



University of Missouri Veterinary Medical Diagnostic Laboratory (VMDL) Annual Report – 2015

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Summary

The University of Missouri Veterinary Medical Diagnostic Laboratory (MUVMDL) is a full service veterinary diagnostic laboratory and it is Missouri's only laboratory accredited by the American Association of Veterinary Laboratory Diagnosticians (AAVLD). The VMDL is also a Level II Lab of the National Animal Health Laboratory Network (NAHLN) and Tier I Lab of the FDA Veterinary Laboratory Response Network (FDA Vet-LRN). In 2015, the VMDL processed approximately 42,929 accessions (about 14% increase from 2014) and performed 90,515 tests. The VMDL diagnostic service was utilized by veterinarians and owners from 43 US states and 104 MO counties. In 2015, the VMDL faculty taught (or co-taught) 37 courses and 16 clinical/diagnostic rounds, and devoted more than 4,500 student-contact hours to teaching. The VMDL faculty received 14 extramural grants for a total of \$1,333,921 and \$435,297 to VMDL faculty. The VMDL faculty published 22 peer-reviewed papers; presented 57 conference abstracts, posters, and presentations; and attended 15 international, national and state conferences and trainings.



Introduction

The Veterinary Medical Diagnostic Laboratory (VMDL) Annual Report - 2015 is a compilation of test data from Jan 1, 2015 to Dec 30, 2015. To monitor caseload, testing data from 2011 to 2014 are also included in this report.

The MU VMDL is a full service veterinary diagnostic laboratory and it is Missouri's only laboratory accredited by the American Association of Veterinary Laboratory Diagnosticians (AAVLD). The faculty and staff of VMDL are committed to excellence in diagnostic service, teaching, and research. We strive to provide relevant, timely, and cost-effective diagnostic services to our clients and create a positive learning environment for our students.

VMDL Mission Statement

To provide appropriate and timely diagnostic support to veterinary practitioners, livestock and poultry interests, companion animal interests, wildlife conservationists, and state-federal regulatory officials.

To monitor domestic animals, indigenous wildlife, and zoo animals for diseases that are a threat to livestock health and public health.

To support the teaching mission of the College of Veterinary Medicine.

To create new knowledge through fundamental and translational research.

VMDL Advisory Board

Mission Statement

To advise VMDL management on policies, long-term developmental strategies, and collaborations with relevant university, private, state, national and international organizations.

VMDL Advisory Board Membership

The Advisory Board consists of 12 members representing the State Veterinarian's office, commodity groups, small animal practice, large animal practice, and the Veterinary Teaching Hospital.

VMDL Advisory Board Members

Linda Hickam, DVM, Missouri State Veterinarian

Tony Martin, DVM, Director of Animal Health Division, MFA, Inc.

Don Nikodim, Executive Vice President, Missouri Pork Association

Steve Patterson, DVM, Bethel, MO

Clark Fobian, DVM, Sedalia, MO, Immediate Past President AVMA



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Steve Strubberg, DVM, Hermann, MO

Chuck Massengill, DVM, Missouri Cattlemen's Association

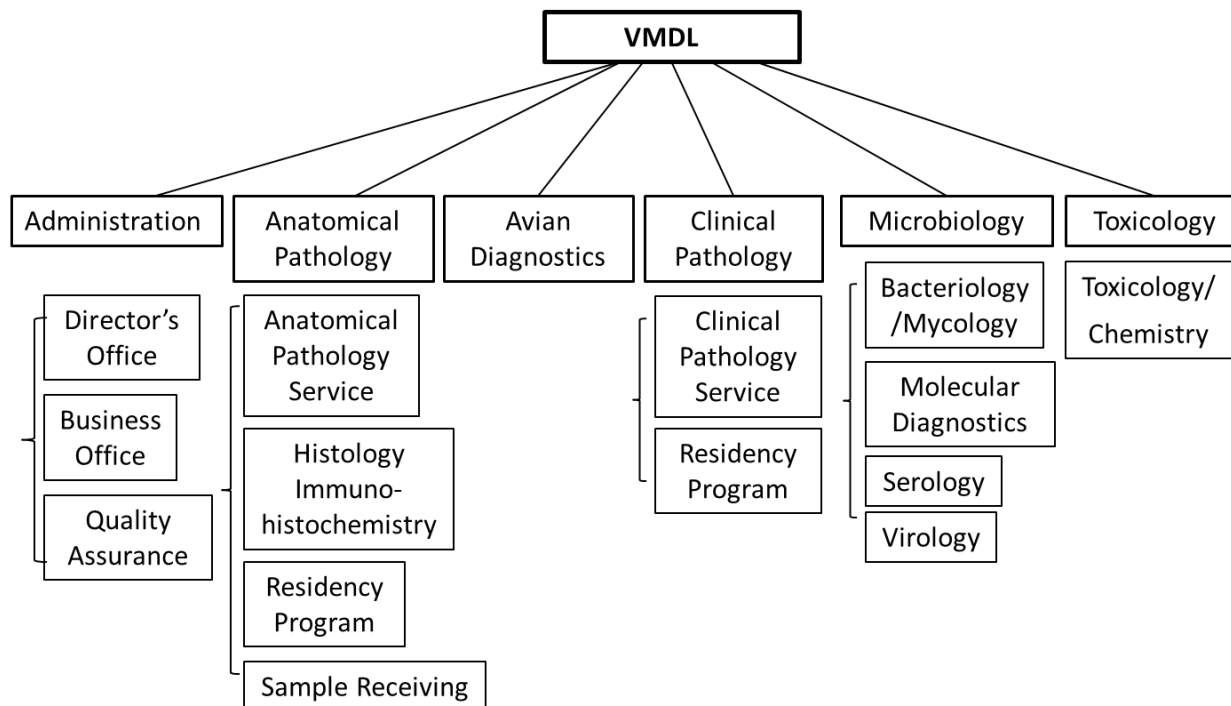
Bruce Addison, President, Addison Biological Laboratory, Inc.

David Wilson, DVM, MS, ACVS, MU VHC Director

Phillip Johnson, BVSc, MS, MRCVS, ACVIM MU VHC Equine Service

John Middleton, DVM, PhD, ACVIM MU VHC Food Animal Service

VMDL Organizational Structure



VMDL Section Heads/Leaders

Avian Diagnostics – Dr. Dan Shaw

Anatomical Pathology – Dr. Gayle Johnson

Bacteriology/Mycology – Dr. Bill Fales/Irene Ganjam

Business Office – Mr. Mike Wimmenauer



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Clinical Pathology – Dr. Marlyn Whitney/ Cheryl Rojas

Director's Office – Ms. Geri Hegstad

Histology – Dr. Dae-Young Kim/Candace Kassel

Molecular Diagnostics – Dr. Jeff Mitchell

Quality Assurance – Dr. Tom Reilly/Susan Martin

Sample Receiving – Ms. Geri Hegstad

Serology – D. Mike Zhang

Virology – Dr. Jeff Mitchell

Toxicology – Dr. Tim Evans

VMDL Diagnostic Program Coordinators

Anatomical Pathology Residency Program – Dr. Kei Kuroki

Clinical Pathology Residency Program – Dr. Charles Wiedmeyer

Equine Diagnostic Investigations – Dr. Fred Williams III

Food Animal Diagnostic Investigations – Dr. Tim Evans

Neuropathology and Oncopathology – Dr. Gale Johnson

Small Animal Internal Medicine Pathology – Dr. Dae-Young Kim

VMDL Service Activities

Year	Total Accession	Main Lab	Clin Path	Source (%) and Type			
				MO & Other States	VMTH	Research	Other
2011	37,311	24,910	12,401	19,791 (53%)	15,917 (43%)	1,402 (3.8%)	201(<1%)
2012	37,715	24,923	12,792	19,911 (53%)	16,118 (43%)	1,451 (3.8%)	235 (1%)
2013	38,499	25,165	13,334	20,081 (52%)	16,460 (43%)	1,867 (4.8%)	91 (<1%)
2014	37,666	24,431	13,235	19,733 (52%)	16,476 (44%)	1,378 (3.6%)	79 (<1%)



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2015 42,929 26,276 16653 20,966 (49%) 20,475 (48%) 1,390 (3.2%) 98 (<1%)

Year	Total	Avian	Bovine	Canine	Caprine	Equine	Feline	MISC	Ovine	Porcine
2011	82,431	6,990	15,526	33,218	1,160	11,189	6,406	3,608	431	3,903
2012	86,693	6,688	16,225	34,472	2,495	12,175	6,043	4,203	645	3,747
2013	86,570	6,554	14,599	36,173	1,649	11,339	6,752	4,614	361	4,529
2014	83,869	5,784	15,806	35,421	1,280	10,038	5,908	4,964	462	4,206
2015	90,515	6,919	17,070	37,258	1,307	10,031	6,563	6,961	404	3,780

Table 1. Five Year VMDL (Main Lab and Clinical Pathology) Accessions*

*A Main Lab accession may include multiple tests for multiple samples whereas each Clin. Path accession represents one test performed on one sample. Caseload increased 13.97% from 2014 to 2015.

Table 2. Five Year VMDL (Main Lab and Clin Path) Tests by Animal Species*

* 2015 data do not include non-technical procedures.

Table 3. Five Year VMDL (Main Lab and Clin Path) Tests by Section

Year	Total	Avian	Bacti.	Clin. Path.	Ana. Path.	Mol	Sero.	Vir.	Tox.	Other
2011	82,431	2,247	11,155	17,006	23,115	7,930	12,944	299	894	6,841
2012	86,693	2,490	15,552	18,050	22,062	9,498	13,723	491	1,277	3,550
2013	86,570	2,535	14,849	20,123	23,696	7,105	12,464	515	1,179	4,104
2014	83,869	2,145	14,094	18,632	22,306	7,521	12,994	588	1,558	4,031
2015	90,515	3,450	15,371	22,958	22,601	7,816	13,548	584	1,456	2,731



Figure 1. Distribution of Diagnostic Tests by Animal Species

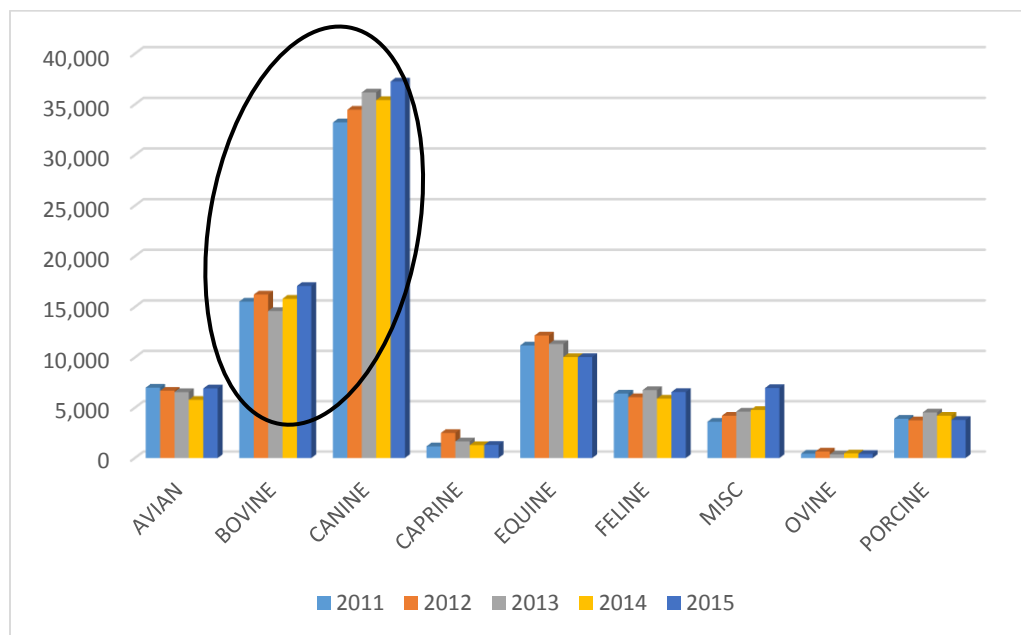


Figure 2. Geographic Distribution of VMDL Accessions in 43 US States

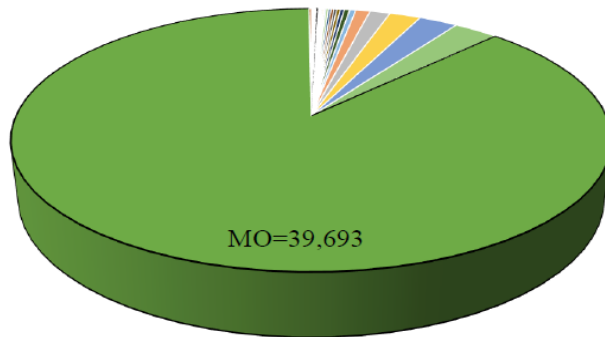


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Geographic Distribution of VMDL Accessions



1-10 DC LA MA AK CT ID ME MI NM TN
RI KY TX UT OH WI WY PR MD NY
11-100 VA MT SC OR IN NE MN AZ FL WA
CO ND AL SD IA
101-1000 CA NC OK KS IL AR
39693 MO

Figure 3. Geographic Distribution of Cases in 104 MO Counties



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VMDL Client Outreach Programs

The VMDL offers an online portal for its clients to check their results in real-time as we work on their samples.

VMDL continues to offer the FedEx Express Prepaid Stamps to all its clients which enables inexpensive second day delivery from clients' office to the VMDL for laboratory testing. In 2015, the program was utilized 5,089 times by VMDL's clients from 78 MO counties and 25 other states in the US.

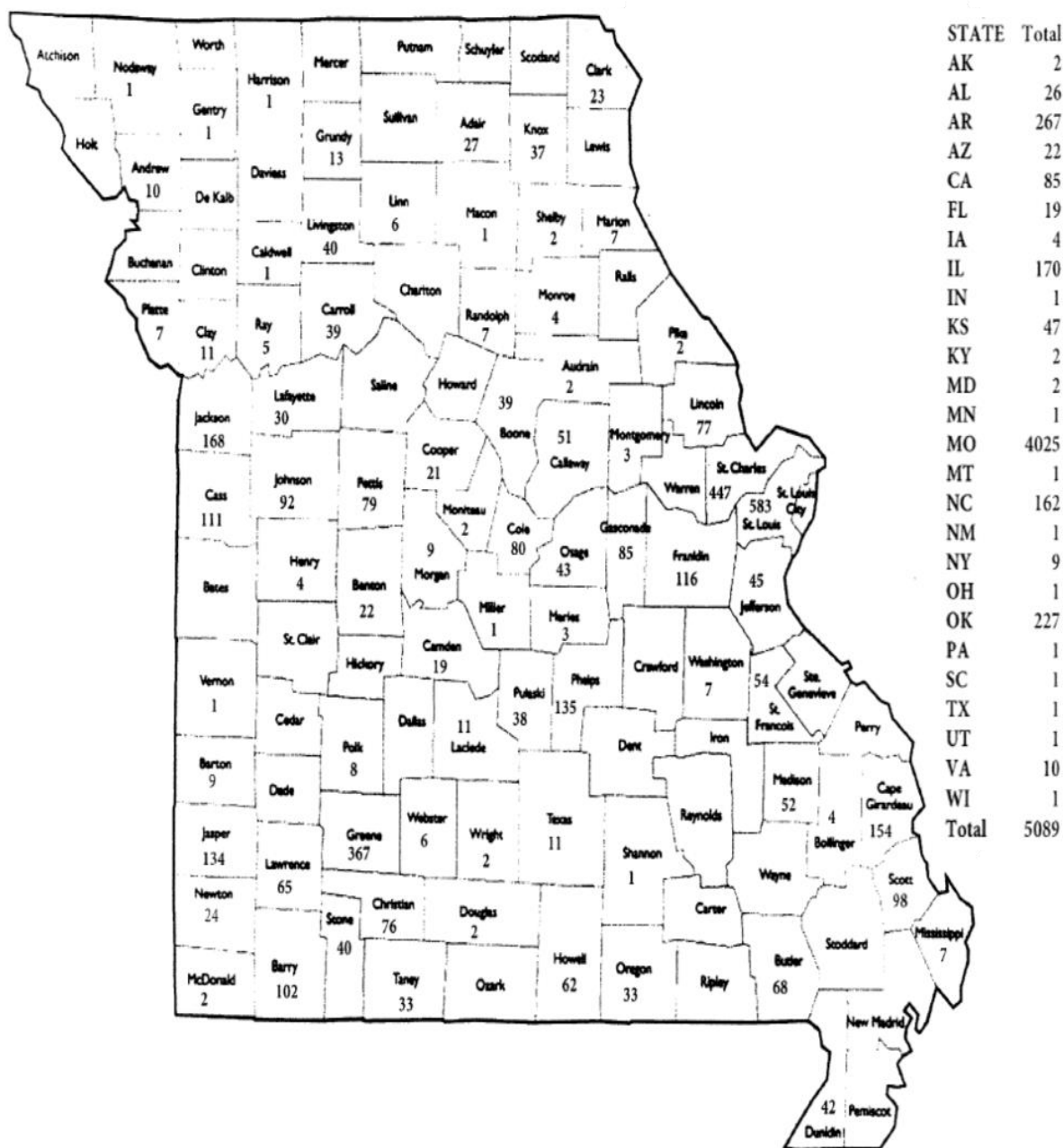
Figure 3. Utilization of the FedEx Express Prepaid Stamps by Clients



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VMDL Participation in National Diagnostic Network



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Figure 3. Level II Lab of National Animal Health Laboratory Network (NAHLN)

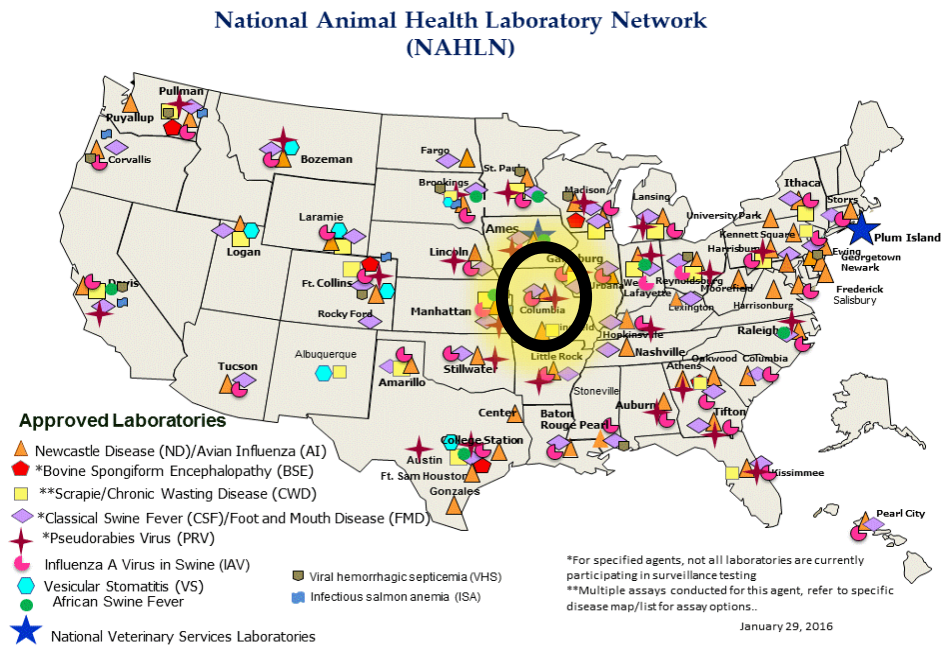
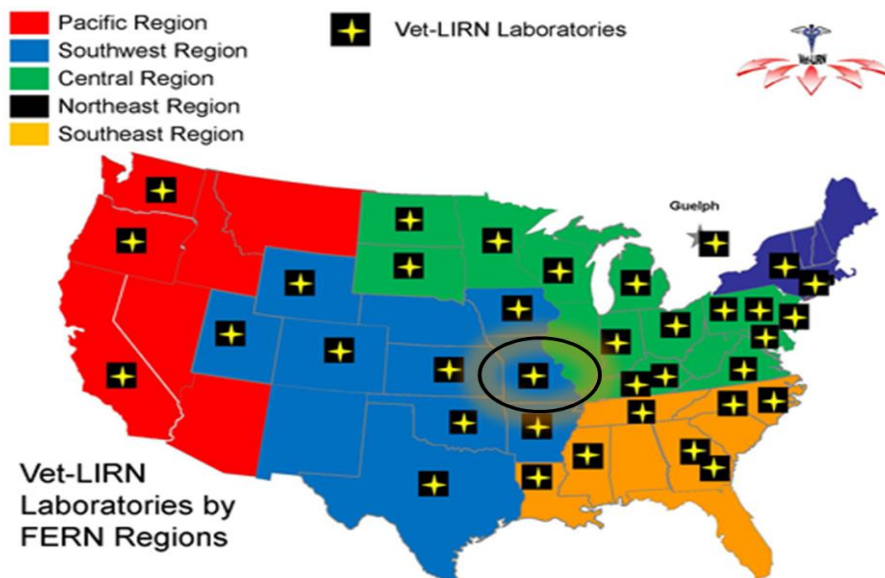


Figure 4. Tier I Member of FDA Veterinary Laboratory Response Network (Vet-LRN)



VMDL Faculty Teaching Activities



Didactic and Laboartory Courses (N = 37; Bold: Coordinated by VMDL Faculty)

AS 140/2140	Companion Animals
AS 325/4977	Horse Production
BioMed 3200	Comparative Hematology
BioMED 3310	Biomedical Pathophysiology Online
BioMed 4100	Veterinary Clinical Chemistry, On-line
BioMed 4110/V_PBIO 7110	Veterinary Cytology
BioMED 4120	Principles of Toxicology On-line
LAB_AN 9437	Lab Animal Pathology
MMI 8050	Mechanisms of Microbial Pathogenesis
MICROB 9001	Topics in Microbiology
P Health 8001	Human Health and the Environment
V_BSCI 5506	Veterinary Cellular Biology
V_BSCI 5507	Veterinary Pharmacology
V_BSCI 5508	Veterinary Pharmacology
V_BSCI 5509	Veterinary Toxicology
V_M_S 6400	Food Animal Medicine & Surgery I
V_M_S 6420	Equine Medicine and Surgery I
V_M_S 6987	Problem-Based Learning Clinic Preparation
V_M_S 6996	Advanced Dermatology
V_M_S 8036	Advanced Physiology of Dog and Cat
V_M_S 8402	Seminar in Veterinary Clinical Sciences
V_M_S 8402 B	Seminar in Veterinary Clinical Sciences
V_M_S 8402 D	Clinicopathologic Case Conference (CPC)
V_M_S 8415	Advanced Veterinary Neurology
V_M_S 8485	Problems in Veterinary Clinical Science
V_PBIO 5552	Veterinary Bacteriology 1
V_PBIO 5553	Veterinary Bacteriology 2
V_PBIO 5554	Veterinary Virology
V_PBIO 5575	General Veterinary Pathology
V_PBIO 5576	Veterinary Systemic and Special Pathology I
V_PBIO 5577	Veterinary Systemic and Special Pathology II
V_PBIO 5578	Veterinary Clinical Pathology
V_PBIO 6647	Diagnostic Pathology and Special Species Medicine I
V_PBIO 6679	Diagnostic Pathology and Special Species Medicine II



V_PBIO 8434	Advanced Clinical Pathology
V_PBIO 8435	Advanced Microscopy in Veterinary Clinical Pathology
V_PBIO 9090	Area Veterinary Pathobiology Dissertation Research

Clinical and Diagnostic Rounds and Seminars (n=16)

Chemistry Rounds

Comparative Orthopaedic Laboratory (COL) journal club

Cytology Rounds

Dermatology Rounds

Food for Thought Rounds

Gross Pathology Rounds

Hematology Rounds

Human Health and the Environment -

Image Review

Joint Pathology Center Wednesday Slide Conference

Mentoring International Students

Mentoring Pre-Vet Students

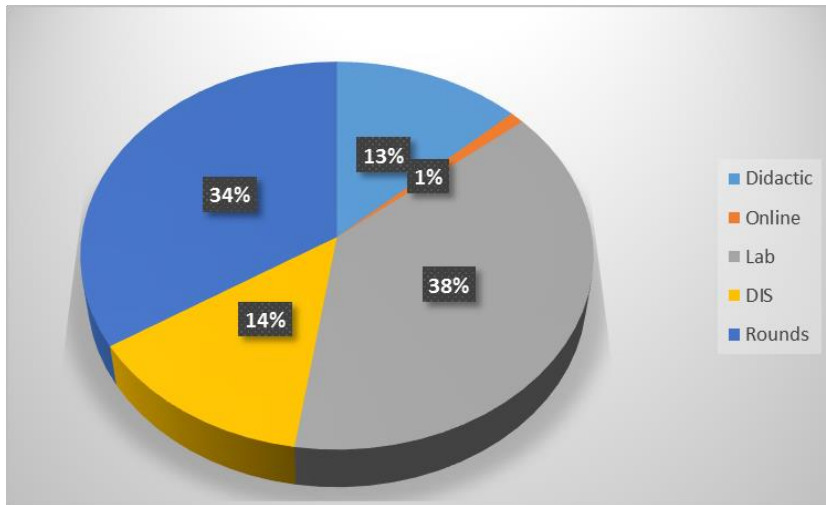
Neurology Rounds

Ophthalmic Pathology Rounds

Slide treats

VMDL-Food Animal Monthly Rounds

Distribution of Student Contact Hours (4,509)



Residency Training Programs

Anatomical Pathology Resident Training

Clinical Pathology Resident Training

VMDL Faculty Scholarly Activities

Extramural Funding Received in 2015 (Total = \$1,333,921; Total to VMDL Faculty = \$435,297)

1. Cateel, S. PI. ZEO Health LTD. Zeohealth AS & PB Project. 9/2015 - 8/2016. Direct: \$3,407; indirect: \$1,823; and total: \$5,230.
2. Casteel, S. PI. ToxStrategies, Inc. Tox Strategies Co and Ni Study. 12/2015 – 12/2016. Direct: \$102,175; indirect: \$48,870; and total: \$151,045.
3. Kuroki, K. Co-I. Zimmer Holdings, Inc. Assessment of Enhanced Subchondroplasty Treatment for Post-Traumatic Osteoarthritis in a Canine Model. 11/01/15 – 10/31/17. Direct: \$234,658; indirect: \$100,744; total: \$335,402; and shared credit: 10%.
4. Kuroki, K. Co-I. Zimmer Holdings, Inc. Assessment of an Impact Model for Subchondroplasty Treatment in Dogs. 12/01/13 – 03/31/16. Direct: \$183,837; indirect: \$78,534; total: \$262,371; and shared credit: 10%.
5. Kuroki, K. Co-I. Arthrex Inc. Pivotal Anchor Study. 07/01/10 – 12/31/16. Direct: \$131,545; indirect: \$55,388; total: \$186,933; and shared credit: 20%.
6. Kuroki, K. Co-I. Artelon. Evaluation of Artelon augmentation of tendon healing in a canine patellar tendon defect model. 06/01/15-05/31/16. Direct: \$34,342; indirect: \$17,928; total: \$50,738; and shared credit: 10%.



7. Kuroki, K. Co-I. Arthrex, Inc. Arthrex - Bone Solutions Osteocrete Canine Testing. 02/01/15 – 01/31/16. Direct: \$68,009; indirect: \$37,623; total: \$105,632; and shared credit:25%.
8. Melendez P. PI, Pinedo P, Pithua P, Jenkins T, Lucy M, Whitney M, Middleton J. Co-Is. 2015 – 2016. The association between body fat distribution and genomic-wide analysis in Holstein dairy cows. NIFA, USDA. Total direct and indirect: \$17,500.
9. Rottinghaus GE. Co-PI. Ergovaline concentrations in tall fescue samples from test plots in Kentucky and Georgia. AgResearch USA Limited, 2015. Total: \$21,000.
10. Rottinghaus GE. Co-PI. Aflatoxin metabolites in dairy milk, feces, urine, and rumen fluid. University of Illinois 2015. Total: \$14,000.
11. Zhang, S. PI. National Animal Health Laboratory Network Membership. 2015 – 2016. Direct: \$5,000; indirect 5,000; and total: \$5,5000.
12. Zhang, S. PI. USDA/APHIS Swine Surveillance. 2015-2016. Total: \$8,275
13. Zhang, S. PI., Evans, T. Co-I, Johnson, G. Co-I, Reilly, T. Co-I. FDA CVM Vet-LRN Vet Diagnostic Lab Program. 9/2014 – 8/2015. Direct: \$ 19,300, indirect: \$1,500; total: \$20,800.
14. Zhang, S. Clinical PI., Almasri, M. Engineering PI. Coulté MU. GermSensor for simultaneous detection of multiple *Salmonella* serogroups. 7/2015 – 6/2016. Total direct: \$101,500 and shared credit: 50%.

Publications (N = 22)

1. Axiak-Bechtel S, Royal A. Comparative Imagery – Cytology. 2015. Cutaneous and subcutaneous neoplasms. Clinician's Brief.
2. Bovo F, Franco LT, Kobashigawa E, Rottinghaus GE, Ledoux DR, Oliveira CA. 2015. Efficacy of beer fermentation residue containing *Saccharomyces cerevisiae* cells for ameliorating aflatoxicosis in broilers¹. Poult Sci. pii: pev067
3. Bozynski CC, Kuroki K, Stannard JP, Smith PA, Stoker AM, Cook CR, Cook JL. 2015. Evaluation of partial transection versus synovial debridement of the ACL as novel canine models for management of AC: injuries. J Knee Surg 28:404-410.
4. Brownstein KJ, Rottinghaus GE, Knight M, Ito Y, Folk W. 2015. Isolation of Sutherlandioside B from *Sutherlandia frutescens* by Spiral Countercurrent Chromatography. J Liq Chromatogr Relat Technol 38(4):423-429.
5. Cook JL, Smith PA, Stannard JP, Pfeiffer FM, Kuroki K, Bozynski CC, Cook CR. 2015. A canine hybrid double-bundle model for surgery of arthroscopic ACL reconstruction. J Orthop Res 33:1171-9.
6. Dhatwalia, R, Singh, H, Reilly, T, and Tanner, J. 2015. Crystal Structure and tartrate inhibition of *Legionella pneumophila* histidine acid phosphatase. Arch. Biochem Biophys 585: 32-38.



7. Eason BD, Leach SB, Kuroki K. 2015. Arrhythmogenic right ventricular cardiomyopathy in a weimaraner. *Can Vet J* 56:1035-9.
8. Herrera CL, Kim DY, Kumar SR, Bryan JN. 2015. Peroxisome proliferator activated receptor γ protein expression is asymmetrically distributed in primary lung tumor and metastatic to lung osteosarcoma samples and does not correlate with gene methylation. *BMC Vet Res* 11(1):230.
9. Hull NC, O'Toole D, Miller MM, Shoults H, Deck R, Jones W, Johnson GC, Shaw DP, Schumaker BA. 2015. Canine dysautonomia in a litter of Havanese puppies. *J Vet Diagn Invest* 27(5):627-31.
10. Johnson, SA, Painter, MS, Javurek, AB, Ellersieck, MR, Wiedmeyer, CE, Thyfault, JP, Rosenfeld, CS. 2015. Sex-Dependent Effects of Developmental Exposure to Bisphenol A and Ethinyl Estradiol on Metabolic Parameters and Voluntary Physical Activity. *Journal of Developmental Origins of Health and Disease* 6(6): 539-52, 2015
11. Katz ML, Tecedor L, Chen Y, Williamson BG, Lysenko E, Wininger FA, Young WM, Johnson GC, Whiting RE, Coates JR, Davidson BL. 2015. AAV gene transfer delays disease onset in a TPP1-deficient canine model of the late infantile form of Batten disease. *Sci Transl Med* 7(313):313ra180.
12. Kuhns CA, Cook CR, Dodam JR, Leach SB, Kuroki K, Jenkins T, Tallmage A, Hoernschemeyer D. 2015. Injectable gelatin utilized as hemostatic agent to stop pedicle bleeding in long deformity surgeries – Does it embolize? *Spine* 40:218-23.
13. Laura Schoenlaub, Alexandra Elliott, Daniel Freches, William Mitchell, and Guoquan Zhang 2015. The role of B cells in host defense against primary *Coxiella burnetii* infection. *Infect Immun* 83:4826–4836.
14. Leissinger M, Garber JB, Fowlkes N, Grooters AM, Royal A, and Gaunt SD. 2015. *Mycobacterium Fortuitum* Lipoid Pneumonia in a Dog. *Veterinary Pathology* 52: 359-359
15. Lewis, S. M., Ya, L., Catalano, M. J., Laciak, A., Singh, H., Seiner, D. R., Reilly, T. J., Tanner, J. J. and Gates, K. S. 2015. Inactivation of protein tyrosine phosphatases by isothiocyanates. *J Am Chem Soc* 25(20): 4549-4552.
16. Mhlanga-Mutangadura T, Johnson GS, Schnabel RD, Taylor JF, Johnson GC, Katz ML, Shelton GD, Lever TE, Giuliano E, Granger N, Shomper J, O'Brien DP. 2015. A mutation in the Warburg syndrome gene, RAB3GAP1, causes a similar syndrome with polyneuropathy and neuronal vacuolation in Black Russian Terrier dogs. *Neurobiol Dis* 86:75-85.
17. Miskimins, DW, Neiger, RD, Beaty, J, Evans, TJ, Daly R. 2015. Case report-ergot alkaloid poisoning in weaned beef calves. *The Bovine Practitioner* 49(2): 156-158.
18. Roberts, MD, Moberly, CB, Toedebusch, RG, Heese, AJ, Zhu, C, Krieger, AE, Cruthirds, CL, Lockwood, CM, Hofheins, JC, Wiedmeyer, CE, Leidy, HJ, Booth, FW, Rector, RS. 2015. Western Diet-induced Hepatic Steatosis and Alterations in the Liver Transcriptome in Adult Brown-Norway Rats. *BMC Gastroenterology*, 15:151 2015



19. Roller BL, Monibi FA, Stoker AM, Kuroki K, Bal BS, Cook JL. 2015. Characterization of knee meniscal pathology: correlation of gross, histologic, biochemical, molecular, and radiographic measures of disease. *J Knee Surg* 28:175-182.
20. Simonyi A, Chen Z, Jiang J, Zong Y, Chuang DY, Gu Z, Lu CH, Fritsche KL, Greenlief CM, Rottinghaus GE, Thomas AL, Lubahn DB, Sun GY. 2015. Inhibition of microglial activation by elderberry extracts and its phenolic components. *Life Sci*. 2015 Mar 2. pii: S0024-3205(15)00106-X. doi: 10.1016/j.lfs.2015.01.037. [Epub ahead of print]
21. Spoor M, Ramirez C, Daniel R, Shaw D, Wininger F, Whitney M: Pituitary mass in a dog. *Veterinary Clinical Pathology*, in press July 2015.
22. Vuilleminot BR, Kennedy D, Cooper JD, Wong AM, Sri S, Doleman T, Katz ML, Coates JR, Johnson GC, Reed RP, Adams EL, Butt MT, Musson DG, Henshaw J, Keve S, Cahayag R, Tsuruda LS, O'Neill CA. 2015. Nonclinical evaluation of CNS-administered TPP1 enzyme replacement in canine CLN2 neuronal ceroid lipofuscinosis. *Mol Genet Metab*. 114(2):281-293. PMID: 25257657

Book Chapters (N = 1)

Declue, A, Wiedmeyer CE. "Continuous Glucose Monitoring in Cats with Diabetes" August's Consultations in Feline Internal Medicine – Vol. 7. Editor: Susan Little, 2015

Abstracts, Posters, and Presentations (N = 57)

1. Chance, D., Reilly, T., and Mawhinney, T. Using a Microwave-Assisted TEM Sample Processing Approach to Provide for high Resolution Imaging in the Study of Bacterial Colony Organization of Individual and Co-Colonizing Species. University of Missouri Life Sciences Week Poster April 2015
2. Casteel, Stan W., "Back Then, Now, What's Next for Veterinary Medicine?", Oklahoma State University, Center for Veterinary Health Sciences, Class of 1963 Distinguished Lecturer, November 19, 2015.
3. Casteel, Stan W., "A Background for Domestic Biological Incidents," Lake Erie College of Osteopathic Medicine, 1 LECOM Place, Erie, PA., Jan 28, 2015.
4. Casteel, Stan W., "Basic Principles of the Use of Biological Agents," Lake Erie College of Osteopathic Medicine, 1 LECOM Place, Erie, PA., Jan 29, 2015.
5. Casteel, Stan W., "Community Response to Biological Incidents," Lake Erie College of Osteopathic Medicine, 1 LECOM Place, Erie, PA., Jan 29, 2015.
6. Casteel, Stan W., "A Background for Domestic Biological Incidents," Boston Police Department-Boston Police Special Operations, Roxbury, MA. March 11, 2015.
7. Casteel, Stan W., "Principles of the Use of Biological Agents," Boston Police Department-Boston Police Special Operations, Roxbury, MA. March 12, 2015.



8. Casteel, Stan W., "A Background for Domestic Biological Incidents," Paris Fire Department, Paris, TX. September 14, 2015.
9. Casteel, Stan W., "Basic Principles of the Use of Biological Agents," Paris Fire Department, Paris, TX. September 15, 2015.
10. Casteel, Stan W., "Community Response to Biological Incidents," Paris Fire Department, Paris, TX. September 15, 2015.
11. Casteel, Stan W., "A Background for Domestic Biological Incidents," Hot Springs Fire Department, Hot Springs, AR. October 6, 2015.
12. Casteel, Stan W., "Basic Principles of the Use of Biological Agents," Hot Springs Fire Department, Hot Springs, AR. October 7, 2015.
13. Casteel, Stan W., "A Background for Domestic Biological Incidents," Montgomery County Public Health, venue at HFM BOCES (community college campus), Johnstown, NY. October 15, 2015.
14. Casteel, Stan W., "Basic Principles of the Use of Biological Agents," Montgomery County Public Health, venue at HFM BOCES (community college campus), Johnstown, NY. October 16, 2015.
15. Casteel, Stan W., "Community Response to Biological Incidents," Montgomery County Public Health venue at HFM BOCES (community college campus), Johnstown, NY. October 16, 2015.
16. Casteel, Stan W., "A Background for Domestic Biological Incidents," Bentonville Fire Department, Bentonville, AR. November 11, 2015.
17. Casteel, Stan W., "Basic Principles of the Use of Biological Agents," Bentonville Fire Department, Bentonville, AR. November 12, 2015.
18. Casteel, Stan W., "Community Response to Biological Incidents," Bentonville Fire Department, Bentonville, AR. November 12, 2015.
19. Coates JR, Williamson BC, Reinero CN; Rindt H; Pithua PO, Johnson GC; Sibgitroth CM; Weichert A. Immunotherapeutic targeting a monomer/misfolded SOD1 in a canine model of ALS. P281. Robertson 26th international symposium on ALS/MND, 11-13 Dec, Orlando FL
20. Evans, Tim J. How to determine what poison killed the cow. 2015 MVMA Convention, St. Charles, MO, January 23, 2015.
21. Evans, Tim J. Updates on small animal toxicology. Webster Groves Animal Hospital CE. Webster Groves, MO, April 3, 2015.
22. Evans, Tim J. One health: one medicine. Short presentations as part of 2015 MU Global Scholars Program at various universities in Sao Paulo, Belém, and Rio de Janeiro, Brazil, June 8-June 18, 2015.



23. Evans, Tim J. 830-Suspected poisonings II. 2015 AVMA Annual Convention, Boston, MA, July 12, 2015.
24. Evans, Tim J. 831-Mycotoxins. 2015 AVMA Annual Convention, Boston, MA, July 12, 2015.
25. Evans, Tim J. 832-Pregnancy or lactation and medications and toxicants. 2015 AVMA Annual Convention, Boston, MA, July 12, 2015.
26. Evans, Tim J. 833-Plant toxins. 2015 AVMA Annual Convention, Boston, MA, July 12, 2015.
27. Evans, Tim J. My “neighbor” poisoned my dog syndrome. 2015 GVMA Annual Convention, Atlanta, GA, November 10, 2015.
28. Evans, Tim J. What you thought you would never need to know about plant toxins. 2015 GVMA Annual Convention, Atlanta, GA, November 10, 2015.
29. Evans, Tim J. What you thought you would never need to know about mycotoxins. 2015 GVMA Annual Convention, Atlanta, GA, November 10, 2015.
30. Evans, Tim J. Baby onboard: when pregnancy and/or lactation impact the possible adverse effects of medications and toxicants. 2015 GVMA Annual Convention, Atlanta, GA, November 10, 2015.
31. Evans, Tim J. Is it toxic?/how toxic is it? 2015 GVMA Annual Convention, Atlanta, GA, November 10, 2015.
32. Fales, W., Reilly, T., Ganjam, I. and Bowman, J. Trends of bacterial antimicrobial resistance with cattle affected with bovine respiratory disease complex (BRDC) in Missouri. XVII World Association of Veterinary Laboratory Diagnosticians, Saskatoon, Canada, June 15-18 2015.
33. Hoffman D, Hoepp N, Royal A. Persistent Thrombocytosis in a Dog. 34th Annual Meeting of MAVP, Lexington, KY, August 6-7, 2015.
34. Johnson GC, Kuroki K, Kim DY, Taylor H, Evans T. Spinal Cord Degeneration in a Young Goat Associated with Cerebellar Abiotrophy. 58th annual conference of the AAVLD, Providence RI, October 24, 2015.
35. Johnson GC; Leach S, Williamson B, Young W, Castaner L, Coates JR, Davidson BL, Katz ML. Cardiomyopathy in a canine model of CLN2 disease. Poster E-44. 2015 ACVP, Minneapolis MN, Oct 17-21, 2015.
36. Jones A, Rojas C, Vander Lay B, Royal A. Assessment of Agreement between the Sysmex XT-2000i Analyzer and Element HT5 in Analyzing Canine Whole Blood. 34th Annual Meeting of MAVP, Lexington, KY, August 6-7, 2015.
37. Kim, D. Dermatopathology of dogs and cats and slide conference*, invited, Seoul National University, Seoul, South Korea, May 26-27, 2015.
38. Ledoux, DR., Dos Anjos FR, Rottinghaus GE, and Chimonyo M. Efficacy of adsorbents (bentonite and diatomaceous earth) and turmeric (*Curcuma longa*) to ameliorate the toxic effects



- of aflatoxin in chicks. 51st Annual Meeting of the Caribbean Food Crops Society, Paramaribo, Suriname, July 19-24, 2015.
39. Leiomyositis as an Uncommon Cause of Intestinal Pseudo-obstruction in a Dog. Johnson GC, Boes-Kautsch S. 32nd Annual West Coast Pathology Conference, Davis CA, 1-2 May 2015.
 40. Martin, S. Reilly, T. Evans, T. and Zhang, T. Rubric for Evaluating Root Cause Analysis in CAPAs, 58th AAVLD, Providence, RI, October, 2015.
 41. Mhlanga-Mutangadura T., Johnson,G.S.;Johnson,G.C.;Hansen,L.; Tamassia,G.V.;Taylor,J.F.; Schnabel R.D., O'Brien DP. The whole genome sequences from a Rottweiler and black Russian terrier with overlapping neurological syndromes contain the same RAB3GAP1 frame shift mutation. 20th Annual American College of Veterinary Internal Medicine, Indianapolis IN, June 3-6, 2015.
 42. Nelson C, Williams F, Kerl M, Royal A.Unusual Presentation and Composition of an Aortic Embolus in a Dog. 34th Annual Meeting of MAVP, Lexington, KY, August 6-7, 2015.
 43. O'Brien DP, Johnson G, Rose J, Van Meervenne S, Sørensen E, Rohdin C; Frykman O; Granger N. Degenerative encephalopathy of Nova Scotia Duck Tolling Retrievers, Backer E, 28th Annual Symposium , European College of Veterinary Neurology, Amsterdam, Netherlands, September 18-19, 2015.
 44. O'Brien DP, Mhlanga-Mutangadura T, JohnsonGC, Sheldon GD, Shomper J, Granger N, Taylor JF, Schnabel RD, Johnson GS. A P.P248LFS3 mutation in RAB3GAP1 in laryngeal paralysis and polyneuropathy with ocular abnormalities and spongiform encephalopathy in black Russian Terriers. 20th Annual American College of Veterinary Internal Medicine, Indianapolis IN, June 3-6, 2015.
 45. Piech, T. (presenter), Royal A. Case 26 – Extramedullary hematopoiesis suggesting hemangiosarcoma in a dog. 34th Annual Meeting of MAVP, Lexington, KY, August 6-7, 2015.
 46. Piech, T. (presenter), Royal A. Chemistry Case Presentation – Heat Stroke in a Dog. 34th Annual Meeting of MAVP, Lexington, KY, August 6-7, 2015.
 47. Royal, A. ASVCP On-line Rounds, June, 2015.
 48. Shannon TA, Ledoux DR, Rottinghaus GE, Shaw DP, Dakovic A, Stojanovic M, and Dondur V. Efficacy of two adsorbents in ameliorating the toxic effects of aflatoxin in broiler chicks, IPSF, Atlanta GA, January 26-27, 2015.
 49. Shannon TA, Ledoux DR, Shannon MC, Rottinghaus GE, Evans TJ, and Kim DY. Efficacy of antioxidants to reduce the toxicity aflatoxin B1 (AF) in weanling pigs fed dietary treatments for four weeks, 51st Annual Meeting of the Caribbean Food Crops Society, Paramaribo, Suriname, July 19-24, 2015.
 50. Shaw D: Laying hen necropsy workshop. Missouri Organic Association Poultry Session,



51. Shaw, DP: Biosecurity Basics and Developing a Biosecurity Assessment Program. Layer Health Management School, presented by Ohio State Animal Disease Diagnostic Laboratory, Reynoldsburg, OH, May 6-7, 2015.
52. Wells M, Rojas C, Royal A. Confirmation of Albumin and Total Protein Lower Levels of Linearity on a Beckman 400AU. 34th Annual Meeting of MAVP, Lexington, KY, August 6-7, 2015.
53. Yang, M. Zhang, C. Zhang, M. and Zhang, M. Characterization of Antimicrobial and Immunomodulatory Activities of Avian β -defensin 6 and 12. Missouri Valley ASM Branch Meeting. Lincoln, NE, March, 2015.
54. Yang, M. Zhang, C. Zhang, M. and Zhang, M. Comparative Biological Functions of Avian Beta-Defensins 6 and 12. MU Phi Zeta Research Day 2015 (Second Place Award)
55. Zhang, M. Bovine Viral Diarrhea Virus Infection: Associated Disease and Diagnosis. Department of Biomedical Sciences, College of Veterinary Medicine, University of Missouri. Columbia, MO 65211. Jan., 2015.
56. Zhang, M. Equine herpesvirus infections: from rhinopneumonitis to myeloencephalopathy. Missouri State-Federal Veterinary Conference, April 20, 2015.
57. Zhang, S. Avian Influenza Virus. Missouri Department of Agriculture State and federal Conferences. Jefferson City, MO, April, 2015.

2015 Major Annual Professional Meetings and Trainings Attended by VMDL Faculty and Staff (N = 15)

AAVLD/NAHLN Auditors Training
 AAVLD/NAHLN Quality Assurance Training
 American Association of Veterinary Clinical Pathologists
 American Association of Veterinary Laboratory Diagnosticians
 American College of Veterinary Pathologists
 American Society of Microbiology
 American Society for Veterinary Clinical Pathology
 American Veterinary Medical Association
 Global Veterinary Summit
 National Institute of Animal Agriculture
 Missouri Veterinary Medical Association
 Missouri Department of Agriculture State and Federal Conference
 Monthly MVMA West Central meetings



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Pathology of mouse models for human diseases, Institute Pasteur. Paris, France, June, 2015

World Association of Veterianry Laboartory Diagnosticians Conference
