

CURRICULUM VITAE

Craig Wilson Woods DVM, MS, MBA
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Focus and Expertise

Business Development & Management

- Strategic partnerships and collaborative research
- Technology licensing and contract negotiations
- Due diligence, financial and market analysis
- Start-up logistics, operations & commercialization

Clinical and Translational Research / Regulations

- Human PII-PIV clinical trials and study management
- Veterinary clinical trials and translational research
- Regulations of drugs, devices and diagnostics
- Research compliance (GCP, HIPAA, IRB, IACUC, etc.)

Education, Training and Licenses

1987-1991	B.S. (Biology)	University of Missouri, Columbia, Missouri
1991-1995	M.S. (Veterinary Anatomy)	University of Missouri, Columbia, Missouri
1991-1995	D.V.M. (Veterinary Medicine)	University of Missouri, Columbia, Missouri
2001-2003	M.B.A. (Business/Logistics)	Arizona State University, Tempe, Arizona
1989-1990	Howard Hughes Research Fellowship	University of Missouri, Columbia, Missouri
1991-1992	Veterinary Biomedical Fellowship	University of Missouri, Columbia, Missouri
1995 –	Veterinary Medical License	State of Arizona

Professional Appointments

- 2021 – present Arizona State University – Complex Adaptive Systems; Skysong Center (Scottsdale, AZ)
Director – Infectious Disease and Biosecurity Projects – The Institute for Future Health
Current responsibilities focus on forming large scale, multi-institutional collaborations in the areas of infectious diseases & biosecurity and establishing leveraging the resources and expertise of Arizona's public universities (ASU, UArizona, NAU) with external partners (hospital systems, industry, etc.).
- 2015 – 2021 Midwestern University (Glendale, AZ and Downers Grove, IL)
Director – Institute for Healthcare Innovation
Directed Institute's clinical research operations and strategic growth initiatives across two campuses. Supervised human (PII-PIV) and veterinary (pilot-pivotal) clinical trials at University clinics and external hospitals. Responsibilities included managing pharmaceutical sponsor and hospital relations, negotiating clinical research agreements and budgets, ensuring regulatory & research compliance, department operations and implementing coursework/training in clinical research and toxicology.
Director – Clinical and Translational Research Institute (joint-appointment): Held interim appointment as Director of Clinical and Translational Research for the Abrazo Healthcare system in Arizona.
- 2013-2015 Vetoquinol SA (Paris, France and Ft. Worth, TX)
Manager – Business Development (Americas)
Managed the North and South American pharmaceutical business development activities including the identification of new technologies, drugs, biologics and devices in the areas of veterinary infectious disease and inflammation. Responsible for leading licensing negotiations; and coordinating cross-functional due diligence among research, regulatory, financial, legal, & manufacturing departments; and maintaining existing business relationships with collaborative pharmaceutical companies.
- 2009-2013 BioVeteria Life Sciences, LLC (Prescott, AZ & Mexico City, Mexico)
US General Manager and Regulatory Official
Established and managed US pharmaceutical operations for Latin American pharmaceutical company to develop antivenoms for veterinary medicine. Served as the US Regulatory Official for regulatory submissions, import permits, outlines of production, risk analysis, quality assurance, and pivotal safety and effectiveness studies. Supervised R&D programs, contracts and strategic alliances, facilities and operations, human resources, and all matters concerning US operations.

- 2006 Vet-Stem, Inc. (Poway, CA)
Vice President - Marketing
Developed commercialization strategies for adipose derived mesenchymal stem cell technology.
Managed multi-site orthopedic trials and key opinion leader (KOL) relationships.
- 2002-2006 Farnam Companies, Inc.
Vice President of Business Development
Directed the global animal health business development and licensing efforts for pharmaceuticals and insecticides. Managed cross functional interaction among marketing, sales, and R&D for commercialization of new products, and served on divestment team for company's acquisition.
- 1998-2002 **Director – Technical Services**
Managed technical services, pharmacovigilance and research efforts for various veterinary pharmaceuticals, medical devices, medicated feeds, supplements and insecticides.
- 1995-1998 Briarcrest Animal Hospital (Tucson, AZ) and Fountain Hills Animal Hospital (Fountain Hills, AZ)
Associate Veterinary Clinician

Company / Start-up Formation

- 2007-present Woods Consulting, LLC (Scottsdale, AZ)
Owner – Pharmaceutical and Biomedical Consulting
Owner of a consulting company providing business development, technology licensing, development planning, regulatory affairs, R&D strategy, financial modeling, market research and strategic commercialization services for pharmaceutical, medical device, and diagnostic companies. Consulting activities also include USDA-CVB and FDA-CVM submissions, clinical protocol development, and clinical study design and management.
- 2011-2018 Walker Defense Research, LLC (Mesa, AZ)
Managing Partner (owner)
Co-founded company that developed and commercialized patented small arms technology (Nero® Hybrid Muzzle Brake and Compensator). Divested ownership in 2018.
- 2004-2019 Imulan BioTherapeutics, LLC (Scottsdale, AZ)
Managing Partner (owner)
Co-founded pharmaceutical company to develop and commercialize T-cell receptor peptide and salivary derived small peptide immune modulating therapeutics. Company partnered with T-Cyte Therapeutics, Inc. to commercialize the first biological treatment for Feline Leukemia and Immunodeficiency Viruses.
- 2007-2010 TR BioSurgical, LLC (Prescott, AZ)
Managing Partner (owner)
Co-founded medical device company which licensed, further developed and commercialized an embryonic-like acellular bioscaffold (TR Matrix) for various applications in companion animal surgery, orthopedics and soft tissue repair. Company developed, evaluated and commercialized novel subscleral glaucoma implant (TR ClarifEYE) which set the basis for human medical device development of the STARflo™ implant.

Chair, Advisory and Board Appointments

- 2022 Co-Organizer – Southwest Biosecurity Conference; Arizona State University
2022 Organizing Chair – Venom Week VIII International Medical and Scientific Symposium; Arizona
2012 Veterinary Co-Chair - Venom Week & 17th Annual World Toxinology Society
2021-2021 Board Member, Central Arizona United Cerebral Palsy Foundation
2017-2021 Board Delegate (alternate) Arizona Bioindustry Association
2017-2021 Scientific Advisor, Arthrodynamic Holdings, LLC
2017-2021 Independent Board Member, Chelation Partners, Inc.
2010-2013 Scientific Advisory Board, iSTAR Medical
2011-2013 Business Advisor, Advanced Anesthesia Specialists, LLC
1998-1999 Board Member, Arizona Bioindustry Cluster

Academic Coursework

2018-2019 VMED 1325 Venoms and Toxins
2018-2021 VMED 1648 Toxicology
2017-2021 CVM Research Grand Rounds

Academic Committees and Institutional Appointments

2022- ASU Co-Lead: Innovation & Technology Implementation Team – AZ Health Improvement Plan
2019-2021 One Health Committee - Midwestern University
2017-2021 Research Advisory Group – Midwestern University
2017-2018 Thesis Committee - Crystal Harmon – MWU - College of Health Sciences
2018-2019 Thesis Committee - Alexis Nelson - Arizona State University - Barrett Honors College
2018-2019 Fulbright Scholar Advisor and Host – Dr. Svetla Danova (Bulgaria)
2008-2014 IACUC Attending Veterinarian, Translational Genomics Research Institute
2011-2013 IACUC Attending Veterinarian, Alcor Life Extension Foundation

Editorial Activities

Ad hoc Reviewer for *Toxicon*
Ad hoc Reviewer *Journal of the American Veterinary Medical Association*

Professional Memberships / Organizations

1995- American Veterinary Medical Association
1995- Arizona Veterinary Medical Association

Basic Research Summary Experience

2015-current: **Investigator Initiated** – My current bench research is often tied to human and veterinary clinical research. In this capacity, I work out of various laboratories including clinical pathology, anatomical pathology, microbiology, and cellular and molecular core facilities. Work primarily focuses on diagnostic serology, biomarker analysis, microbiology, and toxicology. Research involves various analytical methods including MALDI-TOF, ELISA, HPLC-MS, and other analytical approaches to biospecimen evaluation.

1992-1995: **Graduate Thesis Research** – Evaluated muscle protein isoform alterations during aging process and weightlessness. Analysis consisted of protein extraction from muscle tissue, isoform separation via SDS-PAGE, comparison of protein isoforms with histological fiber type analysis, and laser densitometry to quantitate isoform alterations. Research intended to help further elucidate how bedrest and spaceflight may alter changes in skeletal muscle physiology and recovery. Results presented at American College of Sports Medicine, Minneapolis, MN 1995.

1989-1990: **Howard Hughes Medical Undergraduate Fellowship** – Research focused on driving bacterial mutagenesis of the catalase/superoxide gene regulation systems using nitrosamine compounds; and subsequent characterization of how mutagenesis results in bacterial chemical resistance.

Current Funding

Next Generation Biological Weapons (2023-)
Vogel (PI); Role: Co-I; Sponsor: Department of Defense.

Fellowship for Afghan Chem-Bio Scientists-in-Exile
Vogel (PI); Role: Co-I; Sponsor: US Department of State

Platform to Assess Influenza and COVID-19 Vaccine Effectiveness in Underserved Arizona Populations (2022-)
Murugan (PI); Role: Co-I; Sponsor: Center for Disease Control, National Center for Emerging and Zoonotic Infections

Completed Grants

<u>Start Yr</u>	<u>Abbreviated or Short Grant Title</u>	<u>Sponsor and Role</u>
2017	One Health Grant – Envenomation in Humans and Dogs	Midwestern University (PI)
2016	Effect of an Endothelin Agonist in Dogs with Degenerative Myelopathy	CARE Foundation (PI)
2016	Canine Genetics Disease Database	CARE Foundation (Sub-I)
2012	Targeting Immune Cells as a Novel Treatment for Canine Atopic Dermatitis	Am. (Sub-I)
2009	Development of a Diagnostic Method for Canine Atopic Dermatitis	Am. Club (Sub-PI)
2008	Business Incubator Grant	State of Missouri (Curator)
2007	Treatment of Canine Dilated Cardiomyopathy with T-Lymphocyte Modulator	Am. Kennel Club (Sub-PI)
2007	Treatment of Canine Atopic Dermatitis with an Immune Modulating Vaccine	Am. Kennel Club (PI)

Clinical Research (Human Clinical Trials and Studies)

Management of Phase II-IV interventional and observational trials and investigator-initiated studies across multiple sites (clinics and hospitals). Therapeutic areas consist of cardiovascular, ocular, infectious disease, and wound care studies. Non-confidential study list (below) serving as investigator or site director.

<u>Start Yr</u>	<u>Abbreviated or Short Study Title</u>	<u>Role</u>
2020	Dynamics of Serological Responses to SARS-CoV-2 Infection	Site PI.
2020	Testing the efficacy and safety of [drug] in patients with SARS-CoV-2	Site Dir.
2020	SARS-CoV-2 Longitudinal Immunosurveillance of Emergency Room Providers	Co-PI
2020	COVID-19 – Secondary Use and Analysis of Patient Biospecimens	Co-PI

Clinical Research (Translational, Comparative and Veterinary Trials and Studies)

Serve as investigator on various clinical studies and trials across a range of comparative medical areas. My primary focus is on evaluating drugs, biologics, devices, and other interventions in diseases that have a translational bridge to human medicine. Non-confidential list below, where serving as investigator.

<u>Start Yr</u>	<u>Abbreviated or Short Study Title</u>	<u>Role</u>
2021	Evaluation of oral probiotic formulation in cats with chronic kidney disease	PI
2019	Evaluation of [drug] in dogs with osteoarthritis of the elbow joint	Co-PI
2019	Serum enzyme biomarkers in dogs with active cancer	PI
2019	Evaluation of IRL-1620 in canine degenerative myelopathy	PI
2018	Evaluation of tumor imaging agent in dogs with solid neoplasia	PI
2018	Evaluation of a selective beta-catenin inhibitor in dogs with osteosarcoma	PI
2018	Venom toxin levels in dogs naturally envenomated by Arizona pit vipers	PI
2018	Clinical efficacy study of iron sequestering polymer in dogs with ear infections	PI
2017	Retrospective analysis: canine envenomation in the US	PI
2013	Clinical efficacy trial evaluating an oral antioxidant formulation in canine osteoarthritis	PI
2012	Pivotal field efficacy & safety study of F(ab') ₂ antivenom in dogs	Co-PI
2010	Safety study of F(ab') ₂ antivenom evaluation in healthy dogs	Co-PI
2010	Efficacy of an embryonic-like bioscaffold in canine osteoarthritis	PI
2009	Efficacy of an embryonic-like bioscaffold in dogs undergoing surgical osteotomy	Co-PI
2009	Efficacy of glucosamine analogues in canine osteoarthritis	PI
2009	Efficacy of novel implant in dogs with glaucoma	PI
2009	Efficacy of an embryonic-like bioscaffold in dogs with corneal ulcers	PI
2008	Multi-site evaluation of an <i>in-situ</i> autologous cancer vaccination in dogs with solid tumors	PI
2008	Effects of T-cell immune modulator therapeutic vaccination in dogs with Valley Fever	PI
2008	Pivotal field efficacy study: TCR peptide immunotherapy for canine atopic dermatitis	PI
2007	Effects of a T-cell receptor therapeutic peptide in canine dilated cardiomyopathy	PI
2006	Efficacy of a T-cell receptor therapeutic peptide in feline gingivostomatitis	PI
2003	Efficacy of a dextran-bioconjugate for canine keratoconjunctivitis sicca (dry eye)	PI

Publications

1. **Woods CW**, Huang V, VanDenBerg CM, et al. Clinical evaluation of DIBI, an iron-sequestering anti-infective polymer in canine otitis externa natural infections. Manuscript in preparation.
2. Witsil AJ, Wells RJ, **Woods CW**, and Rao S. 272 cases of rattlesnake envenomation in dogs: demographics and treatment including safety of F(ab')₂ antivenom. *Toxicon*. 2015 Oct Vol105: 19-26.
3. Peterson ME, **Woods CW**, Seibold KE, and Schaer M. Confounding in study of antivenoms. *J Am Vet Med Assoc*. 2013 Dec 1;243(11):1516.
4. **Woods CW** and Young DA. F(ab')₂ Antivenom: Clinical Safety in Dogs. *J. Vet Em Crit Care*, Oct 2011.
5. **Woods CW**, Seibold K. Problems with Antivenom Study; Letter. *J. Vet Em Crit Care*, Oct 2010.
6. Terry DE, Rees-Milton K, Smith P, Carran J, Pezeshki P, **Woods CW**, Greer P, Anastassiades TP. N-acylation of glucosamine modulates chondrocyte growth, proteoglycan synthesis, and gene expression. *J Rheumatol*. 2005 Sep; 32 (9):1775-86.

Recent Invited Presentations

1. "Veterinary Medicine's Snakebit Landscape". Symposium on Treatment of Pitviper Envenomation in the Rural Southwestern United States; Rodeo, NM. June 23-24, 2023.
2. "Comparative Medicine". University of Arizona College of Public Health; Tucson, AZ. Sep. 21st, 2022.
3. "Comparative and Translational Medicine: the integration of veterinary and human clinical research". European Medical Writers Association; May 4, 2021.
4. "Dogs, Pit Vipers and Antivenoms – lessons learned from veterinary medicine. Loma Linda University, Dept. of Earth and Biological Sciences Biology Seminar. April 21st, 2021.

Scientific Abstracts and Presentations

1. **Woods CW**. "Veterinary Antivenoms & Venom Diagnostics: Projected Market Size and Development Costs in the US". Oral Presentation. Venom Week VIII, July 18th, 2022.
2. Nelson A, Pennington L., Miller K., and **Woods CW**. Venom Toxin Levels in Dogs Naturally Envenomated by Arizona Pit Vipers. Poster Abstract. Venom Week VIII, July 2022.
3. Chen M., Rappaport A., Stein A., and **Woods CW**. Incidence and Associated Treatments for Snakebite Envenomation in Dogs. Poster Abstract. Venom Week VIII, July 2022.
4. **Woods CW**. Review: Veterinary Regenerative Medicine and Tissue Engineering. Oral Abstract. Tissue Engineering and Regenerative Medicine International Society Conference (TERMIS). Dec. 13, 2016
5. **Woods CW**. Review: The Dog as a Translational Model for Envenomation. Oral Abstract. Venom Week 2016, *Toxicon* Volume 117, July 2016, Page 107.
6. Wells R and **Woods CW**. F(ab')₂ Antivenom Treatment: A Retrospective Analysis of 180 Rattlesnake Envenomations in Dogs: Oral abstract - IVECCS September 2013, San Diego.
7. Falcone K, Klaus J, Mulligan K, **Woods CW**: Retrospective Study of F(ab')₂ Antivenom in 61 Dogs and 15 Cats Envenomated by Arizona Rattlesnakes, Oral Abstract. IVECCS 2012.
8. **Woods CW**. Anti-Endotoxin Effects and Pharmacology of the Immune Selective Anti-Inflammatory Derivatives. *Venom Week 2012*; Oral Abstract – *Toxicon* Volume 60(2), 2012.
9. Seibold KE, **Woods CW**, and Wells RJ. F(ab')₂ Antivenom in Dogs Envenomated by Pit Vipers. *Venom Week 2012*; Oral Abstract – *Toxicon* Volume 60(2), 2012.
10. **Woods CW**, Seibold KE, Wells RJ. Crotalidae Venom Levels in Dogs Before and After Administration of F(ab')₂ Antivenom. *Venom Week 2012*; Oral Abstract – *Toxicon* Volume 60(2), 2012.
11. K. Seibold, **C. Woods**, R. Wells, M. Lagutchik, et al.B. Vasilopulos. Neutralizing effects of F(ab')₂ antivenom on serum pit viper venom levels in dogs. Oral Abstract. Nashville, TN. IVECCS 2011.
12. Gingerich DA, and **Woods, CW**. T-cell Receptor Peptide Therapeutics for Feline Stomatitis; Oral Abstract, Am. Assoc. of Vet. Pharmacology and Therapeutics – 2011 Conference.
13. K.Seibold, A. Reniker, R. Wells, M. Lagutchik, S. Johnson, D. Bordelon, M. Clare, M. Kaelble, R. Vasilopulous, and **C. Woods**; Evaluation of an Antivenom F(ab')₂ in 74 Dogs Envenomated by North American Pit Vipers. Abstract; San Antonio; IVECCS 2010.
14. **Woods, C**, Godine, R and Huber B. apSTAR Cancer Laser: Review of Immunological Effects and Case Reports. Veterinary Cancer Society Mid-Year Meeting; 2010.
15. **Woods, CW**. Use of TCR Peptides for Feline Stomatitis. 23rd Annual Veterinary Dental Forum: 2009.
16. **Woods, CW**. Tissue Repair BioScaffold; Clinical Review. 23rd Annual Veterinary Dental Forum: 2009.

17. Urbanz, J and **Woods, CW**. Effects of an Embryonic-like BioScaffold on Canine Indolent Ulcer. Abstract Presentation; Am. College of Vet. Ophthalmologists 2009; Chicago, IL.
18. Roberts SW and **Woods, CW**. The Use of a Novel Porous Implant for Refractory Canine Glaucoma. Abstract Presentation; Am. College of Vet. Ophthalmologists Conference 2008; Boston, MA.
19. Urbanz, J and **Woods, CW**. The Use of a Novel Biomaterial for Refractory Canine Dry Eye; 2006 Am. College of Veterinary Ophthalmologists Conference 2006.