

## CURRICULUM VITAE

**VIKRAM N. VAKHARIA**

### **EDUCATION**

Ph.D.	1983	University of Kansas, Lawrence, KS, Chemistry
M.S.	1979	Wichita State University, Wichita, KS, Biochemistry
M.Sc.	1973	University of Bombay, Mumbai, India, Biochemistry
B.Sc.	1971	University of Bombay, Mumbai, India, Chemistry

### **Experience in Higher Education**

2010 – Present	University of Maryland Baltimore County, Professor Department of Marine Biotechnology, Baltimore, MD
2008 – 2010	University of Maryland Biotechnology Institute (UMBI), Professor Center of Marine Biotechnology, Baltimore, MD
2003 – 2008	University of Maryland Biotechnology Institute, Professor Center for Biosystems Research, College Park, MD
1994 – 2003	University of Maryland Biotechnology Institute, Assoc. Professor Center for Biosystems Research, College Park, MD
1988 – 1994	University of Maryland Biotechnology Institute, Asst. Professor Center for Agricultural Biotechnology, College Park, MD
1985 – 1988	State University of New York at Stony Brook, Research Associate Department of Microbiology, Research conducted at USDA's Plum Island Animal Disease Center, Greenport, NY
1983 – 1985	University of Kansas Medical Center, Post-doctoral Fellow Department of Biochemistry, Kansas City, KS
1979 – 1983	University of Kansas, Graduate Research Assistant Department of Chemistry, Lawrence, KS
1976 – 1979	Wichita State University, Graduate Research Assistant Department of Chemistry, Wichita, KS

### **Honors Received**

2014 – Present	Honorary Professor, National University of San Marcos College of Veterinary Medicine, Lima, Peru
2013 – Present	Chutian Scholar and Professor, Huazhong Agricultural University Department of Aquatic Animal Medicine, College of Fisheries, Wuhan, Hubei Province, China
2000 – Present	Member of International Congress for Taxonomy of Viruses for Birnavirus Study Section.
1995	Recipient of David Snyder Award for Technological Development Office of Technology Liaison, Univ. of Maryland at College Park
1990	Outstanding Invention Award, Univ. of Maryland at College Park

**Research Support and/or Fellowships (direct costs)**

2017 – 2018	\$ 79,000	University of Toledo, USDA Subaward, PI
2016 – 2017	\$ 150,000	Maryland Innovation Initiative (MII), TEDCO, co-PI
2015	\$ 15,000	Maryland Innovation Initiative (MII), TEDCO, co-PI
2014	\$ 100,000	Maryland Innovation Initiative (MII), TEDCO, PI
2014 – 2017	\$ 166,122	National Science Foundation, PI
2010 – 2013	\$ 191,248	National Oceanic and Atmospheric Administration, PI
2010 – 2013	\$ 125,100	United States-Israel Binational Agricultural Research Development (BARD), PI
2010 – 2011	\$ 73,340	Maryland Industrial Partnerships (MIPS), Phase II, PI
2009 – 2010	\$ 73,340	Maryland Industrial Partnerships (MIPS), Phase I, PI
2008 – 2012	\$ 183,127	National Institutes of Health, NIAID, co-PI
2008 – 2010	\$ 41,200	National Institutes of Health, co-PI
2005 – 2009	\$ 196,350	U.S. Department of Agriculture, ARS, PI
2005 – 2006	\$ 73,340	Maryland Industrial Partnerships (MIPS), PI
2004 – 2008	\$ 288,000	U.S. Department of Agriculture, ARS, co-PI
2002 – 2004	\$ 36,312	NIH Training Grant, Student Fellowship, co-PI
2002 – 2004	\$ 35,000	Maryland Agricultural Experiment Station, University of Maryland, College Park (UMCP), PI
2002 – 2003	\$ 58,672	Maryland Industrial Partnerships (MIPS), PI
2000 – 2003	\$ 150,000	U.S. Department of Agriculture, ARS, PI
2000 – 2001	\$18,800	U.S. - Spain Joint Commission for Scientific and Technological Cooperation, PI
2000 – 2003	\$ 135,000	Alpharma Fellowship, Aquatic Health, Norway, PI
1998 – 2000	\$ 140,000	Alpharma Aquatic Animal Health, Norway, PI
1997 – 2000	\$ 160,000	U.S. Department of Agriculture, ARS, PI
1996 – 1999	\$ 238,850	National Science Foundation, co-PI
1996 – 1997	\$ 55,000	Maryland Industrial Partnerships (MIPS), PI
1996 – 1997	\$ 14,000	Maryland Agricultural Experiment Station, UMCP, PI
1995 – 1996	\$ 25,000	University of Maryland Biotechnology Institute, PI
1994 – 1996	\$ 175,500	Intervet International, Boxmeer, The Netherlands, PI
1993 – 1996	\$ 271,160	National Science Foundation, co-PI
1993 – 1994	\$ 22,000	Maryland Agricultural Experiment Station, UMCP, PI
1993	\$ 22,300	Maryland Agricultural Experiment Station, Joint Equipment, UMCP, co-PI
1992 – 1995	\$ 149,670	Agency for International Development, co-PI
1991 – 1992	\$ 26,000	Maryland Agricultural Experiment Station, UMCP, PI
1990 – 1993	\$ 60,000	Center for Agricultural Biotechnology, UMBI, Joint Student Fellowship, co-PI
1990 – 1993	\$ 146,175	U.S. Department of Agriculture, ARS, USDA, PI
1989 – 1992	\$ 201,480	Intervet International, Boxmeer, The Netherlands, PI
1989 – 1992	\$ 71,600	Maryland Agricultural Experiment Station, UMCP, PI
1989 – 1991	\$ 54,000	Southeastern Poultry and Egg Association, co-PI
1989 – 1991	\$ 82,000	U.S. Department of Agriculture, ARS, USDA, PI
1988 – 1990	\$ 13,000	Biomedical Res & General Res Board, UMCP, PI

**Visiting Professors (sponsored)**

Name, duration of stay, institutions from where they come from and country

Peng Xiao	February 2015 – March 2016	Institute of Oceanology, Chinese Academy of Sciences, Qingdao, CHINA.
Yudin Fan	March 2015 – March 2016	Yangtze River Fisheries Research Institute, Wuhan, Hubei, CHINA.
Lenita Stefani	January 2015 – November 2015	University of Santa Catarina, Chapeco, Santa Catarina, BRAZIL.
Thavasimuthu Citarasu	December 2014 – August 2015	Manonmaniam Sundaranar University, Kanyakumari Dist., Tamilnadu, INDIA.
Harun Albayrak	June 2014 – August 2014	Ondokuz Mayıs University, Atakum, Samsun, TURKEY.
Sohini Dey	October 2006 – December 2006	Indian Veterinary Research Institute, Izatnagar, Bareilly, UP, INDIA.

**Research Associates & Post-Doctoral Fellows**

Jie Li (Res. Associate)	December 2015 - December 2016; July 2014 – December 2014
Shamila Yusuff (Res. Assoc.)	April 2011 – October 2013
Arun Ammayappan (Post-doc)	January 2010 – June 2011
Chitra Upadhyay (Res. Assoc.)	June 2006 – August 2009
Yi Liu (Res. Assoc.)	September 1999 – February 2002
Kun Yao (Post-doc)	January 1999 – September 1999
Egbert Mundt (Post-doc)	August 1995 – November 1995
Junkun He (Res. Assoc.)	March 1990 – September 1991

**Visiting Pre-Doctoral Fellows (sponsored)**

Xiaodan Liu (China)	January 2016 – April 2017
Sung-Hyun Kim (Norway)	May 2013 – June 2013
Anne Sandro (Norway)	January 2007 – April 2007
Laura Cordoba-Garcia (Spain)	July 2006 – September 2006
Ines Romero-Brey (Spain)	August 2003 – December 2003
Nina Santi (Norway)	January 2002 – April 2002
Fernando Touris (Spain)	September 1999 – December 1999

**Faculty Research Assistants**

Gerard Edwards	March 2014 - March 2015; November 2011 – February 2013; August 2008 – August 2009
Hsiu Chen	July 2011 – January 2012
Michelle Thompson	February 2010 – February 2011
Sarah Milczanowski	January 1992 – July 1993
Gerard Edwards	September 1988 – December 2005

**Ph.D. Students**Name, date degree conferred, position on committee (Chair or member), Institution

M. Mukherjee	May 2011	Member	UMCP, Molecular & Cell Biology
A. Ammayappan	December 2009	Chair	UMCP, Vet Med Sciences
C. Hebert	December 2008	Member	UMCP, Bioengineering
G. Ramirez	December 2008	Member	UMCP, Vet Med Sciences
S. Kramer	May 2008	Member	UMCP, Cell Bio & Mol. Genetics
C. Tsao	December 2007	Member	UMCP, Chemical Engineering
R. Anthony	May 2006	Member	UMCP, Molecular & Cell Biology
R. Zambon	December 2005	co-Chair	UMCP, Molecular & Cell Biology
G. Dhanasekaran	December 2005	Member	UMCP, Vet Med Sciences
I. Romero-Brey	November 2005	Member (Exm)	University of Santiago, Spain
N. Santi	September 2005	Member (Adv)	University of Oslo, Norway
L. Moura	May 2004	Chair	UMCP, Vet Med Sciences
C. Costas	May 2004	Member (Exm)	University of Santiago, Spain
H. Song	December 2003	Chair	UMCP, Animal & Avian Sciences
A. Panda	December 2003	Member	UMCP, Animal & Avian Sciences
I. Rodriguez	December 2003	Member	Univ. Delaware, Animal Sciences
M. Liu	May 2003	Chair	UMCP, Vet Med Sciences
R. Shivappa	May 2003	Chair	UMCP, Animal & Avian Sciences
S. Golem	May 2003	Member	UMCP, Molecular & Cell Biology
Z. Huang	May 2002	Member	UMCP, Animal & Avian Sciences
K. Sandeep	May 2002	Member	UMCP, Molecular & Cell Biology
S. Goregaoker	May 2002	Member	UMCP, Molecular & Cell Biology
M. Brandt	May 2001	Chair	UMCP, Molecular & Cell Biology
N. Dalal	December 2000	Member	UMCP, Chemical Engineering
A. Yunus	December 2000	Member	UMCP, Animal Sciences
J. Hens	December 2000	Member	UMCP, Animal Sciences
M. Pham	May 1999	Member	UMCP, Chemical Engineering
Y. Hu	May 1999	Member	UMCP, Chemical Engineering
S. Krishnamurthy	May 1999	Member	UMCP, Molecular & Cell Biology
B. Read-Connole	May 1999	Member	UMCP, Molecular & Cell Biology
K. Yao	December 1998	Chair	UMCP, Animal Sciences
A. Sarkar	December 1997	Member	UMCP, Molecular & Cell Biology
K. Subramanian	May 1997	Member	UMCP, Animal Sciences
M. Pастey	May 1997	Member	UMCP, Animal Sciences
B. Biswas	December 1996	Member	UMCP, Animal Sciences
A. Baker	December 1996	Member	UMCP, Biochemistry
T. Pulliam	December 1996	Member	UMCP, Chemical Engineering
M. McGowen	December 1995	Member	UMCP, Biochemistry
J. Ma	December 1995	Member	UMCP, Molecular & Cell Biology
B. Lupiani	December 1994	Member	UMCP, Animal Sciences
S. Mallipreddi	December 1994	Member	UMCP, Animal Sciences
G. Lacourciere	December 1994	Member	UMCP, Biochemistry

**Ph.D. Students (continued)**

M. Bhagwat	December 1994	Member	UMCP, Biochemistry
L. Highburger	December 1994	Member	UMCP, Biochemistry
A. Kallarakal	May 1994	Member	UMCP, Biochemistry
A. Kolhekar	May 1994	Member	UMCP, Biochemistry
M. Wang	December 1993	co-Chair	UMCP, Chemical Engineering
S. Harcum	May 1993	Member	UMCP, Chemical Engineering
P. Zhang	December 1991	Member	UMCP, Biochemistry

**Master's Students**

J. Savage	December 2004	co-Chair	UMCP, Cell Bio & Mol. Genetics
G. Oshop	August 2001	Member	UMCP, Animal & Avian Sciences
J. Hsaio	December 1999	Chair	UMCP, Animal Sciences
S. Mengel-Whereat	December 1995	Member	UMCP, Animal Sciences
C. Chamberlain	December 1994	Member	UMCP, Animal Sciences
M. Annadata	December 1993	Chair	UMCP, Animal Sciences
B. Pukazhenth	August 1992	Member	UMCP, Animal Sciences
P. George	August 1992	Member	UMCP, Animal Sciences
P. Patala	August 1992	Member	UMCP, Animal Sciences
B. Ahmed	December 1991	Chair	UMCP, Animal Sciences

**PUBLICATIONS, PRESENTATIONS, AND CREATIVE ACHIEVEMENTS****A. Publications:**

- **Peer-Reviewed Articles**

1. Dadar M, Dhama K, Vakharia VN, Hoseinifar SH, Karthik K, Tiwari R, Khandia R, Munjal A, Salgado-Miranda C, Joshi SK.(Dadar) Advances in aquaculture vaccines against fish pathogens: Global status and current trends. *Reviews in Fisheries Science & Aquaculture*. 2016 Dec 21; doi:10.1080/23308249.2016.1261277
2. Ghorani M, Adel M, Dadar M, Langeroudi AG, Kamyabi R, Vakharia VN, Einer-Jensen K. (Dadar) Phylogenetic analysis of the glycoprotein gene of viral hemorrhagic septicemia virus from Iranian trout farms points towards a common European origin. *Vet Microbiol*. 2016, 186: 97-101.
3. Liu X, Tu J, Yuan J, Liu X, Zhao L, Dawar FU, Khattak MN, Hegazy AM, Chen N, Vakharia VN, Lin L. (Lin) Identification and characterization of microRNAs in snakehead fish cell line upon snakehead fish vesiculovirus infection. *Int J Mol Sci*. 2016, 17(2). pii: E154.
4. Nita-Lazar M, Mancini J, Feng C, González-Montalbán N, Ravindran C, Jackson S, de las Heras-Sánchez A, Giomarelli B, Ahmed H, Haslam SM, Wu G, Dell A, Ammayappan A, Vakharia VN, Vasta GR. (Vasta) The zebrafish galectins Drgal1-L2 and Drgal3-L1

- bind in vitro to the infectious hematopoietic necrosis virus (IHNV) glycoprotein and reduce viral adhesion to fish epithelial cells. *Dev Comp Immunol.* 2016, 55:241-252.
5. Dadar M, Memari HR, Vakharia VN, Peyghan R, Shapouri MS, Mohammadian T, Hasanzadeh R, Ghasemi M. (Dadar) Protective and immunogenic effects of Escherichia coli-expressed infectious pancreatic necrosis virus (IPNV) VP2-VP3 fusion protein in rainbow trout. *Fish Shellfish Immunol.* 2015, 47:390-396.
  6. Maity HK, Dey S, Mohan CM, Khulape SA, Pathak DC, Vakharia VN. (Dey) Protective efficacy of a DNA vaccine construct encoding the VP2 gene of infectious bursal disease and a truncated HSP70 of Mycobacterium tuberculosis in chickens. *Vaccine.* 2015, 33:1033-1039.
  7. Kim SH, Guo TC, Vakharia VN, Evensen Ø. (Evensen) Specific nucleotides at the 3'-terminal promoter of viral hemorrhagic septicemia virus are important for virulence in vitro and in vivo. *Virology.* 2015, 476:226-232.
  8. Liu X, Wen Y, Hu X, Wang W, Liang X, Li J, Vakharia V, Lin L. (Lin) Breaking the host range: mandarin fish is susceptible to a vesiculovirus derived from snakehead fish. *J Gen Virol.* 2015, 96:775-781.
  9. Kim SH, Yusuff S, Vakharia VN, Evensen Ø. (Evensen) Interchange of L polymerase protein between two strains of viral hemorrhagic septicemia virus (VHSV) genotype IV alters temperature sensitivities in vitro. *Virus Res.* 2015, 195:203-206.
  10. Dey S, Chellappa MM, Gaikwad S, Kataria JM, Vakharia VN. (Dey) Genotype characterization of commonly used Newcastle disease virus vaccine strains of India. *PLoS One.* 2014, 9(6):e98869.
  11. Lai SY, Chang GR, Yang HJ, Lee CC, Lee LH, Vakharia VN, Wang MY. (Wang) A single amino acid in VP2 is critical for the attachment of infectious bursal disease subviral particles to immobilized metal ions and DF-1 cells. *Biochim Biophys Acta.* 2014, 1844(7):1173-1182.
  12. Zheng W, Olson J, Vakharia V, Tao YJ. (Tao) The crystal structure and RNA-binding of an orthomyxovirus nucleoprotein. *PLoS Pathog.* 2013, (9):e1003624.
  13. Dadar M, Peyghan R, Memari HR, Shapouri MR, Hasanzadeh R, Goudarzi LM, Vakharia VN. (Dadar) Sequence analysis of infectious pancreatic necrosis virus isolated from Iranian reared rainbow trout (*Oncorhynchus mykiss*) in 2012. *Virus Genes.* 2013, 47:574-578.
  14. Chellappa MM, Dey S, Gaikwad S, Kataria JM, Vakharia VN. (Chellappa) Complete genome sequence of Newcastle disease virus mesogenic vaccine strain R2B from India. *J Virol.* 2012, 86:13814-13815.
  15. Martinez-Alonso S, Vakharia VN, Saint-Jean SR, Pérez-Prieto S, Tafalla C. (Tafalla) Immune responses elicited in rainbow trout through the administration of infectious pancreatic necrosis virus-like particles. *Dev Comp Immunol.* 2012, 36:378-384.
  16. Ammayappan A, Vakharia VN. (Vakharia) Nonvirion protein of novirhabdovirus suppresses apoptosis at the early stage of virus infection. *J Virol.* 2011, 85:8393-8402.
  17. Upadhyay C, Ammayappan A, Patel D, Kovesdi I, Vakharia VN. (Vakharia) Recombinant infectious bursal disease virus carrying hepatitis C virus epitopes. *J Virol.* 2011 85:1408-1414.
  18. Ammayappan A, Kurath G, Thompson TM, Vakharia VN. (Vakharia) A reverse genetics system for the Great Lakes strain of viral hemorrhagic septicemia virus: the NV gene is required for pathogenicity. *Mar Biotechnol (NY).* 2011 13:672-683.

19. Ammayappan A, Lapatra SE, Vakharia VN. (Vakharia) A vaccinia-virus-free reverse genetics system for infectious hematopoietic necrosis virus. *J Virol Methods*. 2010, 167:132-139.
20. Singh NK, Dey S, Madhan Mohan C, Mohan Kataria J, Vakharia VN. (Dey) Evaluation of four enzyme linked immunosorbent assays for the detection of antibodies to infectious bursal disease in chickens. *J Virol Methods*. 2010, 165:277-282.
21. Ammayappan A, LaPatra SE, Vakharia VN. (Vakharia) Molecular characterization of the virulent infectious hematopoietic necrosis virus (IHNV) strain 220-90. *Virol J*. 2010, 7:10.
22. Ammayappan A, Vakharia VN. (Vakharia) Complete nucleotide analysis of the structural genome of the infectious bronchitis virus strain md27 reveals its mosaic nature. *Viruses*. 2009, 1:1166-1177.
23. Ammayappan A, Vakharia VN. (Vakharia) Molecular characterization of the Great Lakes viral hemorrhagic septicemia virus (VHSV) isolate from USA. *Virol J*. 2009, 6:171.
24. Upadhyay C, Ammayappan A, Vakharia VN. (Vakharia) Detection of NP, N3 and N7 antibodies to avian influenza virus by indirect ELISA using yeast-expressed antigens. *Virol J*. 2009, 6:158.
25. Romero-Brey I, Bandín I, Cutrín JM, Vakharia VN, Dopazo CP. Genetic analysis of aquabirnaviruses isolated from wild fish reveals occurrence of natural reassortment of infectious pancreatic necrosis virus. *J Fish Dis*. 2009, 32:585-595.
26. Ammayappan A, Upadhyay C, Gelb J Jr, Vakharia VN. (Vakharia) Identification of sequence changes responsible for the attenuation of avian infectious bronchitis virus strain Arkansas DPI. *Arch Virol*. 2009, 154:495-499.
27. Dey S, Upadhyay C, Madhan Mohan C, Kataria JM, Vakharia VN. (Dey) Formation of subviral particles of the capsid protein VP2 of infectious bursal disease virus and its application in serological diagnosis. *J Virol Methods*. 2009, 157:84-89.
28. Ammayappan A, Upadhyay C, Gelb J Jr, Vakharia VN. (Vakharia) Complete genomic sequence analysis of infectious bronchitis virus Ark DPI strain and its evolution by recombination. *Virol J*. 2008, 5:157.
29. Allnutt FC, Bowers RM, Rowe CG, Vakharia VN, LaPatra SE, Dhar AK. (Allnutt) Antigenicity of infectious pancreatic necrosis virus VP2 subviral particles expressed in yeast. *Vaccine*. 2007, 25:4880-4888.
30. Pan J, Vakharia VN, Tao YJ. (Tao) The structure of a birnavirus polymerase reveals a distinct active site topology. *Proc Natl Acad Sci U S A*. 2007, 104:7385-7390.
31. Song H, Baxter-Roshek JL, Dinman JD, Vakharia VN. (Vakharia) Efficient expression of the 15-kDa form of infectious pancreatic necrosis virus VP5 by suppression of a UGA codon. *Virus Res*. 2006, 122:61-68.
32. Zambon RA, Vakharia VN, Wu LP. (Wu) RNAi is an antiviral immune response against a dsRNA virus in *Drosophila melanogaster*. *Cell Microbiol*. 2006, 8:880-889.
33. Liu M, Vakharia VN. (Vakharia) Nonstructural protein of infectious bursal disease virus inhibits apoptosis at the early stage of virus infection. *J Virol*. 2006, 80:3369-3377.
34. Santi N, Sandtrø A, Sindre H, Song H, Hong JR, Thu B, Wu JL, Vakharia VN, Evensen Ø. (Evensen) Infectious pancreatic necrosis virus induces apoptosis in vitro and in vivo independent of VP5 expression. *Virology*. 2005, 342:13-25.

35. Song H, Santi N, Evensen O, Vakharia VN. (Vakharia) Molecular determinants of infectious pancreatic necrosis virus virulence and cell culture adaptation. *J Virol.* 2005, 79:10289-10299.
36. Santi N, Song H, Vakharia VN, Evensen Ø. (Evensen) Infectious pancreatic necrosis virus VP5 is dispensable for virulence and persistence. *J Virol.* 2005, 79:9206-9216.
37. Shivappa RB, McAllister PE, Edwards GH, Santi N, Evensen O, Vakharia VN. (Vakharia) Development of a subunit vaccine for infectious pancreatic necrosis virus using a baculovirus insect/larvae system. *Dev Biol (Basel).* 2005, 121:165-174.
38. Zambon RA, Nandakumar M, Vakharia VN, Wu LP. (Wu) The Toll pathway is important for an antiviral response in *Drosophila*. *Proc Natl Acad Sci U S A.* 2005, 102:7257-7262.
39. Tourís-Otero F, Martínez-Costas J, Vakharia VN, Benavente J. (Benavente) Characterization of the nucleic acid-binding activity of the avian reovirus non-structural protein sigma NS. *J Gen Virol.* 2005, 86:1159-1169.
40. Shivappa RB, Song H, Yao K, Aas-Eng A, Evensen O, Vakharia VN. (Vakharia) Molecular characterization of Sp serotype strains of infectious pancreatic necrosis virus exhibiting differences in virulence. *Dis Aquat Organ.* 2004, 61:23-32.
41. Liu M, Vakharia VN. (Vakharia) VP1 protein of infectious bursal disease virus modulates the virulence in vivo. *Virology.* 2004, 330:62-73.
42. Santi N, Vakharia VN, Evensen Ø. (Evensen) Identification of putative motifs involved in the virulence of infectious pancreatic necrosis virus. *Virology.* 2004, 322:31-40.
43. Touris-Otero F, Martínez-Costas J, Vakharia VN, Benavente J. (Benavente) Avian reovirus nonstructural protein microNS forms viroplasm-like inclusions and recruits protein sigmaNS to these structures. *Virology.* 2004, 319:94-106.
44. Oshop GL, Elankumaran S, Vakharia VN, Heckert RA. (Heckert) In ovo delivery of DNA to the avian embryo. *Vaccine.* 2003, 21:1275-1281.
45. Heckert RA, Elankumaran S, Oshop GL, Vakharia VN. (Heckert) A novel transcutaneous plasmid-dimethylsulfoxide delivery technique for avian nucleic acid immunization. *Vet Immunol Immunopathol.* 2002, 89:67-81.
46. Hsiao J, Martínez-Costas J, Benavente J, Vakharia VN. (Vakharia) Cloning, expression, and characterization of avian reovirus guanylyltransferase. *Virology.* 2002, 296:288-299.
47. Shwed PS, Dobos P, Cameron LA, Vakharia VN, Duncan R. (Duncan) Birnavirus VP1 proteins form a distinct subgroup of RNA-dependent RNA polymerases lacking a GDD motif. *Virology.* 2002, 296:241-250.
48. Cha HJ, Dalal NG, Pham MQ, Kramer SF, Vakharia VN, Bentley WE. (Bentley) Monitoring foreign protein expression under baculovirus p10 and polh promoters in insect larvae. *Biotechniques.* 2002, 32:986, 988, 990 passim.
49. Brandt M, Yao K, Liu M, Heckert RA, Vakharia VN. (Vakharia) Molecular determinants of virulence, cell tropism, and pathogenic phenotype of infectious bursal disease virus. *J Virol.* 2001, 75:11974-11982.
50. Yao K, Vakharia VN. (Vakharia) Induction of apoptosis in vitro by the 17-kDa nonstructural protein of infectious bursal disease virus: possible role in viral pathogenesis. *Virology.* 2001, 285:50-58.
51. Lillehoj HS, Choi KD, Jenkins MC, Vakharia VN, Song KD, Han JY, Lillehoj EP. (Lillehoj) A recombinant *Eimeria* protein inducing interferon-gamma production:



- comparison of different gene expression systems and immunization strategies for vaccination against coccidiosis. *Avian Dis.* 2000, 44:379-389.
52. Fodor I, Horváth E, Fodor N, Nagy E, Rencendorsh A, Vakharia VN, Dube SK. (Dube) Induction of protective immunity in chickens immunised with plasmid DNA encoding infectious bursal disease virus antigens. *Acta Vet Hung.* 1999, 47:481-492.
  53. Martínez-Costas J, González-López C, Vakharia VN, Benavente J. (Benavente) Possible involvement of the double-stranded RNA-binding core protein sigmaA in the resistance of avian reovirus to interferon. *J Virol.* 2000, 74:1124-1131.
  54. Cha HJ, Dalal NG, Pham MQ, Vakharia VN, Rao G, Bentley WE. (Bentley) Insect larval expression process is optimized by generating fusions with green fluorescent protein. *Biotechnol Bioeng.* 1999, 65:316-324.
  55. Hu YC, Bentley WE, Edwards GH, Vakharia VN. (Vakharia) Chimeric infectious bursal disease virus-like particles expressed in insect cells and purified by immobilized metal affinity chromatography. *Biotechnol Bioeng.* 1999, 63:721-729.
  56. Cha HJ, Dalal NG, Vakharia VN, Bentley WE. (Bentley) Expression and purification of human interleukin-2 simplified as a fusion with green fluorescent protein in suspended Sf-9 insect cells. *J Biotechnol.* 1999, 69:9-17.
  57. Okamoto T, Minamikawa T, Edward G, Vakharia V, Herman E. (Herman) Post-translational removal of the carboxyl-terminal KDEL of the cysteine protease SH-EP occurs prior to maturation of the enzyme. *J Biol Chem.* 1999, 274:11390-11398. Erratum in: *J Biol Chem* 1999, 274:25188.
  58. Cha HJ, Srivastava R, Vakharia VN, Rao G, Bentley WE. (Bentley) Green fluorescent protein as a noninvasive stress probe in resting *Escherichia coli* cells. *Appl Environ Microbiol.* 1999, 65:409-414.
  59. Yao K, Vakharia VN. (Vakharia) Generation of infectious pancreatic necrosis virus from cloned cDNA. *J Virol.* 1998, 72:8913-8920.
  60. Yao K, Goodwin MA, Vakharia VN. (Vakharia) Generation of a mutant infectious bursal disease virus that does not cause bursal lesions. *J Virol.* 1998, 72:2647-2654.
  61. Banghart LR, Chamberlain CW, Velarde J, Korobko IV, Ogg SL, Jack LJ, Vakharia VN, Mather IH. (Mather) Butyrophilin is expressed in mammary epithelial cells from a single-sized messenger RNA as a type I membrane glycoprotein. *J Biol Chem.* 1998, 273:4171-4179.
  62. Mundt E, Vakharia VN. (Vakharia) Synthetic transcripts of double-stranded Birnavirus genome are infectious. *Proc Natl Acad Sci U S A.* 1996, 93:11131-11136.
  63. Vakharia VN, Raina AK, Kingan TG, Kempe TG. (Raina) Synthetic pheromone biosynthesis activating neuropeptide gene expressed in a baculovirus expression system. *Insect Biochem Mol Biol.* 1995, 25:583-589.
  64. Bentley WE, Wang MY, Vakharia V. (Bentley) Development of an efficient bioprocess for poultry vaccines using high-density insect cell culture. *Ann N Y Acad Sci.* 1994, 745:336-359.
  65. Snyder DB, Vakharia VN, Mengel-Whereat SA, Edwards GH, Savage PK, Lütticken D, Goodwin MA. (Snyder) Active cross-protection induced by a recombinant baculovirus expressing chimeric infectious bursal disease virus structural proteins. *Avian Dis.* 1994, 38:701-707.

66. Meyer RF, Pacciarini M, Hilyard EJ, Ferrari S, Vakharia VN, Donini G, Brocchi E, Molitor TW. (Meyer) Genetic variation of foot-and-mouth disease virus from field outbreaks to laboratory isolation. *Virus Res.* 1994, 32:299-312.
67. Vakharia VN, Snyder DB, Lütticken D, Mengel-Whereat SA, Savage PK, Edwards GH, Goodwin MA. Active and passive protection against variant and classic infectious bursal disease virus strains induced by baculovirus-expressed structural proteins. *Vaccine.* 1994, 12:452-456.
68. Annadata M, Vakharia VN. (Vakharia) Comparative analysis of virus-induced polypeptides of an avirulent and a virulent strain of avian reovirus. *Avian Dis.* 1994, 38:244-250.
69. Wang MY, Bentley WE, Vakharia V. (Vakharia) Purification of a recombinant protein produced in a baculovirus expression system by immobilized metal affinity chromatography. *Biotechnol Bioeng.* 1994, 43:349-356.
70. Vakharia VN, He J, Ahamed B, Snyder DB. (Vakharia) Molecular basis of antigenic variation in infectious bursal disease virus. *Virus Res.* 1994, 31:265-73.
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• **Book Chapters and Proceeding Articles**

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**B. Presentations:**

• **Conference/Poster Presentations (Non-Refereed)**

1. Vakharia, V.N., Yusuff, S. 2016. (Vakharia) Protective immunity against nervous necrosis virus in European sea bass following vaccination with virus-like particles based vaccine. 11th International Marine Biotechnology Conference, August 29- September 2, Baltimore, USA.
2. Albayrak, H., Isidan, H., LKalayci, G, Ozan, E., Vakharia, V.N. 2015. (Albayrak) Genetic analysis of the complete G gene of viral hemorrhagic septicemia virus (VHSV) isolates in Turkey. 17th International Conference on diseases of fish and shellfish, September 7-10, Las Palmas, Gran Canaria, Spain.
3. Albayrak, H., Ozan, E., Vakharia, V.N. 2015. (Albayrak) Molecular characterization of the Almus infectious pancreatic necrosis virus (IPNV) isolate from Turkey. 17th International Conference on diseases of fish and shellfish, September 7-10, Las Palmas, Gran Canaria, Spain.
4. Albayrak, H., Isidan, H., Ozan, E., Vakharia, V.N. 2015. (Albayrak) Molecular characterization of the HAH-2 infectious pancreatic necrosis virus (IPNV) isolate from Turkey. X International Congress of Veterinary Virology, August 31, September 3, Montpellier, France.
5. Yusuff, S., Edwards, G.H., Vakharia, V.N. 2014. (Vakharia) Virus-like particles produced by expression of betanodavirus capsid protein in insect cells. 9<sup>th</sup> International Symposium on Viruses of Lower Vertebrates, October 1-4, Malaga, Spain.
6. Yusuff, S., Kurath, G., Kim, M.S., Vakharia, V.N. 2013. (Vakharia) Glycoprotein and non-virion genes of viral hemorrhagic septicemia virus are not major determinants of host-specific virulence. 16th International Conference on diseases of fish and shellfish, September 2-6, Tampere, Finland.

7. Ammayappan, A., Yusuff, S., Kurath, G., Thompson, T., and Vakharia, V.N. 2013. (Vakharia) Heterologous exchanges of non-virion and glycoprotein in novirhabdovirus: effects on pathogenicity and host specificity. 15th International Negative Strand RNA Virus Meeting, June 16-21, Granada, Spain.
8. Carcamo, J.G., Manriquez, R.A., Torres, C.I., Mancilla, A., Vakharia, V.N., Yanez, A. 2012. (Carcamo) Production of VLPs of infectious pancreatic necrosis virus (IPNV) using the baculovirus-insect cell expression system. 11th International Symposium on double-stranded RNA viruses, November 27-December 1, San Juan, Puerto Rico.
9. Vakharia, V.N., Dey, S., Mohan, M. 2012. (Vakharia) Subviral particles of infectious bursal disease virus produced in yeast confer complete protection in chickens. XXIII Pan American Congress of Veterinary Sciences, October 24-27, Cartagena, Colombia.
10. Vakharia, V. N., and Yusuff, S. 2012. (Vakharia) Expression of betanodavirus structural protein genes in insect cells. IX International Congress of Veterinary Virology, September 4-7, Madrid, Spain.
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14. Ammayappan, A., and Vakharia, V.N. 2010. (Vakharia) A vaccinia-virus-free reverse genetics system for Novirhabdovirus, infectious hematopoietic necrosis virus. 14th International Negative Strand Virus Meeting, June 21-25, Bruges, Belgium.
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27. Vakharia, V.N., Lamichhane, C., and Edwards, G.H. 2005. (Vakharia) Serological reactivity of baculovirus-expressed infectious bronchitis virus nucleoprotein. 141st American Veterinary Medical Association Annual Convention, July 16-20, Minneapolis, MN.
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  82. Read-Connole, E.L., Frana, M.F., Kuenzel, W.J. and Vakharia, V.N. 1995. (Vakharia) Characterization of a panel of monoclonal antibodies to avian reovirus isolates. 67th Northeastern Conf. on Avian Dis. June 12-14, 1995. Storrs, CT.
  83. Mallinson, E.T., Vakharia, V.N., Savage, P.K., Senne, D.A., Odor, E.M., Salem, M., Stephenson, E.H. and Mohanty, S.B. 1996. (Mallinson) Direct, rapid detection of avian influenza virus from clinical poultry specimens. 68th Northeastern Conference on Avian Diseases, June 10-12, 1996. University Park, PA.
  84. Vakharia, V. N. and Edwards, G.H. 1995. (Vakharia) Analysis of antigenic sites of infectious bursal disease virus using virus-like particles produced by the expression of viral capsid proteins in insect cells. Vth International Symposium on Double-Stranded RNA Viruses, March 19-23, 1995. Jerba, Tunisia.

85. Vakharia, V.N., Snyder, D.B. and Lütticken, D. 1994. (Vakharia) Molecular basis of antigenic variation in infectious bursal disease virus. International symposium on infectious bursal disease and chicken infectious anemia, June 21-24, 1994. Rauschholzhausen, Germany.
86. Snyder, D.B., Savage, P.K., Mengel-Whereat, S.A., Vakharia, V.N. and Lütticken, D. 1994. (Snyder) Molecular epidemiology of infectious bursal disease virus in the United States. (Ibid.).
87. Simpson, L.M. and Vakharia, V.N. 1994. (Simpson) Cloning and expression of the sigma coat protein gene of avian reovirus. 66th Northeastern Conference on Avian Diseases, June 19-21, 1994. College Park, MD.
88. Wang, M.Y., Bentley, W.E. and Vakharia, V.N. 1993. (Wang) Integrated strategies for protein expression and metal affinity separation in the insect cell/baculovirus expression system. Annual Meeting of American Institute of Chemical Engineering, November 1993. St. Louis, MO.
89. Vakharia, V.N., Snyder, D.B., Lütticken, D., Mengel-Whereat, S.A., Savage, P.K. and Edwards, G.H. 1993. (Vakharia) Active and passive protection against variant and classic infectious bursal disease virus strains induced by baculovirus expressed structural proteins. Sixth International Congress of Virology, August 8-13, 1993. Glasgow, Scotland.
90. Snyder, D.B. and Vakharia, V.N. 1993. (Snyder) A recombinant baculovirus expressing infectious bursal disease virus antigens provides active and passive cross-protection of chickens. 130th Annual Meeting of American Veterinary Medical Association, July 17-21, 1993. Minneapolis, MN.
91. Bentley, W.E., Wang, M.Y. and Vakharia, V.N. 1993. (Bentley) Development of an efficient bioprocess for poultry vaccines using high-density insect cell culture. Biochemical Engineering Foundation Conf., VIII, July 1993. Princeton, NJ.
92. Wang, M.Y., Vakharia, V.N. and Bentley, W.E. 1993. (Wang) Heterologous protein production in high cell density insect cell culture. 1st Annual Maryland Biotechnology Institute Research Symposium, January 11-12, 1993. Rockville, MD.
93. Vakharia, V.N., Snyder, D.B., Edwards, G.H., Savage, P.K., Mengel-Whereat, S.A. and Milczanowski S. 1993. (Vakharia) Infectious bursal disease virus structural proteins expressed in a baculovirus recombinant confer protection in chickens. 1st Annual Maryland Biotechnology Institute Research Symposium, January 11-12, 1993. Rockville, MD.
94. Wang, M.Y., Vakharia, V.N. and Bentley, W.E. 1992. (Bentley) Heterologous protein production in high cell density insect cell culture. Annual Meeting of American Institute of Chemical Engineering, November 1992. Miami, FL.
95. Vakharia, V.N., Snyder, D.B., He, J., Edwards, G.H., Savage, P.K. and Mengel-Whereat, S.A. 1992. (Vakharia) Infectious bursal disease virus structural proteins expressed in a baculovirus recombinant confer protection in chickens. IVth International Symposium on Double-Stranded RNA Viruses, December 12-16, 1992. Scottsdale, AZ.
96. Meyer, R.F., Vakharia, V.N., Hilyard, E. and Molitor, T. 1992. (Meyer) A study of genetic variation of foot-and-mouth disease virus from a field outbreak to laboratory isolation. 73rd Annual Meeting of the Conference of Research Workers in Animal Disease, November 9-10, 1992. Chicago, IL.

97. Vakharia, V.N. and Snyder, D.B. 1992. (Vakharia) Baculovirus system for poultry vaccines. 27th National Meeting on Poultry Health and Processing, October 15-16, 1992. Ocean City, MD.
98. He, J. and Vakharia, V.N. 1991. (He) Molecular cloning and nucleotide sequence analysis of segment A of DS326 strain infectious bursal disease virus: mapping of a monoclonal antibody binding site. 72nd Annual Meeting of the Conference of Research Workers in Animal Disease, November 11-12, 1991. Chicago, IL.
100. Annadata, M. and Vakharia, V.N. 1991. (Annadata) Comparison of intracellular synthesis of virus induced polypeptides by avian reovirus strains S1133 and 1733. 72nd Annual Meeting of the Conference of Research Workers in Animal Disease, November 11-12, 1991. Chicago, IL.
101. He, J. and Vakharia, V.N. 1991. (He) Virus-encoded polypeptide VP4 of infectious bursal disease virus is required for the processing of precursor polyprotein. 10th Annual Meeting of the American Society for Virology, July 7-11, Fort Collins, CO.
102. Ahamed, B. and Vakharia, V.N. 1991. (Ahamed) Cloning of the large segment of D-78 infectious bursal disease virus (IBDV) by polymerase chain reaction: comparison of the nucleotide sequence with other strains of IBDV. 10th Annual Meeting of the American Society for Virology, July 7-11, 1991. Fort Collins, CO.
103. Vakharia, V.N., He, J., Edwards, G.H. and Snyder, D.B. 1990. (Vakharia) Nucleotide and deduced amino acid sequence of large genome segment A of the US variant, GLS, infectious bursal disease virus. Third International Symposium on Double-Stranded RNA viruses, December 2-7, 1990. Kona Surf Resort, HI.
104. Snyder, D.B. and Vakharia, V.N. 1990. (Snyder) Comparative epidemiologic and antigenic evolution of vaccine and field strains of serotype I infectious bursal disease virus. 127th Annual Meeting of American Veterinary Medical Association, July 21-25, 1990. San Antonio, TX.
105. Vakharia, V.N. and Edwards, G.H. 1989. (Vakharia) Molecular cloning and sequencing of the VP2 gene of two antigenic variants of infectious bursal disease virus. 70th Annual Meeting of the Conference of Research Workers in Animal Disease, November 14-15, 1989. Chicago, IL.
106. Meyer, R.F., DeMaula, C.D., Molitar, T.W., House, J.A. and Vakharia, V.N. 1989. (Meyer) Detection of foot-and mouth disease virus in experimentally infected bovine tissue and fluid samples using DNA and RNA probes 70th Annual Meeting of the Conference of Research Workers in Animal Disease, November 14-15, Chicago, IL.
107. Vakharia, V.N. (1989). Detection of infectious bursal disease virus using solid-phase nucleic acid hybridization. 126th Annual Meeting of American Veterinary Medical Association, July 15-19, 1989. Orlando, FL.
108. Vakharia, V.N., Devaney, M.A., Grubman, M.J. and Moore, D.M. 1988. (Grubman) Cloning and expression of foot-and-mouth disease virus genes. XIth Pan American Congress of Veterinary Sciences, August 14-20, 1988. Lima, Peru.
109. Baxt, B., Vakharia, V.N., Franke, A.J., Morgan, D.O. and Moore, D.M. 1988. (Baxt) Analysis of neutralizing antigenic sites on type A12 foot-and-mouth disease virus. XIth Pan American Congress of Vet. Sci. August 14-20, 1988. Lima, Peru.
110. Baxt, B., Vakharia, V.N., Franke, A.J., Morgan, D.O. and Moore, D.M. 1988. (Baxt) Analysis of neutralizing antigenic sites on type A12 foot-and-mouth disease virus.

- Molecular Aspects of Picornavirus Infection and Detection. ICN-UCI International Conference on Virology, January 14-15, 1988. Newport Beach, CA.
111. Moore, D.M., Vakharia, V.N., Devaney, M.A., Grubman, M.J., Dunn, J.J. and Fuerst, T. 1987. (Moore) Expression of foot-and-mouth disease virus proteins in a cell-free system and in mammalian cells. VIIth International Congress of Virology, August 9-14, 1987. Edmonton, Canada.
  112. Baxt, B., Morgan, D.O., Vakharia, V.N., and Moore, D.M. 1987. (Baxt) Neutralizing antigenic sites on type A foot-and-mouth disease virus defined by neutralization resistant variants. VIIth International Congress of Virology, August 9-14, 1987. Edmonton, Canada.
  113. Devaney, M.A., Vakharia, V.N., Moore, D.M., Dunn, J.J. and Grubman, M.J. 1987. (Devaney) Proteolytic processing of foot-and-mouth disease virus polyproteins expressed in a cell-free system from clone-derived transcripts. 6th Annual Meeting of the American Society for Virology, May 31-June 4, 1987. Chapel Hill, NC.
  114. Vakharia, V.N. and Moore, D.M. 1986. (Vakharia) Molecular basis of variation in foot-and-mouth disease virus. Symposium on positive strand RNA viruses held at the 15th Annual Meeting of the UCLA Symposia on Molecular and Cellular Biology. Keystone, CO, April 20-26, 1986. J. Cell. Biochem. Suppl. 10D, p. 284.
  115. Padmanabhan, R., Yaegashi, T., Vakharia, V.N. and Feighny, R. 1986. (Padmanabhan) Structural analysis of dengue virus type-2 genome. Symposium on positive strand RNA viruses held at the 15th Annual Meeting of the UCLA Symposia on Molecular and Cellular Biology, Keystone, CO, April 20-26, 1986. J. Cell. Biochem. Suppl. 10D, pg. 286.
  116. Vakharia, V.N., Yaegashi, T., Kolhekar, S., Feighny, R., Shoppe, R., Dalrymple, J.M., and Padmanabhan, R. 1984. (Padmanabhan) Structural analysis of dengue-2 virus genome. Joint Meeting of the American Society of Tropical Medicine and Hygiene and the Royal Society of Tropical Medicine and Hygiene. December 3-6, 1984. Baltimore, MD.
  117. Vakharia, V.N., Yaegashi, T., Kolhekar, S., Feighny, R. and Padmanabhan, R. 1984. (Vakharia) Sequence analysis of dengue-2 virus genome. 27th Annual West Central States Biochemistry Conference, October 26-27, 1984. Manhattan, KS.
  118. Vakharia, V.N., Yaegashi, T., Feighny, R., Kolhekar, S. and Padmanabhan, R. 1984. (Padmanabhan) Structural analysis of dengue virus type 2 genome. International Workshop on Molecular biology of Flavivirus, November 29 -December 1, 1984. Fort Detrick, MD.
  119. Singhal, R.P., Vakharia, V.N. and Roberts, E.F. 1983. (Singhal) Functions of queuine in transfer RNA. 74th Annual Meeting of the American Society of Biological Chemists, San Francisco, CA, June 5-9, 1983. Fed. Proc. 42 (7). Abstract 2824.
  120. Singhal, R.P. and Vakharia, V.N. 1983. (Vakharia) Role of Q nucleotide of transfer RNA in protein synthesis. 18th ACS Midwest Regional Meeting, November 2-4, 1983. Lawrence, KS.
  121. Singhal, R.P. and Vakharia, V.N. 1982. (Vakharia) Structure of aspartate transfer RNA-2 from rabbit liver. 66th Annual Meeting of the Federation of American Societies for Experimental Biology, New Orleans, LA, April 15-23, 1982. Fed. Proc. 41 (4). Abstract 4445.

122. Vakharia, V.N. Liver aspartate transfer RNAs: primary structures and aminoacylation kinetics. 1981. 72nd Annual Meeting of the American Society of Biological Chemists, St. Louis, MO, May 31 - June 4, 1981. Fed. Proc. 40 (6).
123. Singhal, R.P., Vakharia, V.N., Garcia, C.M., Kopper, R.A., Smoll, D.B., Bajaj, R.K. and Harding, M.A. 1979. (Singhal) Affinity chromatography of specific mammalian transfer RNA. Stability of aminoacyl transfer RNA on columns. 63rd Annual Meeting of the Federation of American Societies for Experimental Biology, Dallas, TX, April 1-5, 1979. Fed. Proc. 38(1). Abstract 1439.
124. Singhal, R.P., Kopper, R.A., Vakharia, V.N., Garcia, C.M. and Harding, M.A. 1979. (Vakharia) Instability of aminoacyl-tRNA on columns. Large-scale isolation and affinity chromatography of tRNAs. 11th International Congress of Biochemistry, July 8-13, 1979, Toronto, Canada.

- **Other Professional Presentations (Non-Juried)**

- **Seminars as Invited Speaker Titled:**

1. “Molecular determinants of pathogenicity and host specificity of viral hemorrhagic septicemia virus using reverse genetics” at University of Toledo, Toledo, Ohio, February 28, 2014.
2. “Functional studies and vaccine development of infectious pancreatic necrosis and novirhabdoviruses affecting salmonids,” ( 4 seminars) at Huazhong Agricultural University, Wuhan, October 21, 2013; Yangtze River Fisheries Research Institute, Wuhan, October 22, 2013; Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan, October, 23, 2013; and Institute of Oceanology, Chinese Academy of Sciences, Qingdao, October 28, 2013.
3. “Functional studies and vaccine development of infectious pancreatic necrosis,” at Marine Harvest Company, Puerto Montt, Chile, March 25, 2013.
4. “Functional studies and vaccine development of infectious pancreatic necrosis and novirhabdoviruses affecting salmonid species,” at The University of Maine, Orono, Maine, October 1, 2012.
5. “Reverse genetics of VHSV and its use for the study of viral pathogenesis” at The Norwegian School of Veterinary Science, September 9, 2011, Oslo, Norway.
6. “Virus-like particles based platform technologies for vaccine development” at Universidad Austral de Chile, Valdivia, Chile, May 10-19, 2010, Valdivia, Chile.
7. “Functional studies and vaccine development of infectious pancreatic necrosis and infectious hematopoietic necrosis viruses” at Centro de Investigación en Sanidad Animal (CISA), Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria (INIA), September, 11-13, 2009, Valdeolmos (Madrid), Spain.
8. “Generation of fish rhabdoviruses as vectors for vaccine development” at Intervet Schering-Plough Animal Health, September 9-10, 2009, Boxmeer, Netherlands.
9. “Development of recombinant vaccines for infectious pancreatic necrosis disease” at Pontificia Catholic University of Valparaiso, July 15-23, 2008, Valparaiso, Chile.
10. “Virus-like particles based platform technologies for vaccine development” at MedImmune Vaccines, June 4, 2008, Mountain View, CA.

11. "Development of recombinant vaccines to control viral diseases of poultry pathogens" at Hester Pharmaceuticals, February 5-6, 2008, Ahmedabad, India.
12. "Functional studies and vaccine development of infectious pancreatic necrosis virus" at Novartis Animal Health Canada, July 31-August 1, 2007, Victoria, Canada.
13. "Diagnosis and control of poultry virus infections" at North Carolina A&T University, October 23, 2006, Greensboro, NC.
14. "Functional studies and vaccine development of Gumboro disease and infectious bronchitis virus using reverse genetics" at University of Delaware, October 9, 2006, Newark, DE.
15. "Novel recombinant vaccines against infectious pancreatic necrosis virus disease", Dept. of Basic Sciences & Aquatic Medicine, Norwegian School of Veterinary Medicine, September 7 2005, Oslo, Norway.
16. "Functional studies of birnavirus proteins", at Rice University, March 14, 2005, Houston, TX.
17. "Development of recombinant vaccines against poultry pathogens" at Lohmann Animal Health, November 17-18, 2004, Gainesville, GA.
18. "Functional studies of virulence in infectious bursal disease virus using reverse genetics" at Department of Pathobiology, University of Connecticut, October 7, 2004, Storrs, CT.
19. "Functional studies of virulence in birnaviruses using reverse genetics" at Department of Biotechnology, Instituto Nacional de Investigacion y Tecnologia Agraria y Alimentaria (INIA), March 24, 2004, Madrid, Spain.
20. "Development of recombinant vaccines against IBDV in chickens and IPNV in fish" at Department of Microbiology & Immunology, Panum Institute, University of Copenhagen, April 7, 2003, Copenhagen, Denmark.
21. "Development of recombinant vaccines against infectious bursal disease virus and avian reovirus" at Merial Ltd., Animal Health Division, October 10-11, 2002, Athens, GA.
22. "Functional studies of birnaviruses using reverse genetics approach". Dept. of Diagnostic Medicine/Pathobiology, College of Veterinary Medicine, Kansas State University, November 1-2, 2001, Manhattan, KS.
23. "Development of recombinant vaccines against Gumboro disease" at HIPRA Laboratories, June 27-28, 2001, Girona, Spain.
24. "Cloning and expression of inner capsid protein genes of avian reovirus" at University of Santiago at Compostela, Department of Biochemistry and Molecular Biology, June 23-26, 2001, Santiago de Compostela, Spain.
25. "Functional analysis of infectious bursal disease virus using reverse genetics" at National Center of Biotechnology, Department of Molecular & Cell Biology, June 20-23, 2001, Madrid, Spain.
26. "Molecular basis of virulence and pathogenesis in infectious pancreatic necrosis virus", Alfarma, Aquatic Animal Health Division, June 14-16, 2001, Oslo, Norway.
27. "Development of recombinant vaccines against Gumboro disease, using infectious clones", at Schering-Plough, Division of Animal Health, October 9, 1998, Elkhorn, NE.
28. "Development of recombinant vaccines against Gumboro disease, using infectious clones", at College of Vet. Medicine, Univ. of Georgia and USDA's Southeast Poultry Research Center., October 6, 1998, Athens, GA.
29. "Biotechnology trends in animal vaccines", presented at 4th Bioscience Forum, sponsored by High Technology Council of Maryland, October 1, 1998, Rockville, MD.

30. "Towards the development of a multispectrum vaccine against Gumboro disease, using a reverse genetics approach", at College of Veterinary Medicine, September 9, 1998, College Park, MD.
31. "Generation of a nonpathogenic virus from cloned cDNA". Department of Veterinary Pathobiology, College of Veterinary Medicine, University of Minnesota, April 29, 1998, St. Paul, MN.
32. "Recombinant viral vaccines derived from baculovirus/insect cell system", presented at Biotechnology Industry Access-1997, November 6, College Park, MD.
33. "Generation of infectious birnavirus from cloned cDNA: Potential for vaccine development", at Biotechnology Center/Molecular & Cell Biology Department of University of Connecticut, September 26, 1996, Storrs, CT.
34. "Protection induced by a recombinant baculovirus expressing infectious bursal disease virus antigens", at Kirkegaard and Perry Laboratories, March 15, 1995, Gaithersburg, MD.
35. "Development of a recombinant vaccine for infectious bursal disease virus in chickens", at Center of Marine Biotechnology, UMBI, October 28, 1994, Baltimore, MD.
36. "Development of a recombinant vaccine for infectious bursal disease virus in chickens", at Intervet International, B.V. (AKZO-NOBEL), June 20, 1994, Boxmeer, The Netherlands.
37. "Monoclonal antibodies and epitope analysis" course taught at Indian Veterinary Research Institute as a consultant on a United Nations Assisted Program, December 5-18, 1993, Izatnagar, India.
38. "The use of a baculovirus expression system for production of foreign proteins", at Crop Genetics International. January 13, 1993, Hanover, MD.

#### **Lectures as Invited Speaker in Symposia:**

1. "Infectious Bronchitis Virus – New Technologies and Prospects for Control." (Plenary) XVII South Brazil Poultry Symposium, April 5-7, 2016, Chapeco, Santa Catarina State, Brazil.
2. "Recent advances in veterinary viral vaccines" and "Development of recombinant subunit and attenuated vaccines for Gumboro disease" (2 Plenary). XXII Pan American Congress of Veterinary Sciences (PANVET), September 1-4, 2010, Lima, Peru.
3. "Novel strategies to control infectious pancreatic necrosis disease". International Symposium of Marine Biotechnology, December 9-13, 2007, Viña del Mar, Chile.
4. "Novel strategies to control infectious pancreatic necrosis disease" (Plenary). 4th International Veterinary Vaccines and Diagnostics Conference, June 27, 2006, Oslo, Norway.
5. "Molecular determinants of virulence in infectious bursal disease virus" (Keynote). 4th European Co-operation of Scientific and Technical Research (COST Action 839) meeting on Immunosuppressive Viral Diseases in Poultry, April 25-27, 2002, Leipzig, Germany.
6. "Molecular basis of virulence in infectious pancreatic necrosis virus". International Symposium on fish virus pathogenesis and disease control, August 27-31, 2001, Taipei, Taiwan.



7. "Generation of a potential recombinant IBDV vaccine" (Plenary and Chair of session). 2nd International Symposium on Infectious Bursal Disease and Chicken Infectious Anemia, June 16-20, 2001, Rauschholzhausen, Germany.
8. "Functional studies of birnaviruses using reverse genetics" (Plenary). 7th International Symposium on Double-Stranded RNA Viruses, December 5, 2000, Palm Beach, Aruba.
9. "Generation of non-pathogenic infectious bursal disease virus using reverse genetics" (Plenary and Chair of session). World Veterinary Poultry Association, August 18-22, 1997, Budapest, Hungary.
10. "Adenovirus and reovirus infections in poultry". World Veterinary Poultry Association, June 24-27, 1996, Rauschholzhausen, Germany.
11. "Infectious Bursal Disease and Chicken Infectious Anemia". World Veterinary Poultry Association, June 21-24, 1994, Rauschholzhausen, Germany.
12. "Baculovirus system for poultry vaccines". 27th National Meeting on Poultry Health and Processing, October 15-16, 1992, Ocean City, MD.

#### **Lectures as Invited Speaker in Workshops:**

1. "Development of diagnostic tests for the surveillance of infectious salmon anemia virus (ISAV)," in a workshop organized by University of Austral on March 21, 2013 in PuertoVaras, Chile.
2. "Second generation of vaccines: technological potential in disease prevention," in a workshop organized by Technology Corp. of Andalusia on September 11, 2013 in Jerez de la Frontera, Spain.
3. "New generation of veterinary viral vaccines" and "Virus-like particles based technology for vaccine development", in a workshop organized by University of Austral, January 19-29, 2012, Valdivia, Chile.
4. "Detection of infectious bursal disease virus using solid-phase nucleic acid hybridization" in "Practical application of nucleic acid techniques to avian disease problems" workshop organized by American Association of Avian Pathologists and American Veterinary Medical Association, July 17, 1989 in Orlando, FL.

#### **C. Creative Achievements:**

- **Original designs and plans and patents:**

##### **Patents licensed:**

Vakharia, V.N. (2016) Provisional U. S. Patent entitled, "Oral vaccine for nervous necrosis virus".

Licensed from UMBC to VakSea, Inc., a start-up company formed by the PI. The licensee to pay royalties and option fees after the sale of a product.

\*Vakharia, V.N. and Mundt, E. (1998, 1999, 2000, 2001, 2003, 2004, 2005, 2006, 2008). U.S. Patents # 5,871,744 and 5,596,280, Australian Patent # 741055, China Patent # 1,168,500, Czech Republic # 299417, Israel Patent # 128804, Korea Patent # 475,427,

Mexico Patent # 222,990, New Zealand Patent # 334,667, Poland Patent # 190,220, entitled, “A method for generating birnavirus from synthetic RNA transcripts”.

Applications are pending in Brazil, Canada, Chile, and EP (divisional) France, Germany, Great Britain, Hungary, Italy, Japan, Netherlands, Norway, Philippines, Spain and Switzerland.

\*Vakharia, V. N. and Yao, K. (2001). U.S. Patent # 6,231,868 entitled, “Method for generating nonpathogenic birnavirus from synthetic RNA transcripts”.

The licensee paid all the patent costs, royalties and option fees. \*Currently paying maintenance fees.

**Patents not licensed:**

Vakharia, V.N. (2009). U.S. Patent # 7, 491,399, “In ovo vaccine against infectious bursal disease (IBD).”

Vakharia, V.N. (2007). U.S. Patent # 7,244,432, “An infectious bursal disease virus variant from Georgia.”

Vakharia, V.N. (2005, 2008). U.S. Patent # 6, 936,256, and European Patent (EP) 1,420,819 (granted in Denmark and Sweden), entitled “Subunit vaccine for infectious pancreatic necrosis virus”.

Vakharia, V. N. and Yao, K. (2001, 2005, 2010, 2011). U.S. Patent # 6,274,147, Chile Patent # 42,554, Norway Patent # 329,660, Canada Patent # 2,324,478, entitled “Method for generating nonpathogenic infectious pancreatic necrosis virus from synthetic RNA transcripts”.

Raina, A.A., Leclerc, R.F. and Vakharia, V.N. (2000). U.S. Patent # 6,087,165 entitled, “Construction of a recombinant baculovirus and its use as a biocontrol agent for crop pests”. (USDA patent).

**Tangible research property licensed:**

Vakharia, V.N. (2012). Development of reagents for the detection of infectious salmon anemia virus (ISAV).

Vakharia, V.N. (2004) Use of cDNA clones in diagnosis of Newcastle disease and avian influenza virus.

Perez, D., Edwards, H., and Vakharia, V.N. (2004) Use of nucleoprotein in diagnosis of influenza A viruses.

**Patents filed:**

Vakharia, V.N. (2016) U.S. Provisional Patent application, “Oral vaccine for nervous necrosis virus.”

Vakharia, V.N. (2013) U.S. Provisional Patent application, “Subunit vaccine for nervous necrosis virus.” (Abandoned and combined with 2016 provisional patent).

**SERVICE TO THE DEPARTMENT, UNIVERSITY, COMMUNITY, AND PROFESSION****A. University:**

Member, Strategic Awards for Research Transitions (START) [formerly "SRAIS"] Committee to review proposals, UMBC (2016-2017)

Member, College of Natural and Mathematical Sciences (CNMS) Research Retreat Committee, UMBC 2014-2015

Guest Lecture, External to UMBC, Marine & Environmental Biotech. MEES 498T/698T Class, Academic. Aquaculture Biotech. - Disease and Immunity; 2h lecture (April 15, 2015 - April 20, 2015 and April 13, 2016)

Member, Search Committee for Assistant Professor, Institute of Marine & Environmental Technology [IMET] (2013)

Member, Promotion and Tenure Committee, University of Maryland Biotechnology Institute [UMBI] (2007-2008)

Member, Fischell Department of Bioengineering (BIOE), College of Engineering, UMCP (2006-2008)

Member, Search Committee for Nano-Biotechnology Position, Center for Biosystems Research, UMBI (2006)

Member, Promotion and Tenure Committee, UMBI (2005)

Member, Search Committee for Assistant Director, Center for Biosystems Research, UMBI (2004)

Member, Patent Review Board, UMBI (2003 – 2008)

Vice-chair of Senate, General Committee on Staff Affairs, UMBI (2003 – 2005)

Member, Promotion and Tenure Committee, Center for Biosystems Research, UMBI (2003)

Chair, Promotion and Tenure Committee, College of Veterinary Medicine, UMCP (2003)

Chair, Search Committees for Virologist and Immunologist Positions, College of Veterinary Medicine, UMCP (2002)

Member, Promotion and Tenure Committee, College of Veterinary Medicine, UMCP (2001-2002)

Member, Graduate Admission Committee, Molecular and Cell Biology department, UMCP (2001-2003)

Member, Promotion and Tenure Committee, College of Agriculture, UMCP (2001-2002)

Member, Search Committee for Associate Dean's Position, College of Veterinary Medicine, UMCP (2001)

Member, Search Committee for Molecular Pathogenesis Position, College of Veterinary Medicine, UMCP (2000)

Member, Search Committee for Assistant Director's position, Center for Agricultural Biotechnology (CAB). UMBI (2000)

Member, Graduate Education Committee for admission to Animal and Avian Sciences Department, UMCP (1999-2001)

Member, Intellectual Property Committee, UMBI (1998-99, 2001-2002)

Vice-Chair, Northeast -138 Regional Project/USDA, Maryland Agricultural Experiment Station, UMCP (1998)

Vice-chair of Senate, General Committee on Staff Affairs, UMBI (1997-1998)

Member, Promotion and Tenure Committees of three Faculty Members at Center of Marine Biotechnology (COMB) and (1997)

Senate Member, General Committee on Staff Affairs, UMBI (1996-1997)

Chair, Search Committee for Molecular Immunologist Position, College of Veterinary Medicine, UMCP (1997)

Member, Technology Advancement Program (TAP) Panel to review projects submitted by the companies, UMCP (1995)

Member, Internal Review Committee, VA-MD Regional College of Veterinary Medicine, UMCP Campus (1994-95)

Member, Search Committee for Director Position, Center for Agricultural Biotechnology, UMBI (1994)

Member, Search Committee for Biochemical Engineer Position, Center for Agricultural Biotechnology, UMBI (1993)

Member, Search Committee for the Plant Virologist position, Center for Agricultural Biotechnology, UMBI (1993)

Member, Search Committee for the Fish Virologist Position, College of Veterinary Medicine, UMCP (1993)

Member, Review of proposals for Maryland Agricultural Experiment Station Competitive Grants Program, UMCP (1993)

Member, Cell Biology and Molecular Genetics (CBMG), formerly Molecular and Cell Biology Program, UMCP (1994-present)

Senate Member, General Committee on Staff Affairs, UMCP (1993-1995)

Member, Admissions Committee for Maryland applicants to VA-MD Regional College of Veterinary Medicine, UMCP (1989-2004)

**B. Community:**

Judge, Science Fair Posters Competition, Bowie High School, Bowie, MD (2007-2008)

**C. Professional:**

Honorary Professor, University of San Marcos, Lima, Peru (2014- Present)

Adjunct Professor, Huazhong Agricultural University, Wuhan, China (2013-Present)

Member, International Congress for Taxonomy of Viruses, Birnavirus Study Section (2000-Present)

Ad-hoc Reviewer, manuscripts submitted to Journal of Virology, Virology, Journal of General Virology, Virus Research, Archives of Virology, Virus Genes, Journal of Virological Methods, Vaccine, Biotechnology & Bioengineering, Antiviral Research, Diseases of Aquatic Organisms, Journal of Fish Diseases. (1995-Present)

Ad-hoc Reviewer, Animal Production and Protection Panel. Review of research proposals for U.S. Department of Agriculture, Small Business Innovation Research Program, Washington, D.C. (2015, 2001, 1998)

Ad-hoc Reviewer, Aquaculture Sciences Panel. Review of a research proposal for Chile's FONDECYT Research Foundation (2010)

Ad-hoc Reviewer, Sustaining Animal Health Panel. Review of research proposals for U.S. Department of Agriculture, National Research Initiative Competitive Grants Program, Washington, D.C. 1993-2003

Panel member, Sustaining Animal Health Panel. Review of research proposals for U.S. Dept. of Agriculture, National Research Initiative Competitive Grants Program. Washington, D.C. 1998 and 2001

Ad-hoc Reviewer, Natural and Medical Sciences Panel. Review of research proposal for Netherlands Foundation for the Advancement of Tropical Research (1998)

Ad-hoc Reviewer, Bioengineering Panel. Review of proposals for National Science Foundation, Arlington, VA. 1998

Ad-hoc Reviewer, Natural Sciences & Engineering Panel. Review of a proposal for Research Council of Canada, 1997

Ad-hoc Reviewer, Bioengineering Panel. Review of research proposals for National Science Foundation, Small Business Innovation Research Program, Arlington, VA. 1996-1997

Member, Bioengineering Panel. Review research proposals for National Science Foundation, Washington, D.C. 1994

Member, Animal/Veterinary Science Panel. Review of research proposals for the Agency for International Development, Office of the Science Advisor, National Academy of Sciences, Washington, D.C. 1989-1991

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