul G. Allen School for Global Animal Health, College of Veterinary Medicine, Washington State University
2008-2013	Professor, Paul G. Allen School for Global Animal Health
2013-Pres	Regents Professor, Paul G. Allen School for Global Animal Health

Professional Associations:

American Association for the Advancement of Science
American Association of Veterinary Laboratory Diagnosticians
American College of Veterinary Pathologists
American Veterinary Epidemiology Society
American Veterinary Medical Association
United States Animal Health Association
Washington State Veterinary Medical Association

Honors and Awards:

B.S. (1978) and D.V.M. (1980), Summa Cum Laude; Valedictorian, D.V.M. Class of 1980; Pfizer Award for Research Excellence, College of Veterinary Medicine, Washington State University,1997; Distinguished Service Award, Washington State Veterinary Medical Association, 1999; President, American Association of Veterinary Laboratory Diagnosticians, 2002-2003; E.P. Pope Award, American Association of Veterinary Laboratory Diagnosticians, 2003; Board of Directors, World Association of Veterinary Laboratory Diagnosticians, 2001-Present; Alumni Recognition Award, Kansas State University College of Veterinary Medicine, 2006; USDA Administrator's Award, 2006; Selected as WSU "Faculty Innovator", 2007; Honorary Diplomate, American Veterinary Epidemiology Society, 2008; WSU Sahlin Faculty Excellence Award for Outreach and Engagement (Public Service), 2009; Elected to Institute of Medicine, National Academy of Sciences, 2009; Washington State Academy of Sciences, 2009; Washington State Veterinary Medical Association Faculty Member of the Year Award, 2010; Fellow, American Association for the Advancement of Science, Medical Sciences, 2011; Niemeyer Lecture, University of Missouri College of Veterinary Medicine, September 1, 2011; 2013 Alumni Fellow, Kansas State University College of Veterinary Medicine; Invited Lecture, WWAMI Science in Medicine Lecture, University of Washington, March 12, 2013; Appointed Regents Professor, Washington State University, July 1, 2013

Selected State, National and International Appointments:

National Academy of Sciences

- Committee Chair, Analysis of the Requirements and Alternatives for Foreign Animal and Zoonotic Disease Research and Diagnostic Laboratory Capabilities, National Research Council, 2012.
- Committee on Achieving Sustainable Global Capacity for Surveillance and Response to Emerging Diseases of Zoonotic Origin, National Academy of Sciences Institute of Medicine (2008-2009)
- Committee on "Assessing the Nation's Framework for Addressing Animal Diseases", National Academy of Sciences, Board on Agriculture and Natural Resources, 2004-2005
- Life Sciences Review Panel, National Research Council Research Associateship Program, 2010-Present

National Animal Health Laboratory Network

- Coordinating Council, National Animal Health Laboratory Network, 2010-2012
- Chair, Evaluation Team, Phase I review of the National Animal Health Laboratory Network, 2007
- Co-Chair, Methods Technical Working Group, National Animal Health Laboratory Network, 2006-2013
- Steering Committee (Founding Member), National Animal Health Laboratory Network, 2002 - 2005

Invited Speaker, "The Many Faces of Disease Surveillance in Global Health", 2013 Kansas State University College of Veterinary Medicine Alumni Fellow, February 2013.

Invited Speaker, "Addressing Global Health at the Animal Human Interface", WWAMI Science in Medicine Lecture, University of Washington, March, 2013

Invited Speaker, "The Role of the Animal Health Laboratory in Global Health: Challenges and Opportunities", Opening Panel Session on One World-One Health: Laboratories and their Roles in Protecting the World's Health, Association of Public Health Laboratories Annual Meeting, Seattle, WA, May 2012.

Invited Speaker, “Emerging Diseases at the Wildlife/Livestock Interface”, Wildlife and Emerging Infectious Diseases, International Conference on Emerging Infectious Diseases, Atlanta, GA, March 2012

Steering Committee and Biodetection/Biodiagnostics Working Group Co-Chair, United States Department of the Interior and Department of Homeland Security Workshop “Preparing for and Responding to High Consequence and Foreign Animal Diseases”, National Conservation Training Center, Shepherdstown, West Virginia, August 26-29, 2013.

Chair, Review Panel, Department of Homeland Security (DHS) Science and Technology (S&T) agricultural defense branch portfolio (Chemical and Biological Defense Division), February, 2012.

Panel Member, United States Department of the Interior, USGS, National Wildlife Health Center, Expert Panel - Can We Predict the Unpredictable? Future Emerging Wildlife Disease Threats to North America, January 25-27, 2011, Madison, WI.

National Center for Foreign Animal and Zoonotic Disease Defense, Department of Homeland Security, External Advisory Committee, 2010 – Present

Expert Advisor, Consultants meeting to develop a roadmap for the implementation of modern OIE principles and methods of diagnostic test validation, Vienna, Austria, September 6-9, 2010

Expert Advisor, Consultants Meeting on Standards, Referencing and Validation, International Atomic Energy Agency, Vienna, Austria, November 21-24, 2006.

External Advisor, Centers for Disease Control and Prevention, Emerging Infections Plan, 2003

Advisory Committee, Bioterrorism Preparedness and Response Program, Washington State Public Health Laboratories, 2002-Present.

Board of Directors, World Association of Veterinary Laboratory Diagnosticians, 2001 - Present

American Association of Veterinary Laboratory Diagnosticians

Vice President (2000-2001), President-Elect (2001-2002), President (2002-2003).
Chair, Accreditation Committee, 2006-2009 (member 1996-present)
Executive Committee, 2000-2004.

Chair, Anatomic and Clinical Pathology Certifying Examination Committee, American College of Veterinary Pathologists, 1996.

General Pathology Section Head, Anatomic Pathology Certifying Examination Committee, American College of Veterinary Pathologists, 1995-1996.

Small Animal Section Head, Anatomic Pathology Certifying Examination Committee, American College of Veterinary Pathologists, 1993-1994.

Publications in refereed journals:

(Italicized authors are those for which TF McElwain had an advisory/mentorship role in the published research).

1. Traub JL, Grant BD, Rantanen NW, McElwain T, Wagner PC, Bayly WM: Surgical removal of choleliths in a horse. J Am Vet Med Assoc 182:714-716, 1983

2. Evermann JF, LeaMaster BR, McElwain TF, Potter KA, McKeirnan AJ, Green JS: Natural infection of captive coyote pups with a herpesvirus antigenically related to canine herpesvirus. J Am Vet Med Assoc 185:1288-1290, 1984.

3. Hargis AM, McElwain TF: Vascular neoplasia in the skin of horses. J Am Vet Med Assoc 184:1121-1124, 1984.

4. McElwain TF, Perryman LE, Davis WC, McGuire TC: Antibodies define multiple proteins with epitopes exposed on the surface of live *Babesia bigemina* merozoites. J Immunol 138:2298-2304, 1987.

5. Parish SM, Maag-Miller L, Besser TE, Weidner JP, McElwain T, Knowles DP, Leathers CW: Myelitis associated with protozoal infection in newborn calves. J Am Vet Med Assoc 191:1599-1600, 1987.

6. McElwain TF, Palmer GH, Goff WL, McGuire TC: Identification of *Babesia bigemina* and *Babesia bovis* merozoite proteins with isolate- and species-common epitopes recognized by antibodies in bovine immune sera. Infec Immun 56:1658-1660, 1988.

7. Goff WL, Davis WC, Palmer GH, McElwain TF, Johnson WC, Bailey JF, McGuire TC: Identification of *Babesia bovis* merozoite surface antigens using immune bovine sera and monoclonal antibodies. Infec Immun 56:2363-2368, 1988.

8. *Hines SA*, McElwain TF, Buening GM, Palmer GH: Molecular characterization of Babesia bovis merozoite surface proteins bearing epitopes immunodominant in protected cattle. Mol Biochem Parasitol 37:1-10, 1989.

9. Allred DR, McGuire TC, Palmer GH, Leib SR, Harkins TM, McElwain TF, Barbet AF: Molecular basis for surface antigen size polymorphisms and conservation of a neutralization sensitive epitope in *Anaplasma marginale*. PNAS 87:3220-3224, 1990.

10. McGuire TC, Davis WC, Brassfield AL, McElwain TF, Palmer GH: Identification of *Anaplasma marginale* long-term carrier cattle by detection of serum antibody to isolated MSP-3. J Clin Microbiol 29:788-793, 1991.

11. *Suarez CE*, Palmer GH, Jasmer DP, Hines SA, Perryman LE, McElwain TF: Characterization of the gene encoding a 60 kDa *Babesia bovis* merozoite protein with conserved and surface exposed epitopes. Mol Biochem Parasitol 46:45-52, 1991.

12. *Kaylor PS*, Crawford TB, McElwain TF, Palmer GH: Passive transfer of antibody to *Ehrlichia risticii* protects mice from ehrlichiosis. Infec Immun 59:2058-2062, 1991.

13. McElwain TF, Perryman LE, Musoke AJ, McGuire TC: Molecular characterization and immunogenicity of neutralization sensitive *Babesia bigemina* merozoite surface proteins. Mol Biochem Parasitol 47:213-222, 1991.

14. *Mishra VS*, Stephens EB, Dame JB, Perryman LE, McGuire TC, McElwain TF: Immunogenicity and sequence analysis of recombinant p58 - a neutralization sensitive, antigenically conserved *Babesia bigemina* merozoite surface protein. Mol Biochem Parasitol 47:207-212, 1991.

15. Palmer GH, McElwain TF, Perryman LE, Davis WC, Reduker DR, Jasmer DJ, Shkap V, Pipano E, Goff WL, McGuire TC: Strain variation of *Babesia bovis* merozoite surface exposed epitopes. Infec Immun 59:3340-3342, 1991.

16. *Suarez CE*, McElwain TF, Palmer GH: Sequence conservation among merozoite apical complex proteins of *Babesia bovis*, *Babesia bigemina*, and other apicomplexa. Mol Biochem Parasitol 49:329-332, 1991.

17. *Mishra VS*, McElwain TF, Dame JB, Stephens EB: Isolation, nucleic acid sequence and differential expression of the p58 gene family of *Babesia bigemina*. Mol Biochem Parasitol 53:149-158, 1992.

18. *Hines SA*, Palmer GH, Jasmer DP, McGuire TC, McElwain TF: Neutralization-sensitive merozoite surface antigens of *Babesia bovis* encoded by members of a polymorphic gene family. Mol Biochem Parasitol 55:85-94, 1992.

19. *Suarez CE*, Palmer GH, Hines SA, McElwain TF: Immunogenic B-cell epitopes of *Babesia bovis* rhoptry-associated protein 1 are distinct from sequences conserved between species. Infect Immun 61:3511-3517, 1993.

20. Brown WC, Palmer GH, McElwain TF, Hines SA, Dobbelare DAE: *Babesia bovis*: Characterization of the T helper cell response against the 42 kilodalton merozoite surface antigen (MSA-1) in cattle. Exp Parasitol 77:97-110, 1993.

21. *Machado RM*, McElwain TF, Suarez CE, Hines SA, Palmer GH: *Babesia bigemina*: isolation and characterization of merozoite rhoptries. Exp Parasitol 77:315-325, 1993.

22. Cantor GH, McElwain TF, *Birkebak TA*, Palmer GH: Ribozyme cleaves *rex/tax* RNA and inhibits bovine leukemia virus expression. Proceedings of the National Academy of Sciences, USA 90:10932-10936, 1993.

23. *Dilbeck PM*, McElwain TF: Immunohistochemical detection of *Coxiella burnetti* in formalin-fixed placenta. J Vet Diagn Invest 6:125-127, 1994.

24. *Suarez CE*, Thompson SM, McElwain TF, Hines SA, Palmer GH: Conservation of oligopeptide motifs in rhoptry proteins from different genera of erythroparasitic protozoa. Exp Parasitol 78:246-251, 1994.

25. McGuire TC, Stephens EB, Palmer GH, McElwain TF, Lichtensteiger CA, Leib SR, Barbet AF: Recombinant vaccinia virus expression of *Anaplasma marginale* surface protein MSP-1a: effect of promoters, leader sequences and GPI anchor sequence on enhancement of antibody response. Vaccine 12:465-471, 1994.

26. Shompole S, McElwain TF, Jasmer DP, Hines SA, Katende J, Musoke AJ, Rurangirwa FR, McGuire TC: Identification of *Babesia bigemina* infected erythrocyte surface antigens containing epitopes conserved among strains. Parasite Immunol 16:119-127, 1994.

27. *Birkebak TA*, Palmer GH, Davis WC, McElwain TF: Quantitative characterization of the CD5 bearing lymphocyte population in the peripheral blood of normal sheep. Vet Immunol Immunopath 41:181-186, 1994.

28. Shkap V, Pipano E, McElwain TF, Herzberg U, Krigel Y, Fish L, Palmer GH: Cross-protective immunity induced by *Babesia bovis* clones with antigenically unrelated variable merozoite surface antigens (VMSA). Vet Immunol Immunopath 41:367-374, 1994.

29. Stone DM, McElwain TF, Davis, WC: Enhanced B-lymphocyte expression of IL-2Ra associated with T lymphocytosis in BLV-infected persistently lymphocytotic cows. Leukemia 8:1057-1061, 1994.

30. Suarez CE, McElwain TF, Echaide I, Toriani de Echaide S, Palmer GH: Interstrain conservation of babesial RAP-1 surface-exposed B-cell epitopes despite *rap-1* genomic polymorphism. Infect Immun 62:3576-3579, 1994.

31. *Vidotto MC*, McGuire TC, McElwain TF, Palmer GH, Knowles DP: Intermolecular relationships of major surface proteins of *Anaplasma marginale*. Infect Immun 62:2940-2946, 1994.

32. Palmer GH, Eid G, Barbet AF, McGuire TC, McElwain TF: The immunoprotective *Anaplasma marginale* major surface protein 2 (MSP-2) is encoded by a polymorphic gene family. Infect Immun 62:3808-3816, 1994

33. Palmer GH, Munodzana D, Tebele N, *Ushe T*, McElwain TF: Heterologous strain challenge of cattle immunized with *Anaplasma marginale* outer membranes. Vet Immunol Immunopath 42:265-273, 1994.

34. Eriks IS, Stiller D, Goff WL, *Panton M*, Parish SM, McElwain TF, Palmer GH: Molecular and biological characterization of a newly isolated *Anaplasma marginale* strain. J Vet Diagnost Invest 6:435-441, 1994.

35. *Ushe TC*, Palmer GH, *Sotomayor L*, Figueroa JV, Buening GM, Perryman LE, McElwain TF: Antibody response to a *Babesia bigemina* RAP-1 surface exposed and neutralization sensitive epitope in immune cattle. Infect Immun 62:5698-5701, 1994.

36. *Birkebak TA*, Palmer GH, Davis WC, Knowles DP, McElwain TF: Association of GP51 expression and persistent CD5+ B-lymphocyte expansion with lymphomagenesis in bovine leukemia virus infected sheep. Leukemia 8:1890-1899, 1994.

37. Hines SA, Palmer GH, Jasmer DP, Goff WL, McElwain TF: Immunization of cattle with recombinant *Babesia bovis* merozoite surface antigen-1 (MSA-1). Infec Immun 63:349-352, 1995.

38. Ndung'u LW, *Aguirre C*, Rurangirwa FR, McElwain TF, McGuire TC, Knowles DP, Palmer GH: Detection of *Anaplasma ovis* infection in goats using the MSP5 competitive inhibition ELISA. J Clin Micro 33:675-679, 1995.

39. Hines SA, Palmer GH, Brown WC, McElwain TF, Suarez CE, Vidotto O, Rice-Ficht AC: Genetic and antigenic characterization of *Babesia bovis* merozoite spherical body protein Bb-1. Mol Biochem Parasitol 69:149-159, 1995.

40. Knowles DP, Perryman LE, McElwain TF, Kappmeyer LS, Stiller D, Palmer GH, Visser ES, Hennager SG, Davis WC, McGuire TC: Conserved recombinant antigens of *Anaplasma marginale* and *Babesia equi* for serologic diagnosis. Vet Parasitol 57:93-96, 1995.

41. Shompole S, Perryman LE, McElwain TF, Jasmer DP, Musoke AJ, Rurangirwa FR, McGuire TC: Monoclonal antibody to a conserved epitope on proteins encoded by

Babesia bigemina and present on the surface of intact infected erythrocytes. Infect Immun 63:3507-3513, 1995.

42. *Vidotto O*, McElwain TF, Machado RZ, Perryman LE, Suarez CE, Palmer GH: *Babesia bigemina*: Identification of B cell epitopes associated with parasitized erythrocytes. Exp Parasitol 81:491-500, 1995.

43. *Madruga CR*, Suarez CE, McElwain TF, Palmer GH: Conservation of merozoite membrane and apical complex B-cell epitopes among *Babesia bigemina* and *Babesia bovis* strains isolated in Brazil. Vet Parasitol 61:21-30, 1996.

44. Eid G, French DM, Lundgren AM, Barbet AF, McElwain TF, Palmer GH: Expression of major surface protein 2 antigenic variants during acute *Anaplasma marginale* rickettsemia. Infect Immun 64:836-841, 1996.

45. Rodriguez SD, Palmer GH, McElwain TF, McGuire TC, Ruef BJ, Chitko-McKown CG, Brown WC: CD4+ helper lymphocyte responses against *Babesia bigemina* rhoptry associated protein-1 (RAP-1). Infect Immun 64:2079-2087, 1996.

46. Baszler TV, Knowles DP, Dubey JP, Gay JM, Mathison BA, McElwain TF: Serological diagnosis of bovine neosporosis by *Neospora caninum* monoclonal antibody-based competitive inhibition ELISA. J Clin Micro 34:1423-1428, 1996.

47. Brown WC, McElwain TF, Ruef BJ, Suarez CE, Shkap V, Chitko-McKown CG, Rice-Ficht AC, Palmer GH: *Babesia bovis* rhoptry-associated protein 1 (RAP-1) is immunodominant for T helper cells of immune cattle and contains T cell epitopes conserved among geographically distant *B. bovis* strains. Infect Immun 64:3341-3350, 1996.

48. Hotzel I, Brown WC, McElwain TF, Rodriguez SD, Palmer GH: Dimorphic sequences of *rap-1* genes encode B and CD4+ T helper lymphocyte epitopes in the *Babesia bigemina* rhoptry associated protein-1. Mol Biochem Parasitol 81:89-99, 1996.

49. Knowles D, *Torioni de Echaidc S*, Palmer G, McGuire T, Stiller D, McElwain TF: Antibody against an *A. marginale* MSP5 epitope common to tick and erythrocyte stages identifies persistently infected cattle. J Clin Micro 34:2225-2230, 1996.

50. Cantor GH, Stone DM, McElwain TF, Palmer GH: Comparison of the antiviral efficacy of ribozymes and antisense RNA directed against bovine leukemia virus *rex/tax*. Antisense and Nucleic Acid Drug Development 6:301-304, 1996.

51. Alleman AR, Palmer GH, McGuire TC, McElwain TF, Perryman LE, Barbet AF: *Anaplasma marginale* major surface protein 3 (MSP3) is encoded by a polymorphic, multigene family. Infect Immun 65:156-163, 1997.

52. Reuf BJ, Tuo W, Rodriguez SD, Roussel AJ, Chitko-McKown CG, Palmer GH, McElwain TF, Canals A, Zarlenga DS, Gasbarre LC, Brown WC: Immunization with *Babesia bigemina* rhoptry-associated protein 1 induces a type 1 cytokine response. Journal of Interferon and Cytokine Research 17:45-54, 1997.

53. Hotzel I, Suarez CE, McElwain TF, Palmer GH: Genetic variation in the dimorphic regions of *rap-1* genes and *rap-1* loci of *Babesia bigemina*. Mol Biochem Parasitol 90:479-489, 1998.

54. *Torioni de Echaide S*, Knowles DP, McGuire TC, Palmer GH, Suarez CE, McElwain TF: Detection of cattle naturally infected with *Anaplasma marginale* in a region of endemicity by nested PCR and a competitive enzyme-linked immunosorbent assay using recombinant major surface protein 5. J Clin Micro 36:777-782, 1998.

55. Pessier AP, Hamilton VT, Foreyt WJ, Parish S, McElwain TF: Probable elaeophorosis in a moose (*Alces alces*) from eastern Washington state. J Vet Diag Invest 10:82-84, 1998.

56. Brown WC, McElwain TF, Hotzel I, Suarez CE, Palmer GH: Helper T-cell epitopes encoded by the *Babesia bigemina rap-1* gene family in the constant and variant domains are conserved among parasite strains. Infect Immun 66:1561-1569, 1998.

57. *Trueblood ES*, Brown WC, Palmer GH, Davis WC, Stone DM, McElwain TF: B-lymphocyte proliferation during BLV-induced persistent lymphocytosis is dependent on T-lymphocyte derived IL-2. J Virol 72:3169-3177, 1998.

58. French DM, McElwain TF, McGuire TC, Palmer GH: Expression of *Anaplasma marginale* major surface protein 2 variants during persistent cyclic rickettsemia. Infect Immun 66:1200-1207, 1998.

59. McElwain TF, Hines SA, Palmer GH: Persistence of antibodies against epitopes encoded by a single gene copy of the *Babesia bovis* variable merozoite surface antigen 1 (MSA-1). J Parasitol 84:449-452, 1998.

60. Suarez CE, Palmer GH, Hotzel I, McElwain TF: Structure, sequence, and transcriptional analysis of the *Babesia bovis rap-1* multigene locus. Mol Biochem Parasitol 93:215-224, 1998.

61. Munodzana D, McElwain TF, Knowles DP, Palmer GH: Conformational dependence of *Anaplasma marginale* major surface protein 5 surface-exposed B-cell epitopes. Infect Immun 66:2619-2624, 1998.

62. *Echaide IE*, Hines SA, McElwain TF, Suarez CE, McGuire TC, Palmer GH: In vivo binding of immunoglobulin M to the surfaces of *Babesia bigemina*-infected erythrocytes. Infect Immun 66:2922-2927, 1998.

63. Brown WC, McElwain TF, Hotzel I, Ruef BJ, Rice-Ficht AC, Stich RW, Suarez CE, Estes DM, Palmer GH: Immunodominant T-cell antigens and epitopes of *Babesia bovis* and *Babesia bigemina*. Annals of Trop Med Parasitol 92:473-482, 1998.

64. Von Beust BR, Brown WC, Estes DM, Zarlenga DS, McElwain TF, Palmer GH: Development and in vitro characterization of recombinant vaccinia viruses expressing BLV gp51 in combination with bovine IL4 or IL12. Vaccine 17:384-395, 1998.

65. Suarez CE, Palmer GH, Hotzel I, Hines SA, McElwain TF: Sequence and functional analysis of the intergenic regions separating babesial rhoptry-associated protein 1 (*rap-1*) genes. Exp Parasitol 90:189-194, 1998.

66. Palmer GH, Abbott JR, French DM, McElwain TF: Persistence of *Anaplasma ovis* infection and conservation of the *msp-2* and *msp-3* multigene families within the genus *Anaplasma*. Infect Immun 66:6035-6039, 1998.

67. Brown WC, Shkap V, Zhu D, McGuire TC, Tuo W, McElwain TF, Palmer GH: CD4+ T lymphocyte and IgG2 responses in calves immunized with *Anaplasma marginale* outer membranes and protected against homologous challenge. Infect Immun 66:5406-5413, 1998.

68. Brown WC, McElwain TF, Palmer GH, Chantler SE, Estes DM: Bovine CD4+ T-lymphocyte clones specific for rhoptry-associated protein 1 of *Babesia bigemina* stimulate enhanced immunoglobulin G1 (IgG1) and IgG2 synthesis. Infect Immun 67:155-164, 1999.

69. Molloy JB, Bowles PM, Knowles DP, McElwain TF, Bock RE, Kingston TG, Blight GW, Dalgliesh RJ: Comparison of a competitive inhibition ELISA and the card agglutination test for detection of antibodies to *Anaplasma marginale* and *Anaplasma centrale* in cattle. Aust Vet J 77: 245-249, 1999.

70. Rurangirwa FR, Dilbeck PM, Crawford TB, McGuire TC, McElwain TF: Analysis of 16S rRNA gene of WSU 86-1044 microorganism from an aborted bovine fetus reveals it is a member of the order *Chlamydiales*: proposal of *Waddliaceae* fam. Nov., *Waddlia chondrophila*, gen. nov., sp. nov. Int J Systematic Biol 49:577-581, 1999.

71. Machado RZ, McElwain TF, Pancracio HP, Freschi CR, Palmer GH: *Babesia bigemina*: Immunization with purified rhoptries induces protection against acute parasitemia. Exp Parasitol 93:105-108, 1999.

72. Baszler TV, Long MT, McElwain TF, Mathison BA: Interferon-γ and interleukin-12 mediate protection to acute *Neospora caninum* infection in BALB/c mice. Int J Parasitol 29:1635-1646, 1999.

73. Florin-Christensen J, Suarez CE, Florin-Christensen M, Hines SA, McElwain TF, Palmer GH: Phosphatidylcholine formation is the predominant lipid biosynthetic event in the hemoparasite *Babesia bovis*. Mol Biochem Parasitol 106:147-156, 2000.

74. Tebele N, Skilton RA, Katende J, Wells CS, Nene V, McElwain T, Morzaria SP, Musoke AJ: Cloning, characterization and expression of a 200 kilodalton diagnostic antigen of *Babesia bigemina*. J Clin Microbiol 38:2240-7, 2000.

75. Baszler TV, McElwain TF, Mathison BA: Immunization of BALB/c mice with killed *Neospora caninum* tachyzoite antigen induces a type 2 immune response and exacerbates encephalitis and neurological disease. Clin Diag Lab Immunol 7:893-898, 2000.

76. Suarez CE, Florin-Christensen M, Hines SA, Palmer GH, Brown WC, McElwain TF: Characterization of allelic variation in the *Babesia bovis* merozoite surface antigen-1

(*msa-1*) locus and identification of a cross-reactive, inhibition-sensitive MSA-1 epitope. Infect Immun 68:6865-6870, 2000.

77. Bradway DS, *Torioni de Echaide S*, Knowles DP, Hennager SG, McElwain TF: Sensitivity and specificity of the complement fixation test for detection of cattle persistently infected with *Anaplasma marginale*. J Vet Diag Invest 13:79-81, 2001.

78. Palmer GH, Rurangirwa FR, McElwain TF: Strain composition of the ehrlichia *Anaplasma marginale* within persistently infected cattle, a mammalian reservoir for tick transmission. J Clin Micro 39:631-635, 2001.

79. Snekvik KR, Beyer JC, Bertoni G, Von Beust BR, Baszler TV, Palmer GH, McElwain TF, Cheevers WP: Characterization of caprine interleukin 4. Vet Immunol Immunopathol, 78:219-229, 2001.

80. Fisher TG, McElwain TF, Palmer GH: Molecular basis for variable expression of the merozoite surface antigen gp45 among American isolates of *Babesia bigemina*. Infect Immun 69:3782-3790, 2001.

81. Florin-Christensen J, Suarez CE, Florin-Christensen M, Wainszelbaum M, Brown WC, McElwain TF, Palmer GH: A unique phospholipid organization in bovine erythrocyte membranes. Proceedings of the National Academy of Sciences, USA, 98:7736-7741, 2001.

82. Löhr CV, Rurangirwa FR, McElwain TF, Stiller D, Palmer GH: Specific expression of *Anaplasma marginale* major surface protein 2 salivary gland variants occurs in the midgut and is an early event during tick transmission. Infect Immun 70:114-120, 2002.

83. Mosqueda J, McElwain TF, Stiller D, Palmer GH: *Babesia bovis* Merozoite surface antigen 1 and rhoptry-associated protein 1 are expressed in sporozoites, and specific antibodies inhibit sporozoite attachment to erythrocytes. Infect Immun 70: 1599-1603, 2002.

84. O'Donnell RA, Freitas-Junior LH, Preiser PR, Williamson DH, Duraisingh M, McElwain TF, Scherf A, Cowman AF, Crabb BS: A genetic screen for improved plasmid segregation reveals a role for Rep20 in the interaction of *Plasmodium falciparum* chromosomes. EMBO J 9:1-9. 2002.

85. Norimine J, Suarez CE, McElwain TF, Florin-Christensen M, Brown WC: Immunodominant epitopes in *Babesia bovis* rhoptry-associated protein 1 (RAP-1) that elicit memory CD4+ T lymphocyte responses in *B. bovis*-immune individuals are located in the amino terminal domain. Infect Immun 70:2039-2048, 2002.

86. Florin-Christensen M, Suarez CE, Hines SA, Palmer GH, Brown WC, McElwain TF: The *Babesia bovis* merozoite surface antigen 2 locus contains four tandemly arranged and expressed genes encoding immunologically distinct proteins. Infect Immun 70:3566-3575, 2002.

87. Mosquesda J, McElwain TF, Palmer GH: *Babesia bovis* MSA-2 proteins are expressed on the merozoite and sporozoite surface and specific antibodies inhibit attachment and invasion of erythrocytes. Infect Immun 70:6448-6455, 2002.

88. Goff WL, McElwain TF, Suarez CE, Johnson WC, Brown WC, Norimine J, Knowles DP: A competitive enzyme linked immunosorbent assay based on a rhoptry-associated protein-1 epitope specifically detects *Babesia bovis* infected cattle. Clin Lab Diag Immunol 10:38-43, 2003.

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