

**BIOGRAPHICAL SKETCH**NAME: **Mochel, Jonathan Paul**

eRA COMMONS USER NAME (credential, e.g., agency login): JPMOCHEL

POSITION TITLE: Associate Professor (Presidential High-Impact)

## EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE	Completion Date MM/YYYY	FIELD OF STUDY
Veterinary School of Toulouse, France	DEFV	09/2006	Veterinary Medicine Degree
Paul Sabatier University, France	MS	09/2006	Pharmacology (M1)
Paris Val de Marne University, France	DVM	09/2007	Veterinary Medicine
Alfort Veterinary School, France	Internship	09/2008	Veterinary Medicine and Surgery
Paul Sabatier University, France	MS	09/2009	Pharmacology/Pharmacokinetics (M2)
Novartis Pharma, Basel, Switzerland	Residency	10/2013	Pharmacology and Toxicology
Leiden University, Netherlands	Ph.D.	03/2015	Pharmacology

**A. Personal Statement**

I am an Early Stage Investigator with a broad background in clinical and basic Pharmacology and Toxicology sciences, serving as a board-certified veterinary Pharmacologist and Toxicologist (DECVPT) in the Department of Biomedical Sciences at Iowa State University (ISU). I have extensive post-graduate training in Pharmacology/Toxicology (MS), Pharmacokinetics (MS), and applied Mathematical Modeling (PhD), and I currently chair the Education and Residency Committee of the College of Veterinary Pharmacology and Toxicology (ECVPT). I have in-depth experience in Drug Research and Development, working for about 10 years in the pharmaceutical industry, which provides me with the necessary background to evaluate the PK, efficacy and safety of EcN<sub>L</sub>-DOPA in animal systems and human patients. Specifically, during my time at Novartis I was heading the collaboration between the Animal Health and Pharma (human) divisions for all aspects related to disposition kinetics and pharmacodynamics (PD). Over the last 6 years I have been expanding the scope of PK/PD modeling by founding the Animal Health Modeling and Simulation Society (AHM&S, 2017 President) and producing first-of-a-kind analysis in translational sciences. These results later matured into several peer-reviewed research publications summarized below. As a result of my previous leadership positions in industry I am well aware of the importance of frequent communication among project members and of constructing a realistic research plan, timeline, and budget.

- Schneider B, Balbas-Martinez V, Jergens AE, Troconiz IF, Allenspach K, **Mochel JP**. Model-Based Reverse Translation Between Veterinary and Human Medicine: The One Health Initiative. CPT Pharmacometrics Syst Pharmacol. 2017 Nov 27. PMID: [29178333](#).
- Bon C, Toutain PL, Concordet D, Gehring R, Martin-Jimenez T, Smith J, Pelligand L, Martinez M, Whitem T, Riviere JE, **Mochel JP**. Mathematical modeling and simulation in animal health. Part III: Using nonlinear mixed-effects to characterize and quantify variability in drug pharmacokinetics. J Vet Pharmacol Ther. 2017 Dec 11. PMID: [29226975](#).
- Lin Z, Gehring R, **Mochel JP**, Lavé T, Riviere JE. Mathematical modeling and simulation in animal health - Part II: principles, methods, applications, and value of physiologically based pharmacokinetic modeling in veterinary medicine and food safety assessment. J Vet Pharmacol Ther. 2016 Oct;39(5):421-38. PMID: [27086878](#).

## B. Positions and Honors

### Positions and Employment

2004 - 2006	Teaching Assistant, Department of Physiology and Therapeutics, National Veterinary School of Toulouse, France
2007 - 2008	Chief Intern, Veterinary Internal Medicine and Surgery, Small Animal Internal Medicine and Surgery, Alfort Veterinary School, France
2009 - 2013	Resident in Veterinary Pharmacology and Toxicology, Novartis, Centre de Recherche Sante Animale, DMPK and Safety, Saint-Aubin, Switzerland
2011 - 2013	Resident in Veterinary Pharmacology and Toxicology, Novartis, St Johann Campus, Pharmacology Modeling and Simulation, Basel, Switzerland
2013 - 2015	Senior Pharmacology Modeler, Department of Modeling and Simulation, Novartis, Basel
2015 - 2016	Quantitative Systems Pharmacology Leader, Roche Innovation Center, Pharma Research and Early Development, Basel, Switzerland
2016 -	Associate Professor (Presidential High-Impact), Department of Biomedical Sciences, Iowa State University College of Veterinary Medicine, Ames, IA

### Other Experience and Professional Memberships

2011 -	Founder and President, Animal Health Modeling and Simulation Society
2013 -	Diplomate, European College of Veterinary Pharmacology and Toxicology (ECVPT)
2015 -	Member, European Association for Veterinary Pharmacology and Toxicology (EAVPT)
2015 -	Board member, European Federation for Pharmaceutical Sciences
2016 -	Fellow, American Academy of Veterinary Pharmacology and Therapeutics
2017 -	Member, International Society of Pharmacometrics
2017 -	Member, American Association of Pharmaceutical Scientists
2017 -	Member, Comparative Gastroenterology Association
2017 -	Reviewer, NIH Study Section, Early Career Reviewer (ECR) Program
2017 -	Review Editor, Frontiers
2018 -	Founder and Chief Operating Officer, 3D Health Solutions, Inc
2018 -	Co-Founder, Lifengine Animal Health Labs, Inc
2019 -	Editor, Current Drug Metabolism
2020 -	Reviewer, NSF Study Section, Physiological Mechanisms and Biomechanics Program
2020 -	Reviewer, CNRS/INSERM Study Section, ATIP-Avenir Program

### Honors

2006	Valedictorian, Veterinary Medicine Graduate Class, National Veterinary School of Toulouse
2007	Silver Medal for Outstanding Veterinary Thesis, Alfort Veterinary School
2007	Valedictorian, Medicine and Surgery Internship National Competitive Exam
2008	Valedictorian, Master of Sciences (M2), Paul Sabatier University
2013	Diplomate, European College of Veterinary Pharmacology and Toxicology
2015	Chair of the Education and Residency Committee, ECVPT
2017	Councilor, American Academy of Veterinary Pharmacology and Therapeutics
2017	Scientific Organizing Committee, EAVPT, Poland
2018	Vice-President of the European Association of Veterinary Pharmacology and Therapeutics
2018	Chair of the Education and Residency Committee, ECVPT
2018	Y Combinator Seed Accelerator (Top ranked start-up incubator program in the U.S)

## C. Contributions to Science

1. **Optimizing the scheduling of VEGF inhibitors and chemotherapeutics for solid tumors using computational modeling and simulation.** Bevacizumab-pemetrexed/cisplatin (BEV-PEM/CIS) is a first-line therapeutic for advanced non-squamous non-small cell lung cancer (NSCLC). Bevacizumab potentiates PEM/CIS cytotoxicity by inducing transient tumor vasculature normalization. It is therefore an attractive target for administration schedule optimization. Using mathematical modeling to explore a range of practical

scheduling regimens, we could estimate the optimal scheduling gap in sequential BEV-PEM/CIS in human patients with NSCLC without the considerable time and resource investment required to conduct a suite of *in vivo* experiments. The developed structural model can be used in future systems pharmacology modeling of tumor growth and response vs. antiangiogenic-antiproliferative combination therapy. This case study illustrates how *in silico* models can streamline the development and use of therapeutic drugs in oncology.

- a. Schneider BK, Boyer A, Ciccolini J, Barlesi F, Wang K, Benzekry S, **Mochel JP**. Modeling Primary Tumor Growth in a Xenograft Mouse Model of Non-Small Cell Lung Cancer Treated With Pemetrexed-Cisplatin and Bevacizumab. Population Approach Group in Europe (PAGE, ISSN: 1871-6032) Meeting, 2018, Montreux. PAGE 27 (2018) Abstr 8509 [<https://www.page-meeting.org/default.asp?abstract=8509>].
- b. Schneider BK, Boyer A, Ciccolini J, Barlesi F, Wang K, Benzekry S, **Mochel JP**. Optimal Scheduling of Bevacizumab and Pemetrexed/Cisplatin Dosing in Non-Small Cell Lung Cancer. CPT Pharmacometrics Syst Pharmacol. 2019 Apr 19. PMID: [31004380](https://pubmed.ncbi.nlm.nih.gov/31004380/).
- c. Schneider BK, Bieth N, Boyer A, Ciccolini J, Barlesi F, Wang K, Benzekry S, **Mochel JP**. Simulation-based Optimization of Bevacizumab-Pemetrexed/Cisplatin Combination Therapy in Non-Small Cell Lung Cancer. Population Approach Group in Europe (PAGE, ISSN: 1871-6032) Meeting, 2019, Stockholm. PAGE 28 (2019) Abstr 9135 [<https://www.page-meeting.org/default.asp?abstract=9135>].
- d. Vaghi C, Rodallec A, Ciccolini J, **Mochel J**, Matri M, Ebos JML, Benzekry S. A reduced Gompertz model for predicting tumor age using a population approach. bioRxiv 670869. DOI: [10.1101/670869](https://doi.org/10.1101/670869).

2. **Improving *in vitro* screening of therapeutic drugs through the development of a physiologically relevant *ex vivo* model.** The success of drug screening approaches requires significant improvement of animal disease models used for preclinical testing. Specifically, there are growing concerns about the ability of murine models to faithfully recapitulate human phenotypes, as more than 90% of drugs passing preclinical testing in preclinical rodent studies ultimately fail in human clinical trials. This results in unnecessary developmental costs for the biopharmaceutical industry as well as excessive use of live animals to bring potential therapeutics to market. Eventually, these limitations delay the development of critically needed drugs and dramatically increase drug prices and healthcare costs. Our preliminary data show that canine enteroids are a translatable *ex vivo* model to study naturally occurring intestinal diseases and drug absorption in dogs and humans. This is a significant step toward the development of a completely new animal model system for biomedical research. The dog is a particularly relevant species since it shares similar environmental, genomic, anatomical, and intestinal physiologic features with humans. Our vision is that our innovative drug testing platform based on canine intestinal enteroids will accelerate drug discovery while ultimately decreasing overall healthcare costs for patients.

- a. **Mochel JP**, Jergens AE, Kingsbury D, Kim HJ, Martin MG, Allenspach K. Intestinal Stem Cells to Advance Drug Development, Precision, and Regenerative Medicine: A Paradigm Shift in Translational Research. AAPS J. 2017;20(1):17. PMID: [PMC6044282](https://pubmed.ncbi.nlm.nih.gov/26044282/).
- b. Kingsbury D, **Mochel JP**, Atherly T, Chandra L, Philips R, Hostetter J, Wannemuehler M, Jergens AE, Allenspach K. Comparison of endoscopically (Egd/Colo) procured enteroids and colonoids from normal dogs and dogs with naturally occurring chronic enteropathies (IBD). Gastroenterology. 2018;154(S1): 686-7. DOI: [10.1016/S0016-5085\(18\)32420-X](https://doi.org/10.1016/S0016-5085(18)32420-X).
- c. **Mochel JP**, Jergens AE, Allenspach K, Martinez M. Use of canine enteroids/colonoids to explore differences in intestinal absorption/metabolism/transporter characteristics in dogs as a function of intestinal region, breed, genotype and disease. HHS-Food and Drug Administration (FDA) [Research Collaboration Agreement 019765-00001](https://www.fda.gov/research/collaboration-agreement-019765-00001) (10/11/2018-10/10/2023).
- d. Chandra L, Borcharding DC, Kingsbury D, Atherly T, Ambrosini YM, Bourgois-Mochel A, Yuan W, Kimber M, Qi Y, Wang Q, Wannemuehler M, Ellinwood NM, Martin M, Skala M, Estes M, Fernandez-Zapico ME, Jergens AE, **Mochel JP**\*, Allenspach K\*. Derivation of adult canine intestinal organoids for translational research in gastroenterology. BMC Biol. 2019;17(1):33. PMID: [PMC6460554](https://pubmed.ncbi.nlm.nih.gov/32660554/). \*: co-senior author.

3. **Establishing a translational canine disease model of congestive heart failure (CHF) for the development of new therapeutic strategies.** Similar to humans, CHF is a leading cause of morbidity and mortality with an increasing prevalence in dogs. In both species, overactivation of the renin-angiotensin aldosterone system (RAAS) is known to play a key role in the pathophysiology of the disease. Our PKPD

modeling research in dogs provides a mechanism-based framework to characterize and quantify the effect of angiotensin converting enzyme inhibitors (e.g benazepril) and salidiuretics (e.g furosemide) for optimizing the use of these drugs in the course of CHF. These results, which are set forth in the publications cited below, collectively led to an altogether new awareness of the influence of sodium intake and feeding schedules on the daily changes of circulating RAAS peptides and the related consequences on blood pressure and renal physiology. Our research on furosemide was innovative in that it constituted the *very first application* of dose-response modeling (MCP-Mod) in translational veterinary medicine.

- a. **Mochel JP**, Peyrou M, Fink M, Strehlau G, Mohamed R, Giraudel JM, Ploeger B, Danhof M. Capturing the dynamics of systemic Renin-Angiotensin-Aldosterone System peptides heightens the understanding of the effect of benazepril in dogs. J Vet Pharmacol Ther. 2013;36(2):174-80. PMID: [22568394](#).
  - b. **Mochel JP**, Fink M, Peyrou M, Desevaux C, Deurinck M, Giraudel JM, Danhof M. Chronobiology of the renin-angiotensin-aldosterone system in dogs: relation to blood pressure and renal physiology. Chronobiol Int. 2013;30(9):1144-59. PMID: [23931032](#).
  - c. **Mochel JP**, Fink M, Peyrou M, Soubret A, Giraudel JM, Danhof M. Pharmacokinetic/Pharmacodynamic Modeling of Renin-Angiotensin Aldosterone Biomarkers Following Angiotensin-Converting Enzyme (ACE) Inhibition Therapy with Benazepril in Dogs. Pharm Res. 2015;32(6):1931-46. PMID: [25446774](#).
  - d. Bieth B, Bomkamp B, Toutain C, Garcia R, **Mochel JP**. Multiple comparison procedure and modeling: a versatile tool for evaluating dose-response relationships in veterinary pharmacology - a case study with furosemide. J Vet Pharmacol Ther. 2016 Dec;39(6):539-546. PMID: [27166146](#).
4. **Building the preclinical pharmacokinetics and pharmacodynamics package in dogs for successful FDA registration of a new standard of care.** Sacubitril/valsartan has recently been given Class I recommendation, the strongest endorsement, in updated clinical practice guidelines simultaneously released by the American College of Cardiology, the American Heart Association and the Heart Failure Society of America in the US. Guidelines now establish sacubitril/valsartan as standard of care for heart failure with reduced ejection fraction. During my time with Novartis I have generated the pharmacokinetics and pharmacodynamic package in dogs to support the Nonclinical Pharmacology and Toxicology section of the New Drug Application for FDA approval. Our studies demonstrated the outstanding effect of sacubitril/valsartan in decreasing aldosterone levels, a known prognostic factor of morbidity and mortality for human congestive heart failure. These results were later confirmed in a clinical trial of more than 8,000 patients where the new drug outperformed standard of care enalapril in reducing the rate of cardiovascular events. This case study perfectly illustrates how efficacy and safety data from dog models can positively translate to humans and support medical research. Pharmacokinetics, efficacy and safety data were presented at several international symposiums and summarized in multiple original research papers.
- a. **Mochel J**, Burkey BF, Garcia R, Peyrou M, Giraudel J, Renard D, Danhof M. First-in-class angiotensin receptor neprilysin inhibitor LCZ696 modulates the dynamics of the renin cascade and natriuretic peptides system with significant reduction of aldosterone exposure. J Am Coll Cardiol. 2014;63(12): Suppl. 1. DOI: [10.1016/S0735-1097\(14\)60806-8](#).
  - b. **Mochel J**, Peyrou M, Giraudel J, Danhof M. First-in-class angiotensin receptor-neprilysin inhibitor LCZ696 markedly influences the dynamics of circulating cGMP and biomarkers of the renin-angiotensin aldosterone system in dogs. J Vet Pharmacol Ther. 2015;38(S1):17. DOI: [10.1111/jvp.12246](#).
  - c. **Mochel J**, Seewald W, Danhof M. Pharmacokinetics of the angiotensin receptor-neprilysin inhibitor LCZ696 in furosemide-treated dogs. J Vet Pharmacol Ther. 2015;38(S1):46. DOI: [10.1111/jvp.12246](#).
  - d. **Mochel JP**, Teng CH, Peyrou M, Giraudel J, Danhof M, Rigel DF. Sacubitril/valsartan (LCZ696) significantly reduces aldosterone and increases cGMP circulating levels in a canine model of RAAS activation. Eur J Pharm Sci. 2018;128:103-111. PMID: [30508581](#).

Complete List of Published Work: <https://www.ncbi.nlm.nih.gov/myncbi/jonathan.mochel.1/bibliography/public/>

## D. GRANT SUPPORT

### 1. CURRENT SUPPORT

#### ***Departmental Start-Up***

Source: Iowa State University College of Veterinary Medicine

Dates: 10/24/16 – 12/31/20

Role: PI

Total Costs: \$500,000

Summary: The purpose of this grant is to set up the PI's laboratory and fund preliminary studies needed to be competitive for extramural research support.

#### **1.1. Comparative Medicine Laboratory**

##### ***Use of Canine Enteroids/Colonoids to Explore Differences in Intestinal Absorption/Metabolism/Transporter Characteristics in Dogs as a Function of Intestinal Region, Breed, Genotype and Disease***

Source: HHS-FOOD & DRUG ADMINISTRATION (FDA)

Role: PI

Dates: 10/11/18 – 10/10/23

Person Months Per Year: 1

Summary: The overall goal of this project is to demonstrate the superior performances of 3D canine organoids in predicting drug intestinal transport and metabolism over current *in vitro* models.

##### ***Intesto-Guard™ Efficacy in Canine Intestinal Organoids and Live Clinical Trials for the Treatment of Chronic Enteropathies***

Source: IG Biosciences Corp

Dates: 07/01/19 – 12/31/20

Role: MPI

Total Costs: \$458,526

Person Months Per Year: 1.25

Summary: This project aims to evaluate the efficacy of a commercial product (Intesto-Guard™) for the treatment of canine enteropathies by combining *in vivo* clinical trials and *in vitro* enteroid studies.

##### ***Proof-of-Concept In Vivo Evaluation of the Effect of Candidate Probiotics on Canine Intestinal Health***

Source: Deerland

Dates: 01/01/20 – 12/31/20

Role: CO-PI

Total Costs: \$55,085

Person Months Per Year: 0.1

Summary: The objective of this study is to characterize the *in vivo* efficacy of a new probiotic candidate on the fecal microbiome and metabolome, as well as the serum metabolome.

##### ***P-Glycoprotein Assessment in Canine Gut-On-A-Chip for Drug Transport and Safety Modeling***

Source: ACVIM Foundation

Dates: 01/01/20 – 12/31/20

Role: CO-Primary Mentor

Total Costs: \$25,000

Person Months Per Year: 0.1

Summary: In this application, our objective is to develop canine-specific drug transport assays in intestinal organoids to characterize the risk of drug-drug interactions.

***In-Depth Characterization of the Phenotypic Epithelial Changes in Canine IBD***

Source: Comparative Gastroenterology Society

Dates: 01/01/20 – 12/31/20

Role: CO-I

Total Costs: \$12,000

Person Months Per Year: 0.05

Summary: In this application, we aim to characterize structural and functional changes in the intestinal epithelium of dogs with inflammatory bowel disease (IBD).

***Development of An Organ-On-A-Chip for Canine Chronic Enteropathies***

Source: ACVIM Foundation

Dates: 09/01/18 – 08/30/20

Role: Mentor and CO-PD

Total Costs: \$25,000

Person Months Per Year 0.1

Summary: The goal of this project is to establish the very first microfluidic gut-on-a-chip using canine enteroids/colonoids for mechanistic studies in IBD.

***Development of Improved Model Systems of Host-Mucosal Microbiome Interactions to Understand the Mechanisms of Dietary Impact on the Host***

Source: Iowa State University College of Veterinary Medicine

Dates: 09/01/19 – 08/30/20

Role: CO-PI

Total Costs: \$20,562

Person Months Per Year: 0.25

Summary: This project focuses on the use of microfluidic gut-on-a-chip model systems to characterize the effect of high-fat diets on the intestinal microbiome and gut health.

***Investigating the Mechanistic Bioactivity of Parasitic Nematode Extracellular Vesicles on the Host Intestinal Epithelium***

Source: Iowa State University College of Veterinary Medicine

Dates: 09/01/19 – 08/30/20

Role: CO-PI

Total Costs: \$20,562

Person Months Per Year: 0.25

Summary: In this application, we propose to determine how gastrointestinal parasites trump the host mucosal immunity in soil-transmitted helminthiasis.

***Improving In Vitro Prediction of Oral Drug Permeability and Metabolism Using a Novel 3D Canine Organoid Model***

Source: NSF 18-550

Dates: 07/01/19 – 06/30/20

Role: CO-I

Total Costs: \$225,000

Person Months Per Year: 0.5

Summary: The goal of this project is to improve current *in vitro* screening systems of therapeutic drugs through the use of canine enteroids.

***A Large-Scale Microfluidics Platform for Accelerating Toxicology Testing using Animal-Based Organoids***

Source: NIH 1R43ES029890-01

Dates: 07/01/19 – 03/31/20

Role: PI

Total Costs: \$35,475

Person Months Per Year: 0.5

Summary: This project aims at developing in vitro toxicology assays in 3D canine enteroids to replace live animal experiments.

***Validation Study To Determine The Sensitivity and Specificity of Serum Test for Canine IBD***

Source: Antech Diagnostics

Dates: 09/01/19 – 12/31/20

Role: CO-PI

Total Costs: \$41,182

Person Months Per Year: 0.1

Summary: In this application, we aim at validating the predictive performances of a new serum-based assay for canine inflammatory bowel disease (IBD).

**1.2. Computational Laboratory: SMART Pharmacology**

***Using Canine Urothelial Organoids to Predict Therapeutic Response In Human and Canine Bladder Cancer: A One Health Approach***

Source: Barry Foundation

Dates: 07/01/20 – 06/30/22

Role: CO-PI

Total Costs: \$120,000

Person Months Per Year: 0.25

Summary: The objective of this study is to establish canine spheroids from urothelial transitional cell carcinomas as a preclinical model for human drug discovery.

***Dose-Exposure-Response of Benazeprilat on Biomarkers of the Renin-Angiotensin Aldosterone System in Dogs: Is Higher Always Better?***

Source: CEVA Sante Animale

Dates: 06/01/20 – 12/31/21

Role: PI

Total Costs: \$77,274

Person Months Per Year: 0.25

Summary: The objective of this study is to characterize the dose-exposure-response relationship of benazeprilat on biomarkers of the RAAS which are relevant to Congestive Heart Failure (CHF) pathophysiology and associated morbidity/mortality.

***Nanomedicine Countermeasures to Overcome Antimicrobial Resistance***

Source: DTRA 1-19-C-0005

Dates: 11/01/18 – 10/30/21

Role: Collaborator

Total Costs: \$1,458,344

Summary: The objective of this proposal is to develop a nanomedicine countermeasure to be used as therapeutic regimen for the treatment of AMR Category A and B biowarfare agents.

***Prognostic Value of Circulating Cortisol in Canine Congestive Heart Failure (CHF)***

Source: AKC Foundation

Dates: 10/01/19 – 09/30/21

Role: CO-PI

Total Costs: \$51,240

Person Months Per Year: 0.1

Summary: This study aims at establishing reference cortisol values in dog patients with symptomatic CHF.

***The Antimicrobial Resistance Consortium***

Source: Vice President for Research Interdisciplinary Award

Dates: 09/01/18 – 08/30/21

Role: CO-PI

Total Costs: \$750,000

Person Months Per Year: 0.5

Summary: This project aims at developing innovative therapeutic strategies to reduce antimicrobial resistance.

***International Academic Partnerships Programme***

Source: Polish National Agency for Academic Exchange

Dates: 09/01/19 – 08/30/21

Role: PI

Total Costs: \$10,660

Person Months Per Year: 0.1

Summary: This application aims at fostering international research collaboration between Poland and the United States of America in the field of PK/PD mathematical modeling.

***Application of Bupivacaine Liposome Injectable Suspension for Sustained Analgesia from Disbudding Pain in Calves***

Source: Iowa Veterinary Medical Association

Dates: 03/01/20 – 02/28/21

Role: CO-I

Total Costs: \$19,798

Person Months Per Year: 0.1

Summary: This study aims at characterizing the pharmacokinetics and efficacy of liposomal bupivacaine for pain management in calves.

***Determination of Pharmacokinetics and Withdrawal Periods in Milk Following Intramammary Administration of Cephapirin Sodium to Lactating Does***

Source: USDA NIFA Capacity Funds

Date: 10/01/19 – 09/30/20

Role: CO-I

Total Costs: \$20,000

Person Months Per Year: 0.1

Summary: The aim of this project is to evaluate the pharmacokinetics and risk of violative residues with Cephapirin in MUMS such as lactating does.



***Prognostic Value of Circulating Cortisol in Canine Congestive Heart Failure***

Source: ACVIM Foundation

Dates: 07/01/19 – 06/30/20

Role: CO-I

Total Costs: \$15,000

Person Months Per Year: 0.1

Summary: In this application, we propose to study the value of systemic cortisol concentrations for the prediction of morbidity and mortality in canine congestive heart failure.

***Development of a Clinically Relevant Lameness Model for Evaluation of Analgesic Strategies in Dairy Cattle***

Source: ILHAC General Call 2019

Dates: 06/01/19 – 05/31/20

Role: CO-I

Total Costs: \$24,480

Person Months Per Year: 0.1

Summary: The goal of this study is to improve current preclinical models for evaluation of analgesic therapeutic strategies in dairy cattle.

***Ocular and Systemic Considerations for Topical Drug Delivery in Dogs***

Source: ISU VCS Research Incentive

Dates: 04/01/19 – 03/31/20

Role: CO-PI

Total Costs: \$5,000

Person Months Per Year: 0.05

Summary: In this application, we aims at optimizing ocular delivery of therapeutic drugs by taking into account anatomical differences between human and canine eyes.

***Pharmacokinetics of Liposomal Bupivacaine Following Perineural Injection in the Horse***

Source: ISU VCS Research Incentive

Dates: 04/01/19 – 03/31/20

Role: CO-PI

Total Costs: \$5,000

Person Months Per Year: 0.05

Summary: The guiding hypothesis of this proposal is that liposomal formulation of bupivacaine will significantly impact its pharmacokinetics vs. standard injectable (HCl-based) formulations.

**2. PENDING SUPPORT**

**2.1. Comparative Medicine Laboratory**

***Using Organoids to Advance Precision Medicine in Bladder Cancer: Treating Man and Man's Best Friend***

Source: NIH R21 PA-19-184

Dates: 09/01/20 – 08/30/22

Role: MPI

Total Costs: \$420,750

Person Months Per Year: 1

Summary: In this application, we aim at studying the mechanisms by which environmental chemicals trigger tumor initiation and development using a spontaneous animal disease model of bladder cancer.

***Ultrasound-Based Diagnostic and Monitoring of Bladder Cancer Treatment with Drug Released from Nanoparticles***

Source: NIH R33/44 PA-19-272

Dates: 07/01/20 – 06/30/22

Role: PI

Total Costs: \$382,393

Person Months Per Year: 1

Summary: The objective of this proposal is to demonstrate how nanoparticle-based therapeutic strategies can improve targeted drug delivery and clinical efficacy in spontaneous animal models of bladder TCC.

***Using Canine Urothelial Organoids to Predict Therapeutic Response In Human and Canine Bladder Cancer: A One Health Approach***

Source: Puppy-Up Foundation

Dates: 07/01/20 – 06/30/22

Role: CO-PI

Total Costs: \$100,000

Person Months Per Year: 0.2

Summary: The objective of this study is to establish canine spheroids from urothelial transitional cell carcinomas as a preclinical model for human drug discovery.

***Improving In Vitro Prediction of Oral Drug Permeability and Metabolism Using a Novel 3D Canine Organoid Model***

Source: American College of Laboratory Animal Medicine

Dates: 07/01/20 – 06/30/21

Role: CO-I

Total Costs: \$40,000

Person Months Per Year: 0.1

Summary: This study aims at establishing canine intestinal organoids as a model for drug absorption assays to reduce and/or replace current live animal studies.

***Proof-of-Concept In Vivo Evaluation of the Effect of Candidate Probiotics on Canine Intestinal Health***

Source: Anizome Corp

Date: 03/01/20 – 02/28/21

Role: PI

Total Costs: \$121,900

Person Months Per Year: 0.5

Summary: The objective of this project is to characterize the in vitro efficacy of candidate probiotics on the intestinal epithelium of dogs with inflammatory bowel disease.

## **2.2. Computational Laboratory: SMART Pharmacology**

### ***CPS Frontiers Collaborative Research: Efficient and Adaptive Management of Husbandry***

Source: NSF 19-553

Dates: 06/01/20 – 05/31/24

Role: CO-I

Total Costs: \$3,666,808

Person Months Per Year: 1

Summary: In this application, we propose to develop sensor-based methods to improve detection of endemic diseases in large animal production systems.

### ***High-Throughput Metabolic Spectra Imaging to Predict Response to Therapy in Colorectal Cancer***

Source: DOD CDMRP - Peer-Reviewed Cancer Research Program

Dates: 09/01/20 – 08/31/22

Role: CO-I

Total Costs: \$586,553

Person Months Per Year: 0.18

Summary: This application aims at developing Raman Spectroscopy imaging for characterization of chemotherapeutic response in canine organoids.

### ***Harnessing The Biology of Intestinal Organoids To Accelerate Drug Discovery in Canine Inflammatory Bowel Disease***

Source: Morris Animal Foundation

Dates: 07/01/20 – 06/30/23

Role: PI

Total Costs: \$147,202

Person Months Per Year: 0.5

Summary: The objective of this application is to establish canine intestinal organoids as an *in vitro* model of inflammatory bowel disease for drug efficacy and safety testing prior to clinical trials in live animals.

### ***Unravelling the impact of P-glycoprotein Mutation on the Disposition Kinetics, Efficacy and Safety of Cardiovascular Drugs in Dogs***

Source: Independent Research Fund Denmark

Dates: 06/01/20 – 05/31/23

Role: PI

Total Costs: 78,980

Person Months Per Year: 0.5

Summary: This proposal aims at establishing an *in vitro* organoid model to study the impact of P-glycoprotein (ABCB1) mutation on drug intestinal transport.

### ***Novel Re-Engineered L-DOPA Probiotic Therapy for Parkinson's Disease***

Source: NIH PAR-18-761

Dates: 04/01/20 – 03/31/23

Role: CO-I

Total Costs: \$1,177,494

Person Months Per Year: 0.24

Summary: In this application, we aim at developing second generation *E. coli* bacterial probiotics to produce constant delivery of L-DOPA to the systemic circulation and prevent L-DOPA-induced dyskinesia in Parkinson's patients.

***Reengineered L-DOPA Microbiome Therapy for Depression***

Source: DoD DMRDP

Dates: 09/01/19 – 02/28/21

Role: CO-I

Total Costs: \$534,859

Person Months Per Year: 0.24

Summary: This study aimed at evaluating the effect of a novel bacterial vector for sustained delivery of L-DOPA in patients suffering from major depressive disorders.

***A Microfluidic Assisted Liver Organoid Assay for High-Throughput Drug Candidate and Chemical Toxicity Screening to Reduce Animal Testing***

Source: NIH R33/44 RFA-ES-20-005

Dates: 09/01/20 – 02/28/21

Role: PI

Total Costs: \$83,203

Person Months Per Year: 0.5

Summary: The objective of this project is to establish liver organoids as an *in vitro* system for chemical and drug toxicity testing.

***Pantoprazole as a Gastroprotectant in Calves: A Pharmacokinetic and Pharmacodynamic Study***

Source: American Association of Bovine Practitioners

Dates: 09/01/20 – 08/30/21

Role: CO-I

Total Costs: \$20,360

Person Months Per Year: 0.05

Summary: In this application, we aim at modeling the pharmacokinetics of pantoprazole and its efficacy in modulating gastric ulcers in calves.

***Correcting a Fundamental Flaw in the Paradigm for Antimicrobial Susceptibility Testing***

Source: Morris Animal Foundation and VCS Incentive Grant

Dates: 07/01/20 – 06/30/21

Role: CO-I

Total Costs: \$38,306

Person Months Per Year: 0.05

Summary: This project aims at taking into account the effect of ocular disease on tear composition and antimicrobial susceptibility testing.

**3. COMPLETED PROJECTS**

***Accuracy and Precision of Compounded Famciclovir for Treatment of Cats Affected with Feline Herpesvirus Type-1***

Source: WINN Feline Foundation

Date: 06/01/19 – 12/31/19

Role: CO-PI

Total Costs: \$8,587

Person Months Per Year: 0.05

Summary: This project focuses on the characterization of compounded famciclovir accuracy and precision for the treatment of feline herpesvirus type 1.

***Using Canine Intestinal Stem Cells to Advance Drug Development, Precision and Transplantation Medicine***

Source: Iowa State University Vice President for Research Miller Award

Dates: 10/01/17 – 10/31/19

Role: PI

Total Costs: \$150,000

Person Months Per Year: 1.5

Summary: The purpose of this project is to develop protocols for growth and characterization of canine enteroids/colonoids to interrogate molecular pathways involved in the pathogenesis of Inflammatory Bowel Disease (IBD).

***Using Canine Intestinal Stem Cells to Advance Precision and Regenerative Medicine***

Source: Iowa State University College of Veterinary Medicine

Dates: 09/01/17 – 06/30/19

Role: CO-PI

Total Costs: \$40,000

Person Months Per Year: 0.25

Summary: This project focuses on the development of a large animal disease models for transplantation research and precision medicine.

***Development of a Novel Sheep Model of Human Sepsis***

Source: USDA Formula Grant

Dates: 10/01/17 – 09/30/19

Role: CO-PI

Total Costs: \$40,000

Person Months Per Year: 0.25

Summary: The aim of this study is to establish a two phase translational model for carbapenem-resistant urinary tract infections.

***Towards a Better Understanding of Corneal Sequestrum:***

***Biochemical Analysis of Tears in Healthy Cats and in Cats Affected with Sequestrum***

Source: Morris Animal Foundation

Date: 06/01/17 – 08/30/17

Role: CO-PI

Total Costs: \$5,000

Person Months Per Year: 0.05

Summary: In this project, we aim at characterizing the biochemical profile of tears in cats with ocular sequestrum.

***Accuracy and Precision of Compounded Famciclovir for Treatment of Cats Affected with Feline Herpesvirus Type-1***

Source: Vision for Animal Foundation

Dates: 06/01/19 – 08/30/19

Role: CO-PI

Total Costs: \$5,000

Person Months Per Year: 0.05

Summary: This project focuses on the characterization of compounded famciclovir accuracy and precision for the treatment of feline herpesvirus type 1.

***Ocular and Systemic Considerations for Topical Drug Delivery***

Source: Morris Animal Foundation

Dates: 06/01/19 – 08/30/19

Role: CO-PI

Total Costs: \$5,000

Person Months Per Year: 0.05

Summary: In this application, we propose to establish standard operating procedures to optimize the efficacy and safety of topical treatments for ocular use.

## E. Most Recent Publications (Last six years)

### Accepted Peer-Reviewed Manuscripts

#### Pharmacokinetics and PK/PD Modeling

- [1] Vaghi C, Rodallec A, Fanciullino R, Ciccolini J, **Mochel JP**, Mastri M, Ebos JML, Poignard C, Benzekry S. Population Modeling of Tumor Growth Curves Identifies a Reduced Gompertz Model and Improves Prediction of Tumor Initiation Time. *PLoS Comput Biol*. 2020;16(2):e1007178. DOI:10.1371/journal.pcbi.1007178. PMID: [32097421](#).
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- [3] Musser M, Mahaffey AL, Fath M, Buettner G, Brett W, Schneider B, Seo YJ, **Mochel JP**, Johannes CM. In vitro Cytotoxicity and Pharmacokinetic Evaluation of Pharmacological Ascorbate in Dogs. *Front Vet Sci*. 2019 Nov 7;6:385. DOI: 10.3389/fvets.2019.00385. PMID: [31788483](#).
- [4] Smith JS, Borts DJ, Slagel CC, Rajewski SM, Bousquet-Melou A, Ferran AA, Plummer PJ, **Mochel JP**. Pharmacokinetics of Ertapenem in Sheep (*Ovis aries*) with Experimentally Induced Urinary Tract Infection. *Comp Med*. 2019 Oct 1;69(5):413-418. DOI: 10.30802/AALAS-CM-18-000144. PMID: [31581974](#).
- [5] Wang J, Schneider BK, Xue J, Sun P, Qiu J, **Mochel JP\***, Cao X\*. Pharmacokinetic Modeling of Ceftiofur Sodium Using Non-linear Mixed-Effects in Healthy Beagle Dogs. *Front Vet Sci*. 2019 Oct 17;6:363. DOI: 10.3389/fvets.2019.00363. PMID: [31681816](#). \*: co-corresponding author.
- [6] Tinklenberg RL, Murphy SD, **Mochel JP**, Seo YJ, Mahaffey AL, Yan Y, Ward JL. Dose-Response Effects of Oral Short-Term Prednisone Therapy on Clinicopathologic and Hemodynamic Variables in Healthy Dogs. *Am J Vet Res*. 2020;81(4):317-325. DOI:10.2460/ajvr.81.4.317. PMID: [32228253](#).
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- [8] Sebbag L, Yan Y, Smith JS, Allbaugh RA, Wulf LW, **Mochel JP**. Tear Fluid Pharmacokinetics Following Oral Prednisone Administration in Dogs With and Without Conjunctivitis. *J Ocul Pharmacol Ther*. 2019 May 9. DOI: 10.1089/jop.2019.0020. PMID: [31070497](#).
- [9] Wang J, Sun P, Li J, Pei Y, Schneider BKS, Seo YJ, **Mochel JP\*** and Cao X\*. Nonlinear Mixed-Effects Pharmacokinetic Modeling of the Novel COX-2 Selective Inhibitor Vitacoxib in Dogs. *J Vet Pharmacol Ther*. 2019. DOI: 10.1111/jvp.12802. PMID: [31369157](#). \*: co-corresponding author.
- [10] Smith JS, **Mochel JP**, Borts D, Griffith R. Effects of Experimentally-Induced Respiratory Disease on the Pharmacokinetics and Tissue Disposition of Tulathromycin in Meat Goats. *J Vet Pharmacol Ther*. 2019 Jun 10. DOI: 10.1111/jvp.12764. PMID: [31183876](#).
- [11] Schneider BKS, Boyer A, Ciccolini J, Wang K, Benzekry S, **Mochel JP**. Optimal Scheduling of Bevacizumab and Pemetrexed/Cisplatin Dosing in Non-Small Cell Lung Cancer. *CPT Pharmacometrics Syst Pharmacol*. 2019 Apr 19. DOI: 10.1002/psp4.12415. PMID: [31004380](#).

- [12] Moczarnik J, Berger DJ, Noxon JO, LeVine DN, Lin Z, Coetzee JF, **Mochel JP**. Relative Oral Bioavailability of Two Amoxicillin-Clavulanic Acid Formulations in Healthy Dogs: A Pilot Study. *J Am Anim Hosp Assoc*. 2019 Jan/Feb;55(1):14-22. DOI: 10.5326/JAAHA-MS-6872. Epub 2018 Nov 14. PMID: [30427713](#).
- [13] Smith JS, **Mochel JP**, Borts DJ, Lewis KA, Coetzee JF. Adverse Reactions to Fentanyl Transdermal Patches in Calves: A Preliminary Clinical and Pharmacokinetic Study. *Vet Anaesth Analg*. 2018 Jul;45(4):575-580. DOI: 10.1016/j.vaa.2018.02.009. Epub 2018 Apr 11. PMID: [29880278](#).
- [14] Smith JS, Coetzee JF, Fisher IWG, Borts DJ, **Mochel JP**. Pharmacokinetics of Fentanyl Citrate and Norfentanyl in Holstein Calves and Effect of Analytical Performances on Fentanyl Parameter Estimation. *J Vet Pharmacol Ther*. 2018 Aug;41(4):555-561. DOI: 10.1111/jvp.12501. Epub 2018 Mar 30. PMID: [29603262](#).
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- [18] Martinez MN\*, Gehring R\*, **Mochel JP\***, Pade D\*, Pelligand L\*. Population Variability in Animal Health: Influence on Dose-Exposure-Response Relationships: Part II: Modelling and Simulation. *J Vet Pharmacol Ther*. 2018 Aug;41(4):E68-E76. DOI: 10.1111/jvp.12666. PMID: [29806231](#). \*: equal contributions.
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- [20] Pelligand L, Soubret A, King JN, Elliott J, **Mochel JP**. Modeling of Large Pharmacokinetic Data Using Nonlinear Mixed-Effects: A Paradigm Shift in Veterinary Pharmacology. A Case Study With Robenacoxib in Cats. *CPT Pharmacometrics Syst Pharmacol*. 2016 Nov;5(11):625-635. DOI: 10.1002/psp4.12141. PMID: [27770596](#).
- [21] Lin Z, Gehring R, **Mochel JP**, Lavé T, Riviere JE. Mathematical Modeling and Simulation in Animal Health - Part II: Principles, Methods, Applications, and Value of Physiologically Based Pharmacokinetic Modeling in Veterinary Medicine and Food Safety Assessment. *J Vet Pharmacol Ther*. 2016 Oct;39(5):421-38. DOI: 10.1111/jvp.12311. Epub 2016 Apr 17. PMID: [27086878](#).
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[29] Ambrosini YM, Park Y, Jergens AE, Shin W, Mon S, Atherly T, Borcharding DC, Jang J, Allenspach K, **Mochel JP**\* and Kim HY\*. Recreation of an Accessible Interface of the Biopsy-Derived Canine Intestinal Organoids to Study Epithelial-Luminal Interactions. *PLoS One*. 2020 (In Press). \*: co-corresponding author.

[30] Sebbag L, Moody L, **Mochel JP**. Albumin Levels in Tear Film Modulate The Bioavailability of Medically-Relevant Topical Drugs. *Front Pharmacol*. 2020;10:1560. DOI:10.3389/fphar.2019.01560. PMCID: [PMC6997149](#).

[31] Sebbag L, Uhl LK, Schneider B, Hayes B, Olds J, **Mochel JP**. Schirmer Tear Test is a Reliable Diagnostic Tool in the General Feline Population. *J Am Vet Med Assoc*. 2020 Mar 15;256(6):681-686. DOI: 10.2460/javma.256.6.681. PMID: [32125244](#).

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- [36] Khelik IA, Berger DJ, **Mochel JP**, Seo YJ, Palerme JS, Ware WA, Ward JL. Clinicopathologic, Hemodynamic, and Echocardiographic Effects of Short-Term Anti-Inflammatory Glucocorticoid Treatment in Systemically Healthy Cats. *Am J Vet Res*. 2019 Aug;80(8):743-755. DOI: 10.2460/ajvr.80.8.743. PMID: [31339769](#).
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### Preprints (Under Review)

[64] Martinez M, Pade D, **Mochel JP**. Pharmacokinetic Considerations In Inter-Species Comparisons (Submitted: *Current Opinion in Toxicology*).

[65] Le ST, Cerna J, Klinedinst BS, Frizell B, **Mochel JP**, Willette AA. Mitochondrial Bioenergetics and Alzheimer's Disease: Pyruvate Kinase and Associations with Neural and Cognitive Outcomes (Submitted: *Neurobiology of Aging*).

[66] Pappas C, Klinedinst BS, Le S, Wang Q, Larsen B, McLimans K, Lockhart S, Allenspach K, **Mochel JP**, Willette A. CSF Glucose Tracks Regional Tau Progression Based on Alzheimer's Disease Risk Factors (Submitted: *Alzheimer and Dementia*).

[67] Le ST, Klinedinst BS, Pappas C, Larsen B, Wang Q, Wang Y, Yu S, Wang L, Allenspach K, **Mochel JP**, Bennett D, Willette AA. More Cheese, Less White Wine: Consumption of Whole Foods, Changes in Fluid Intelligence, and the Influence of Alzheimer's Disease Genetic Factors (Submitted: *Journal of Alzheimer's Disease*).

- [68] Klinedinst BS, Meier NF, **Mochel JP**, Allenspach K, Bennett D, Willette AA. Walking In The Light: How History of Physical Activity, Sunlight, and Vitamin D Levels Account For DEXA-Quantified Body Fat Volumes - a UK Biobank Study (Submitted: Obesity).
- [69] Ambrosini YM, Borchering D, Seo YJ, Segarra S, Glanemann B, Garden OA, Neuber S, Müller U, Dang V, Borts D, Atherly T, Jergens A, **Mochel JP**, Allenspach K. Treatment with Hydrolyzed Diet Supplemented with Prebiotics and Glycosaminoglycans Alters Lipid Metabolism in a Canine Model of Inflammatory Bowel Disease (Submitted: Frontiers Veterinary Science).
- [70] Glanemann B, Seo YJ, Priestnall S, Garden OA, Jergens AE, Segarra S, **Mochel JP**, Allenspach K. Clinical Efficacy of Prebiotics and Glycosaminoglycans versus Placebo In Dogs with Food Responsive Enteropathy receiving a Hydrolyzed Diet: A Pilot Study (Submitted: Journal of Veterinary Internal Medicine).
- [71] Wang J, Schneider BK, Sun P, Seo YJ, **Mochel JP\***, Cao X\*. Nonlinear Mixed-Effects Pharmacokinetic Modeling of the Novel COX-2 Selective Inhibitor Vitacoxib in Cats (Submitted: Frontiers in Veterinary Science). \*: co-corresponding author.
- [72] Kittrell HC, **Mochel JP**, Brown J, Schneider BK, Ratliffe B, Karriker L. Pharmacokinetics and Bioavailability of Flunixin Meglumine in Pre-Wean Piglets Following Oral, Topical, and Intramuscular Routes of Administration (Submitted: Frontiers in Veterinary Science).
- [73] Smith JS, **Mochel JP**, Seo YJ, Ahrens AP, Griffith RW. Preliminary Evaluation of a Pasteurella Multocida Respiratory Disease Induction Model for Goats (Submitted: Journal of the American Association for Laboratory Animal Science).
- [74] Sebbag L, Soler E, Allbaugh R, **Mochel JP**. Impact of Acute Conjunctivitis on Ocular Surface Homeostasis in Dogs (Submitted: Veterinary Ophthalmology).
- [75] Coto GM, Musser ML, Tropf M, Ward JL, Seo YJ, **Mochel JP**, Johannes CM. A multi-Institutional Retrospective Analysis of Prognostic Factors and Treatment Options for Presumed or Confirmed Canine Aortic Body Chemodectomas (Submitted: Journal of Veterinary Cardiology).
- [76] Terhaar HM, Allbaugh RA, **Mochel JP**, Sebbag L. Serum Albumin and Total Protein Concentration in the Tear Film of Horses with Healthy or Diseased Eyes (Submitted: Veterinary Ophthalmology).
- [77] Naiman JH, Zellner EM, Petrovsky BL, Riegel TO, Yuan L, **Mochel JP**, Schmitt EM, Kraus KH. Percutaneous Fluoroscopically Guided Lag Screw Fixation for Sacroiliac Luxation in Dogs (Submitted: Veterinary Surgery).
- [78] Heinrich ERE, Levine DN, Walton R, Gonzales J, Seo YJ, **Mochel JP**, Allenspach K. Retrospective Comparison of a Novel Continuous Insulin Infusion Protocol to Standard Of Care Treatment for Diabetic Ketoacidosis in Dogs (Submitted: Journal of Veterinary Internal Medicine).

## In Preparation

[79] Allenspach K, Borcharding DC, Lennarella-Servantez C, Ambrosini Y, Atherly T, Bourgois-Mochel A, Rossoni M, Kilburn L, Jergens AE, **Mochel JP**. Unfavorable Changes in the Gut Microbiome, Intestinal Epithelium and Serum Metabolome Induced by Short-Term High-Fat Diets (Science Translational Medicine).

[80] Sebbag L, **Mochel JP**. An Eye on the Dog as the Scientist's Best Friend for Translational Research in Ophthalmology: A Focus on the Ocular Surface (Medicinal Research Reviews).

[81] Borcharding D, Chandra L, Jergens AE, Atherly T, Bourgois-Mochel A, Martin M, Allenspach K, **Mochel JP**. Differential Transcriptomic Profiles in Response to LPS Stimulated Canine Intestinal Organoids (PLoS One).

[82] Vessieres F, Du Y, Jergens AE, Procoli F, Logue CM, Wang C, **Mochel JP**, Allenspach K. Specific Virulence Factors in Mucosa-Associated E. coli of Dogs With Inflammatory Bowel Disease (IBD) are Associated with Survival (PLoS One).

[83] Seo YJ, Smith JS, Borts D, Coetzee JF, Ayril G, **Mochel JP**. Pharmacokinetic Modeling of Fentanyl Citrate and Norfentanyl in Holstein Calves Using a Nonlinear Mixed-Effects Approach (Frontiers in Veterinary Science).

[84] Yaeger M, **Mochel JP**, Wu Z, Plummer P, Sahin R, Beyi A, Zhang Q, Griffith R. Pharmacokinetics of Tulathromycin in Pregnant Ewes Challenged with *Campylobacter Jejuni*. (Frontiers in Veterinary Science).

[85] Ambrosini Y, Borcharding D, Lennarella C, Atherly T, Martinez M, Jergens AE, Allenspach K, **Mochel JP**. A Novel Canine In Vitro Model for Investigation of Intestinal P-Glycoprotein-Mediated Drug Transport (AAPS Journal).

[86] Martinez M, Pade D, **Mochel JP**. Comparison of Dog and Human Physiology, Transporter and Enzyme Activity/Location (AAPS Journal).

[87] Hanson KR, Rudloff E, Yuan L, **Mochel JP**, Linklater AKJ. The Effect of Prazosin on Feline Recurrent Urethral Obstruction (Veterinary Surgery).

[88] Smith JS, Plummer P, Ferran A, Bousquet-Melou A, **Mochel JP**. Concurrent Use of an Immunostimulant and Antibiotic Improves Treatment Outcome in a Sheep Model of Catheter Associated Urinary Tract Disease Due to *P. aeruginosa* (Frontiers in Microbiology).

[89] Sebbag L, Kirner NS, Wulf L, **Mochel JP**. Tear Film Pharmacokinetics and Systemic Absorption of Topical 1% Prednisolone Acetate Ophthalmic Suspension in Dogs (Frontiers in Veterinary Science).

## Invited Abstracts and Conference Papers (Last six years)

- [1] Kurr L, Allenspach K, Atherly T, Borcharding DC, Jergens AE, **Mochel JP**. Harnessing the Power of Intestinal Stem Cells to Accelerate Drug Discovery in Inflammatory Bowel Disease: A One Health Approach. Capitol Hill Conference, Washington (2020).
- [2] Kurr L, Allenspach K, Mao S, Atherly T, Borcharding D, Ambrosini Y, Seo YJ, Jergens AE, **Mochel JP**. Harnessing The Biology of Intestinal Organoids To Accelerate Drug Discovery in Inflammatory Bowel Disease. American Society for Biochemistry and Molecular Biology, San Diego (2020).
- [3] **Mochel JP**. Reverse Translational Pharmacology: Paradigm Shift or Flash in the Pan. European Federation for Pharmaceutical Sciences, Gothenburg (2020).
- [4] **Mochel JP**. Complexity is Overrated: Back to the Basics of the Renin-Angiotensin Aldosterone System. Translational RAAS Interest Group, Las Vegas (2020).
- [5] Ward J, **Mochel JP**. Rational Dose Selection for ACE Inhibitors in Canine Heart Diseases. Translational RAAS Interest Group, Las Vegas (2020).
- [6] Schneider BK, Benzekry S, **Mochel JP**. A Semi-Mechanistic PK/PD Model of Bevacizumab-Cytotoxic Combination Therapy For Dosing Scheduling Optimization in Non-Small Cell Lung Cancer. Quantitative Systems Pharmacology Conference, Leiden (2020).
- [7] Borcharding D, Atherly T, Bourgois-Mochel A, Rossoni M, Kilburn L, Ambrosini Y, Perez B, Gabriel V, Lenarella-Servantez C, Mao S, Jergens AE, **Mochel JP** and Allenspach K. Polyphenols Reverse the Pathologic Effects of Palmitic Acid and High Fat Diet in Canine Enteroids. Digestive Disease Week, Chicago (2020). Poster of Distinction (Top 10%).
- [8] Allenspach K, Phillips G, Jergens AE, **Mochel JP**. Short-term High Fat/Low Carbohydrate Diet in Dogs Induces Dysbiosis of the Microbiome Analogous to Obesity in People. Society for Mucosal Immunology, Denver (2020).
- [9] Moody LM, **Mochel JP**, Soler EA, Sebbag L. Albumin in Tear Film Decreases the Bioavailability of Topical Tropicamide and Latanoprost in Dogs. American College of Veterinary Ophthalmologists Conference, Hawaii (2019).
- [10] Soler EA, **Mochel JP**, Allbaugh RA, Moody LM, Sebbag L. Impact of Acute Conjunctivitis on Tear Film Dynamics, Quantity and Quality in Healthy Beagle Dogs. American College of Veterinary Ophthalmologists Conference, Hawaii (2019).
- [11] Sebbag L, Yan Y, Smith JS, Allbaugh RA, Wulf LW, **Mochel JP**. Tear Fluid Pharmacokinetics Following Oral Prednisone Administration In Dogs With or Without Conjunctivitis. American College of Veterinary Ophthalmologists Conference, Hawaii (2019).
- [12] Schneider BK, Boyer A, Ciccolini J, Barlesi F, Wang K, Benzekry S, **Mochel JP**. Optimal Scheduling of Bevacizumab and Pemetrexed/Cisplatin Dosing in Non-Small Cell Lung Cancer. American Conference of Pharmacometrics, Orlando (2019).
- [13] **Mochel JP**. Reconciling Quantitative and Clinical Sciences in VetMed 2.0. European College of Veterinary Internal Medicine Annual Conference, Milan (2019).
- [14] Ambrosini Y, Borcharding D, Atherly T, Martinez M, Jergens AE, Allenspach K, **Mochel JP**. A Novel Canine In Vitro Model for Investigation of Intestinal P-Glycoprotein-Mediated Drug Transport. European College of Veterinary Internal Medicine Annual Conference, Milan (2019).

- [15] Jergens AE, **Mochel JP**, Kilburn L, Atherly T, Bourgois-Mochel A, Borcharding D, Ambrosini Y, Allenspach K. Effect of Dietary Fat Content on Mucosal Microbiota and Serum Metabolome in Healthy Beagles. European College of Veterinary Internal Medicine Annual Conference, Milan (2019).
- [16] Glanemann B, Seo YJ, Priestnall S, Garden OA, Jergens AE, Segarra S, **Mochel JP**, Allenspach K. Clinical Efficacy of Prebiotics and Glycosaminoglycans versus Placebo In Dogs with Food Responsive Enteropathy receiving a Hydrolyzed Diet: A Pilot Study. European College of Veterinary Internal Medicine Annual Conference, Milan (2019).
- [17] Allenspach K, Jergens AE, **Mochel JP**. Use of Intestinal Organoids to Improve Predictability of Bioavailability. European College of Veterinary Internal Medicine Annual Conference, Milan (2019).
- [18] Vaghi C, Rodallec A, Fanciullino R, Ciccolini J, **Mochel JP**, Mastri M, Ebos JML, Poignard C, Benzekry S. Population modeling of tumor growth curves: the reduced Gompertz model. International Symposium on Mathematical and Computational Oncology (ISMCO), Lake Tahoe, NV (2019).
- [19] Kirner NS, **Mochel JP**, Allabugh R, Wulf L, Sebbag L. Ocular and Systemic Considerations for Topical Drug Delivery in Dogs. MAF National Veterinary Scholars Symposium, Ames (2019).
- [20] Mao S, Atherly T, Borcharding D, Ambrosini Y, Allenspach K, Seo YJ, **Mochel JP** and Jergens AE. Phenotypic and Functional Characterization of Adult Intestinal Organoids from Dogs with Inflammatory Bowel Disease. National Veterinary Scholars Symposium, Ames (2019).
- [21] Martindale A, **Mochel JP**, Hay-Kraus B, Naiman J, Seo YJ, Petrovsky B, Zellner E. Effect of Intraoperative Antibiotic Administration on Physiological Parameters in Dogs. National Veterinary Scholars Symposium, Ames (2019).
- [22] Borcharding D, Ambrosini Y, Atherly T, Phillips R, Hostetter J, Estes M, Fernandez-Zapico ME, Wang K, Martin M, Jergens AE, Allenspach K, **Mochel JP**. A Novel Canine Enteroid Model for Genome Editing of Multi-Drug Resistance Proteins and Dose-Exposure Response of Chemotherapeutic Drugs. International Society for Stem Cell Research (ISSCR), Los Angeles, CA (2019).
- [23] Nelli RK, Atherly T, Allenspach K, **Mochel JP**, Jergens AE, Gimenez-Lirola GL. Small Intestinal Enteroids on Transwells are Ideal to Study Swine Enteric Corona Viruses. International Society for Stem Cell Research (ISSCR), Los Angeles, CA (2019).
- [24] Borcharding D, Ambrosini Y, Segarra S, Glanemann B, Garden O, Atherly T, Jergens AE, **Mochel JP**, Allenspach K. Treatment with Hydrolyzed Diet Supplemented with Prebiotics and Glycosaminoglycans Improves Abnormalities in Lipid Metabolism in a Canine Model of Inflammatory Bowel Disease. Digestive Disease Week San Diego (2019).
- [25] Borcharding D, Ambrosini Y, Atherly T, Phillips R, Hostetter J, Ellinwood NM, Snella E, Estes M, Fernandez-Zapico ME, Wang K, Martin M, Jergens AE, Allenspach K, **Mochel JP**. CRISPR/CAS9-Mediated Genome Editing of Multi-Drug Resistance Proteins in a Novel Canine Enteroid Model. Digestive Disease Week San Diego (2019).
- [26] Ambrosini Y, Borcharding D, Mochel JP, Atherly T, Phillips R, Hostetter J, Ellinwood NM, Snella E, Estes M, Fernandez-Zapico ME, Wang K, Martin M, Jergens AE, **Mochel JP**, Allenspach K. Molecular Response of Canine Intestinal Organoids to Gastrointestinal Nematode Extracellular Vesicles. Digestive Disease Week San Diego (2019).

- [27] Borcharding D, Ambrosini Y, Atherly T, Phillips R, Hostetter J, Ellinwood NM, Snella E, Estes M, Fernandez-Zapico ME, Wang K, Martin M, Jergens AE, Allenspach K, **Mochel JP**. A Novel Canine Intestinal Organoid Model to Characterize Dose-Exposure-Response of Chemotherapeutic Drugs. Digestive Disease Week San Diego (2019).
- [28] Borcharding D, **Mochel JP**, Ambrosini Y, Atherly T, Phillips R, Hostetter J, Ellinwood NM, Snella E, Estes M, Fernandez-Zapico ME, Wang K, Martin M, Jergens AE, Allenspach K. High-Fat Ketogenic Diet Decreases Serum Lipid Metabolites in Healthy Dogs. Digestive Disease Week San Diego (2019).
- [29] Tinklenberg RL, Murphy SD, **Mochel JP**, Seo YJ, Mahaffey AL, Yan Y, Ward JL. Dose-Response Effects of Oral Short-Term Prednisone Therapy on Clinicopathologic and Hemodynamic Variables in Healthy Dogs. ACVIM Forum, Phoenix, AZ (2019).
- [30] Musser M, Mahaffey AL, Fath M, Buettner G, Brett W, Schneider B, Seo YJ, **Mochel JP**, Johannes CM. In vitro Cytotoxicity and Pharmacokinetic Evaluation of Pharmacological Ascorbate in Dogs. ACVIM Forum, Phoenix, AZ (2019).
- [31] Musser M, Mahaffey AL, Fath M, Buettner G, Brett W, Schneider B, Seo YJ, **Mochel JP**, Johannes CM. In vitro Cytotoxicity and Pharmacokinetic Evaluation of Pharmacological Ascorbate in Dogs. ESVONC, Frankfurt (2019).
- [32] Glanemann B, Seo YJ, Priestnall SL, Garden OA, Jergens AE, Segarra-Lopez S, **Mochel JP**, Allenspach K. Clinical Efficacy of Hydrolyzed Diet With Supplemental Prebiotics and Glycosaminoglycans *versus* Placebo In Canine Food Responsive Enteropathy: A Pilot Study. ACVIM Forum, Phoenix, AZ (2019).
- [33] Ambrosini YM, Borcharding D, Atherly T, Essner J, Wierson W, Kim HY, Jergens AE, **Mochel JP\***, Allenspach K\*. A Novel Canine-Specific Model System to Study P-Glycoprotein-Mediated Drug Transport. \*: co-corresponding author. ACVIM Forum, Phoenix, AZ (2019).
- [34] Kathrani A, Lezcano V, Hall EJ, Jergens AE, **Mochel JP**, Atherly T, Allenspach K. Indoleamine-Pyrrole 2,3-Dioxygenase-1 (IDO-1) mRNA is Over-Expressed in the Duodenal Mucosa and is Negatively Correlated with Serum Tryptophan Concentrations in Dogs with Protein-Losing Enteropathy. ACVIM Forum, Phoenix, AZ (2019).
- [35] Kathrani A, Lezcano V, Hall EJ, Jergens AE, Seo YJ, **Mochel JP**, Atherly T, Allenspach K. IL-13 and IL-33 mRNA are Under-Expressed in the Duodenal Mucosa of German Shepherd Dogs with Inflammatory Bowel Disease. ACVIM Forum, Phoenix, AZ (2019).
- [36] Heinrich E, Walton R, Blong A, LeVine D, Seo YJ, **Mochel JP**, Allenspach K. Comparison of a Novel Continuous Insulin Protocol to Standard of Care Treatment for Diabetic Ketoacidosis. ACVIM Forum, Phoenix, AZ (2019).
- [37] Schneider BK, Boyer A, Ciccolini J, Barlesi F, Wang K, Benzekry S, **Mochel JP**. Simulation-based Optimization of Bevacizumab-Pemetrexed/Cisplatin Combination Therapy in Non-Small Cell Lung Cancer. Population Approach Group in Europe (PAGE) Meeting, Stockholm (2019).
- [38] Seo YJ, Kanthasamy AG, Allenspach K, de Lange ECM, **Mochel JP**. Physiologically-Based Pharmacokinetic (PBPK) Model for the Prediction of Levodopa (L-dopa) Disposition in Plasma and Various Brain Compartments Across Species. Population Approach Group in Europe (PAGE) Meeting, Stockholm (2019).



- [39] Lerch M, Allbaugh R, Sebbag L, **Mochel JP**, Weller P, Borts DJ. Paper Spray High – Resolution Accurate Mass Spectrometry for Quantitation of Voriconazole in Equine Tears and Plasma. American Society for Mass Spectrometry Conference, Atlanta (2019).
- [40] Allenspach K, Atherly T, Borcharding D, Ambrosini Y, Jergens AE, Kilburn L, Bourgois-Mochel A, Rossoni-Serrao M, **Mochel JP**. High fat diet increases stemness of intestinal epithelial cells and induces dysbiosis of the mucosal-adherent microbiome in dogs. International Congress of Mucosal Immunology, Brisbane (2019).
- [41] **Mochel JP**. Translational Pharmacology: Paradigm Shift or Flash in the Pan? AAPS PharmSci 360 Conference, Washington (2018).
- [42] **Mochel JP**, Jergens AE, Borcharding D, Ambrosini Y, Fernandez-Zapico M, Kim HY, Allenspach K. Canine Organoids for Drug Testing: Moving Beyond Caco-2 Cell Systems. US Pharmacopeia Workshop on Drug Absorption, Rockville (2018).
- [43] Smith JS, **Mochel JP**. Treatment of Cerebrospinal Nematodiasis in Boer Goats Utilizing a Camelid Therapy Protocol. Neurosciences Research Day, Ames (2018).
- [44] Sebbag L, Showman L, McDowell E, Perera A, **Mochel JP**. Impact of Tear flow, Collection Devices and Extraction Methods on Tear Concentrations Following Oral Administration of Doxycycline in Dogs and Cats. Annual Meeting of the American College of Veterinary Ophthalmologists, Minneapolis (2018).
- [45] Sebbag L, Allbaugh RA, Wehrman RF, Uhl L, Chen T, Seo YJ, **Mochel JP**. Fluorophotometric Assessment of Tear Volume and Turnover Rate in Healthy Brachycephalic and Non-Brachycephalic Dogs and Cats. Annual Meeting of the American College of Veterinary Ophthalmologists, Minneapolis (2018).
- [46] Sebbag L, Weaver A, Allbaugh RA, Seo JY, Vogel J, **Mochel JP**. A Novel In Vivo Model of Conjunctivitis in Dogs. Annual Meeting of the American College of Veterinary Ophthalmologists, Minneapolis (2018).
- [47] Uhl L, Saito A, Iwashita H, Maggs DJ, **Mochel JP**, Sebbag L. Feline Dry Eye Syndrome: Ten Cases (2006- 2018). Annual Meeting of the American College of Veterinary Ophthalmologists, Minneapolis (2018).
- [48] Uhl L, **Mochel JP**, Hayes B, Olds J, Schneider B, Sebbag L. Is Schirmer Tear Test-1 Reliable in the General Feline Population? Annual Meeting of the American College of Veterinary Ophthalmologists, Minneapolis (2018).
- [49] Allbaugh RA, Sebbag L, Strong T, Lerch M, **Mochel JP**, Borts DJ. Evaluation of Voriconazole Concentrations in Equine Tears Following Subconjunctival Injection of Concentrated Antifungal Combined with Thermosensitive Poloxamer Gel. International Equine Ophthalmology Consortium, Reykjavik (2018).
- [50] Lerch M, Allbaugh RA, Sebbag L, **Mochel JP**, Borts D. Paper Spray High-Resolution Accurate Mass Spectrometry for Quantitation of Voriconazole in Equine Tears and Plasma. American Society for Mass Spectrometry Conference, San Diego (2018).
- [51] Sebbag L, McDowell EM, Hepner PM, **Mochel JP**. Effect of Tear Collection on Lacrimal Total Protein Content in Dogs and Cats. Annual meeting of the European College of Veterinary Ophthalmologists, Florence (2018).

[52] **Mochel JP**, Jergens AE, Chandra L, Kingsbury D, Atherly T, Mochel A, Fernandez-Zapico M, Wang K, Kim HJ, Allenspach K. Canine Organoids for Drug Efficacy and Safety Testing: An Innovative Preclinical Model For Drug Development. International Congress of the European Association of Veterinary Pharmacology and Toxicology, Wroclaw (2018).

[53] Smith JS, Borts D, Coetzee JF, Ayrat G, **Mochel JP**. Pharmacokinetic Modeling of Fentanyl Citrate and Norfentanyl in Holstein Calves Using a Nonlinear Mixed-Effects Approach. International Congress of the European Association of Veterinary Pharmacology and Toxicology, Wroclaw (2018).

[54] Sebbag L, Showman L, McDowell E, Perera A, **Mochel JP**. A Comparison of Schirmer Strips and Ophthalmic Sponges for Quantifying Doxycycline in Tear Fluid of Dogs and Cats Following Oral Drug Administration. International Congress of the European Association of Veterinary Pharmacology and Toxicology, Wroclaw (2018).

[55] Schneider B, Wang K, Fernandez-Zapico M, Benzekry S, **Mochel JP**. Measurement Error Modeling of Tumor Volume in a Xenograft Mouse Model of Non-Small Cell Lung Cancer. International Congress of the European Association of Veterinary Pharmacology and Toxicology, Wroclaw (2018).

[56] **Mochel JP**, Jergens AE, Troconiz I, Balbas V, Benzekry S, Wang K, Fernandez-Zapico M, Allenspach K. Reverse Translational Pharmacology: Paradigm Shift or Flash in the Pan? International Congress of the European Association of Veterinary Pharmacology and Toxicology, Wroclaw (2018).

[57] Smith JS, Slagel C, Borts D, Ferran A, Bousquet-Melou A, Plummer P, **Mochel JP**. Pharmacodynamics of Ertapenem with and without concurrent use of an Immunostimulant Using an Induced Cystitis Model in Sheep. International Congress of the European Association of Veterinary Pharmacology and Toxicology, Wroclaw (2018).

[58] Smith JS, **Mochel JP**, Borts D, Griffith R. Pharmacokinetics of Tulathromycin in Healthy Goats and Goats with Induced *Pasteurella Multocida* Pneumonia. International Congress of the European Association of Veterinary Pharmacology and Toxicology, Wroclaw (2018).

[59] Atherly T, Allenspach K, **Mochel JP**, Jergens AE. Glucocorticoid Effects on Microbial Community Structure in Canine Inflammatory Bowel Disease. European College of Veterinary Internal Medicine Congress, Rotterdam (2018).

[60] Allenspach K, **Mochel JP**, Chandra L, Atherly T, Philips R, Hostetter J, Ellinwood NM, Snella L, Estes M, Fernandez-Zapico M, Wang K, Martin M, Jergens AE. Expression of Prostaglandin EP4 Receptor in Canine Jejunum and Enteroids Derived from Healthy Dogs. European College of Veterinary Internal Medicine Congress, Rotterdam (2018).

[61] Kingsbury D, **Mochel JP**, Atherly T, Chandra L, Philips R, Hostetter J, Wannemuehler M, Jergens AE, Allenspach K. Comparison of Endoscopically (Egd/Colo) Procured Enteroids and Colonoids from Normal Dogs and Dogs with Naturally Occurring Chronic Enteropathies (IBD). Digestive Disease Week (DDW), Washington (2018).

[62] Allenspach K, **Mochel JP**, Kingsbury D, Chandra L, Atherly T, Philips R, Hostetter J, Qi J, Wang Q, Wannemuehler M, Ellinwood NM, Snella L, Estes M, Martin M, Jergens AE. Functional Characterization of Enteroids/Colonoids From Endoscopically Obtained Biopsies in Healthy and Diseased Dogs. Forum of the American College of Veterinary Internal Medicine, Seattle (2018).

[63] Allenspach K, **Mochel JP**, Kingsbury D, Chandra L, Atherly T, Bourgois-Mochel A, Borcharding D, Yuan W, Kimber M, Philips R, Hostetter J, Wannemuehler M, Ellinwood NM,

Snella L, Jergens AE. Characterization of Paneth-like Cells in the Canine Small Intestine. Forum of the American College of Veterinary Internal Medicine, Seattle (2018).

[64] Smith JS, **Mochel JP**, Schneider B, Borts D, Griffith RW. Pharmacokinetics of Tulathromycin in Goats with Experimentally-Induced Respiratory Disease. Forum of the American College of Veterinary Internal Medicine, Seattle (2018).

[65] Van Vertloo L, Guard B, Allenspach K, **Mochel JP**, Park SY, Chandra L, Jergens AE, Suchodolski J. Microbiota-Related Changes in Fecal Bile Acid Metabolism Are Associated With Diabetes Mellitus in Dogs. Forum of the American College of Veterinary Internal Medicine, Seattle (2018).

[66] Khelik I, Berger DJ, **Mochel JP**, Palerme JS, Ware W, Ward JL. Clinicopathologic, Hemodynamic, and Echocardiographic Effects of Anti-Inflammatory Glucocorticoids in Systemically Healthy Cats. Forum of the American College of Veterinary Internal Medicine, Seattle (2018).

[67] Schneider B, Boyer A, Ciccolini J, Wang K, Zapico-Fernandez M, Benzekry S, **Mochel JP**. Modeling Primary Tumor Growth in Xenograft Mouse Model of Non-Small Cell Lung Cancer Treated With Pemetrexed-Cisplatin and Bevacizumab. Population Approach Group in Europe (PAGE) Meeting, Montreux (2018).

[68] Yan Y, **Mochel JP**, Allbauch R, Wulf L, Borts DJ, Sebbag L. Tear Fluid Pharmacokinetics Following Oral Prednisone. ISU College of Veterinary Medicine Summer Symposium, Ames (2018).

[69] Lezcano V, Jergens AE, Atherly T, Chandra L, Borcharding D, Seo YJ, **Mochel JP**, Kanthrani A, Allenspach K. mRNA Expression of Th2 Cytokines Differs in Duodenal Mucosa of Healthy and Diseased Dogs. ISU College of Veterinary Medicine Summer Symposium, Ames (2018).

[70] Lerch M, Allbauch R, Sebbag L, **Mochel JP**, Borts DJ. Quantitation of Voriconazole in Equine Tears and Plasma via Paper Spray High-Resolution Accurate Mass Spectrometry. ISU College of Veterinary Medicine Winter Symposium, Ames (2018).

[71] Allenspach K, Chandra L, **Mochel JP**, Jergens A. Targeting IL-1beta; Translational Inflammatory Bowel Disease Research. ISU College of Veterinary Medicine Winter Symposium, Ames (2018).

[72] Kingsbury D, Sun L, Qi Y, Fredericks J, Wang Q, Wannemuehler M, **Mochel J**, Jergens A, Allenspach K. Optimizing the Development and Characterization of Canine Small Intestinal Crypt Enteroids as a Research Model. International Society for Stem Cell Research Annual Meeting, Boston (2017).

[73] Kingsbury D, Sun L, Qi Y, Fredericks J, Wang Q, Wannemuehler M, **Mochel J**, Jergens A, Allenspach K. Optimizing the Development and Characterization of Canine Small Intestine Crypt Enteroids as a Research Model. International Congress of Mucosal Immunology, Washington (2017).

[74] Balbas-Martinez V, Allenspach K, Kingsbury D, Jergens AE, Troconiz I, **Mochel JP**. One Health: Translational and Reverse Translational Modeling of Inflammatory Bowel Disease using an advanced Boolean Network. Population Approach Group in Europe (PAGE) Meeting, Budapest (2017).

[75] Smith JS, **Mochel JP**, Borts D, Haymond K, Schleining J, Coetzee JF. Pharmacokinetics of Fentanyl and Fentanyl Transdermal Patches in healthy and hospitalized Calves. American

College of Veterinary Internal Medicine Forum, Washington (2017).

[76] **Mochel JP**. Modeling and Simulation: Shifting Gears to Accelerate Understanding of Variability in Animal and Translational Health. American Association of Veterinary Pharmacology and Therapeutics Biennial, Washington (2017).

[77] Kingsbury D, Fredericks J, Qi Y, Wang Q, Wannemuehler M, **Mochel J**, Jergens A, Allenspach K. Watch It Grow. The Original Dog Mini-Gut. ISU College of Veterinary Medicine Winter Symposium, Ames (2017).

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- [99] Fink M, **Mochel J**, Gabrielsson J, Gehring R, Laffont C, Pelligand L, Steimer JL, Toutain PL, Whittam T, Riviere J. Animal Health Modeling & Simulation Society (AHM&S): A New society Promoting Model-Based Approaches for a Better Integration and Understanding of Quantitative Pharmacology in Veterinary Sciences. Population Approach Group in Europe (PAGE) Meeting, Glasgow (2013).
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## **F. Scholarly Teaching**

### **Courses Content and Contribution**

#### **BMS 439/539: *Principles of Pharmacology***

I currently teach 13 lectures in our one-year Biomedical Sciences (Pharmacology and Toxicology) BS (439) and MS (539) program. The broad goals of this course are to give students a knowledge base of the main properties, mechanisms of actions and logical uses of the therapeutic compounds that are for treating diseases and conditions of humans and animals. My specific contribution to this course includes teaching of the following: (1) Drug Metabolism Pharmacokinetics, (2) Basic Autonomic Anatomy and Physiology of the Autonomic Nervous System, (3) Chemical Mediators of the Autonomic Nervous System, (4) Cholinergic Transmission, (5) Noradrenergic Transmission, (6) 5-HT and Pharmacology of Migraines and Purines, (7) Local Hormones: Cytokines, Biologically Active Lipids and Peptides, (8) Peptides and Nitric Oxide, (9) Control of Blood Glucose and Diabetes Mellitus, (10) Obesity, (11) Pituitary and Adrenal Cortex, (12) Drug Discovery and Development, and (13) Biopharmaceuticals.

#### **BMS 502: *Methods in Biomedical Sciences***

The objective of this graduate course (1-year MS) is to familiarize students with many of the important methodologies used in modern biomedical research. These include common techniques used in molecular biology, virology, bacteriology, cell biology, immunology, genome science, structural biology, pharmacology, histopathology, behavioral biology, physiology and quantitative pharmacology. I currently teach two laboratory classes in that course covering the basics of pharmacokinetics and applications in pharmaceutical science, with a special focus on the calculation of a therapeutic dose and extrapolation of dosing regimens between animal species.

#### **BMS 354: *General Pharmacology***

The objective of this professional course (VM3) is to provide veterinary students with a basic understanding of clinical pharmacology. I currently teach 2 lectures in that course covering the basics of pharmacokinetics for drug dose calculation in veterinary species.

#### **VDPAM 560: *Ecology of Infectious Diseases***

The overall goal of this class (graduate level, Ph.D) is to provide students with a broad applied knowledge on the ecology of infectious diseases. Specific objectives include understanding dynamics of pathogen transmission within and between animal populations, approaches to reduce risk of pathogen introduction, and scientific methods for the early detection of pathogens. My contribution to this course involves mathematical methods used to optimize dosing strategies in the context of population medicine. This includes: identification of population characteristics (i.e. covariates) that impact drug disposition kinetics, and therapeutic strategies to minimize antimicrobial resistance development in food-producing animals.

#### **VDPAM 654: *Comparative Antimicrobial Clinical Pharmacology***

VDPAM 654 is a graduate course (Ph.D level) that provides advanced training in the mechanisms of action for antimicrobials, understanding the underlying pharmacokinetics (PK) and pharmacodynamics (PD) of antimicrobial selection, and regulatory issues associated with antimicrobial use in veterinary medicine. I currently teach 2 lectures (4 hours total) in that class, with a special focus on applications of nonlinear mixed-effects for characterizing antimicrobial disposition kinetics and effects in livestock. Another component of my teaching pertains to the

use of PK/PD modeling approach to mitigate antimicrobial resistance and the role of generics in resistance development.

### TOX 689: Toxicology Interdepartmental Program

TOX 689 is an interdepartmental Toxicology program (graduate level, Ph.D) organized as a seminar series for Ph.D students. I typically teach a couple of lectures covering the use of mathematics to characterize the safety of therapeutic drugs in preclinical research in that class.

### ISU Preparing Future Faculty (PFF): Coming Back to American Academe: Returning from Industry

The PFF program is scheduled as a 2-hour lab course focusing on the importance of building collaboration between academia in industry. Iowa State University's PFF program was founded to help better prepare graduate students (Ph.D ) and Postdoctoral RA to become the future teachers, researchers, and citizens of the academic community. About 70 ISU Ph.D candidates and Postdoctoral fellows are enrolled in the class, representing a wide variety of disciplines from all over Iowa State University. I have been teaching class for the last two years (2018, 2019) in collaboration with Dr. Holly Bender (CELT) and Clark Coffman (GDCB).

### Evidence of Didactic Teaching Effectiveness

My formal involvement in the teaching curriculum started in the Spring of 2018. While waiting on my first student reviews and in agreement with the instructor-in-charge of the BMS 439/539 class, I had organized a survey to evaluate the quality of my teaching and areas of improvements for the following years. The survey included the following measures of assessment, with scores ranging from 0 (Poor/Strongly Disagree) to 4 (Excellent/Strongly Agree): (1) The instructor stimulated my interest in the subject; (2) The instructor managed classroom time and pace well; (3) The instructor was organized and prepared for every class; (4) The instructor encouraged discussions and responded to questions; (5) The instructor demonstrated in-depth knowledge of the subject; (6) The instructor appeared enthusiastic and interested; (7) The instructor used a variety of instructional methods to reach the courses objectives; (8) The instructor was clear on the key learnings from each lecture; (9) Overall, how do you rate your experience in this course; (10) Take-home messages were useful. My average score from that survey was **3.90/4** (4 being the maximum allowable score), with min-max range [**3.73-4.00**]. In addition, **100%** of the surveyed students considered my class a worthwhile investment in their future, and **100%** of the students would recommend this course. A detailed summary of my individual score can be found in **Appendix 6**. Besides this first survey, I have collected student feedback for the two years I have been teaching at Iowa State (2018-2019) with the help of the Office of Academic and Student Affairs. Student evaluations have been important to the way I have developed an improved my teaching materials. I have received excellent student evaluations for the past two years. Further examination of these student evaluations allows me to define my contributions and achievements in teaching. The numbers compiled below are aggregate measures from the various classes I have taught in 2018-2020. Student evaluations are presented on a scale of 1 (Poor) to 5 (Excellent).

	Organization/ Presentation	Quality of Instruction Materials	Stimulation of Student's Interest	Communication Skills	Interest in Helping Students Learn	Accessibility	Overall Assessment
2018-19	4.75	4.69	4.61	4.71	4.74	4.69	4.73
2019-20	4.66	4.73	4.70	4.67	4.66	4.35	4.70

Feedback I received from students demonstrate that my teaching materials are well-organized and prepared (few examples below):

*“Very organized lectures, well thought out and well presented”*

*“Very clear on what we were expected to learn, open to questions, willing to help students, made lecture truly enjoyable. He was an absolute pleasure to have as a professor!”*

*“Take home messages are so helpful. I actually learned and remember the important things we talked about in class. To me this is the best thing a class could give me because actually learning the material is what we are here for, not necessarily the grade we receive.”*

*“By far the best professor for this class- makes learning the material super easy and really informs us what we should know and focus on. The layout of his slides is perfect - not too much information, not too little.”*

*“Slides were very clear in terms of information, and highlighting important concepts. I really enjoyed your style of lecture, especially how you reinforced key topics.”*

Comments from students also emphasized that I am an enthusiastic and engaging teacher:

*“Wonderful professor! Very caring! He is clear about what the important message is with every lecture. Reviews the previous lecture at the end of the current lecture. Very knowledgeable.”*

*“Dr. Mochel is a great professor and cares about the students' success.”*

*“He was probably my favorite professor - he was very enthusiastic and engaging. I find his teaching method to be the best of the professors that taught this course.”*

*“Dr. Mochel is by far one of the best instructors I have ever had in my educational career. He had so much passion and was able to convey incredibly dense material in an exciting and concise manner.”*

### **Comparative Students Review**

Student evaluations indicate I am a good instructor relative to my peers in the Department and the College. Comparison of my teaching evaluations with those of the Department of Biomedical Sciences and throughout the College of Veterinary Medicine as a whole, indicates I perform significantly better than my peers in teaching. For example, for the Spring Semester 2018, my evaluation for Overall Assessment of Instructor was 4.70, whereas the departmental average for the same evaluation was 4.25 and that of the College as a whole was 4.23. Likewise, my evaluation for Quality of Instruction Materials was 4.73, while the departmental and College average was of 4.15 and 4.19, respectively. A detailed comparison of my teaching scores vs. those of my peers in Biomedical Sciences for each individual course can be found in **Appendix 6**. These data were provided by the Office of Academic and Student Affairs for BMS 439, BMS 539 and BMS 502. No data was available for the other courses.

	Organization/ Presentation	Quality of Instruction Materials	Stimulation of Student's Interest	Communication Skills	Interest in Helping Students Learn	Accessibility	Overall Assessment
<b>2018-19</b>							
JPM	4.75	4.69	4.61	4.71	4.74	4.69	4.73
BMS	4.29	4.18	4.12	4.15	4.39	4.32	4.25
CVM	4.31	4.23	4.19	4.25	4.41	4.32	4.30
<b>2019-20</b>							
JPM	4.66	4.73	4.70	4.67	4.66	4.35	4.70
BMS	4.27	4.15	4.08	4.13	4.25	4.18	4.23
CVM	4.29	4.19	4.12	4.17	4.29	4.22	4.25



## **G. Mentoring**

### **Post-Doctoral Fellows and Scientists**

Yeonjung Seo, Ph.D (Mathematics), Ph.D (Statistics)  
Dana Borcharding, Ph.D  
Yoko Ambrosini, DVM, Ph.D, DACVIM  
Lawrance Chandra, DVM, Ph.D, DACLA  
Dawn Kingsbury, DVM, Ph.D, DACVIM  
Todd Atherly, MS

### **Residents (Clinical Pharmacology)**

Joseph Smith, DVM, MPH, DACVIM, Ph.D  
Patrick Gorden, DVM, DABVP

### **Ph.D Graduate Students**

Lionel Sebbag\*, DVM, DACVO (Major Professor)  
Joseph Smith\*, DVM, MPH, DACVIM (Major Professor)  
Benjamin Schneider, MS (Major Professor)  
Heather Kittrell, DVM (Committee Member)  
Bharathi Niveditha, MS (Committee Member)  
Ashenafi Beyi, DVM (Committee Member)  
Rochelle Warner, DVM (Committee Member)  
Kristen Hayman, DVM (Committee Member)  
Meghan Gage, MS (Committee Member)  
Chelsea Lennarella-Servantez, DVM Candidate (Committee Member)  
Vojtech Gabriel, DVM (Committee Member)  
Sarah Minkler, MS (Committee Member)  
Ahmed Abdalla, DVM (Committee Member)  
Brittany Larsen, MS (Committee Member)

Jianzhong Wang, DVM (Rotating Student)  
Lingnan Yuan (Research Assistant)  
Yingzhou Du (Research Assistant)

- \* Smith (2017): Lora and Russ Talbot Graduate Award
- \* Smith (2018): ISU College of Veterinary Medicine Graduate Student of the Year
- \* Sebbag (2019): Lora and Russ Talbot Graduate Award
- \* Sebbag (2019): ISU Biomedical Science Research Excellence Award

### **MS Graduate Students**

Grace Matangira, Biomedical Sciences (Major Professor)  
Oanh Nguyen, Biomedical Sciences (Major Professor)  
Erin Goar, Biomedical Sciences (Major Professor)  
Samantha Thomson, Biomedical Sciences (Major Professor)  
Michael Knouse, Biomedical Sciences (Major Professor)  
Sarah Higgins, Biomedical Sciences (Major Professor)

Fatiha Iqbal, Biomedical Sciences (Major Professor)  
Kendra Myers, Biomedical Sciences (Major Professor)  
Kimberly Dao, Biomedical Sciences (Major Professor)  
Megan Bonnett, Biomedical Sciences (Major Professor)  
Nicole Hasstedt, Biomedical Sciences (Major Professor)  
Jordan Neyens, Biomedical Sciences (Major Professor)  
Hannah Gustafson, Biomedical Sciences (Major Professor)  
Joshua Dunigan, Biomedical Sciences (Major Professor)  
Austin Parris, Biomedical Sciences (Major Professor)  
Jessica Heinen, Biomedical Sciences (Major Professor)  
Charlotte Halley, Biomedical Sciences (Major Professor)  
Alexandria Reed, Biomedical Sciences (Major Professor)  
Zoe Lambert, Biomedical Sciences (Major Professor)  
Jesslyn Hendrickson, Biomedical Sciences (Committee Member)  
Hunter White, Biomedical Sciences (Committee Member)  
Alex McMullen, Biomedical Sciences (Committee Member)  
Kaysha Rodriguez-Avila, Biomedical Sciences (Committee Member)  
Alejandro Tarabillo, Biomedical Sciences (Committee Member)  
Miriam Reed, Biomedical Sciences (Committee Member)  
Paige Slifer, Biomedical Sciences (Committee Member)  
Savanna Bergeron (Committee Member)  
Lucien Bahinga (Committee Member)  
Chou Yen-Yu, Veterinary Clinical Sciences (Committee Member)  
Jeff Olivarez (Co-Major Professor)  
Adam Copeland (Co-Major Professor)

**Undergraduate Students**

Laura Kurr (Honors Project)

## **H. Institutional Service – Professional Activities**

### **International Activities**

2017 – President, Animal Health Modeling and Simulation Society (AHM&S)  
2017 – Fellow, American Academy of Veterinary Pharmacology and Therapeutics (AAVPT)  
2017 – Councilor, American Academy of Veterinary Pharmacology and Therapeutics  
2017 – Member, International Society of Pharmacometrics (ISOP)  
2017 – Member, American Association of Pharmaceutical Scientists (AAPS)  
2017 – Member, American Gastroenterology Association (AGA)  
2017 – Member, Comparative Gastroenterology Society (CGS)  
2017 – Board Member, European Federation for Pharmaceutical Sciences (EUFEPS)  
2018 – Vice-President, European Association of Veterinary Pharmacology and Toxicology (EAVPT)  
2018 – Committee Chair, European College of Veterinary Pharmacology and Toxicology (ECVPT)  
2019 – Board Member, Veterinary Renin-Angiotensin-Aldosterone System Interest Group (V-RIG)  
2020 – Reviewer, CNRS/INSERM Study Section, ATIP-Avenir Program

### **National**

2017 – Reviewer, NIH Study Section, Early Career Reviewer (ECR) Program  
2018 – Member, CLSI Subcommittee on Veterinary Antimicrobial Susceptibility Testing (VAST)  
2018 – Thrust Leader, National Institute of Antimicrobial Resistance and Education (NIAMRE)  
2020 – Reviewer, NSF Study Section, Physiological Mechanisms and Biomechanics Program

### **Editorial Board/Reviewer/Grant Reviewer**

2017 – Section Editor, Frontiers  
2017 – Reviewer, Journal of Veterinary Pharmacology and Toxicology  
2017 – Reviewer, American Journal of Veterinary Research  
2017 – Reviewer, BMC Veterinary Research  
2017 – Reviewer, BSP Pharmaceutical Sciences  
2018 – Reviewer, Biomaterials Science  
2018 – Reviewer, Journal of Veterinary Internal Medicine  
2018 – Reviewer, Journal of Pharmacokinetics and Pharmacodynamics  
2019 – Editorial Board Member, Current Drug Metabolism  
2019 – Reviewer, Pharmaceutics  
2019 – Reviewer, British Journal of Clinical Pharmacology  
2019 – Reviewer, Translational Neurodegeneration

### **Professional Societies: Offices/Committees/Memberships/Panels**

Animal Health Modeling and Simulation Society, President  
American Academy of Vet. Pharmacology and Therapeutics, Fellow  
American Academy of Vet. Pharmacology and Therapeutics, Councilor  
International Society of Pharmacometrics, Member  
American Association of Pharmaceutical Scientists, Member

American Gastroenterology Association, Member  
Comparative Gastroenterology Association, Member  
CLSI's Subcommittee on Veterinary Antimicrobial Susceptibility Testing (VAST), Member  
European College of Veterinary Pharmacology and Toxicology, Diplomate  
European Association for Veterinary Pharmacology and Toxicology, Vice-President  
European Federation for Pharmaceutical Sciences, Board Member  
NIH Study Section, Early Career Reviewer (ECR) Program, Reviewer  
NSF Study Section, Physiological Mechanisms and Biomechanics Program, Reviewer  
CNRS/INSERM Study Section, ATIP-Avenir Program, Reviewer  
Translational RAAS Research Interest Group, Co-Founder

### **College Committees**

Admission Committee, Iowa State University College of Veterinary Medicine  
Graduate Research and Education Committee, Iowa State University College of Veterinary Medicine (Biomedical Sciences)  
Oversight Committee for Conflicts of Interest in Research, Iowa State University  
Search Committee (Gastroenterology), Biomedical Sciences, Iowa State University  
Search Committee (Analytical Chemistry), Veterinary Diagnostic, Iowa State University

### **Consulting Activities**

Ethos Animal Health  
CEVA Sante Animale  
LifEngine Animal Health Labs

### **Equity Owner**

3D Health Solutions (Founder and COO)  
LifEngine Animal Health Labs (Co-Founder and Consultant)