

**David M. Shepherd, Ph.D**  
**Professor of Environmental Immunology**

Department of Biomedical & Pharmaceutical Sciences  
Center for Environmental Health Sciences  
Skaggs School of Pharmacy  
College of Health Professions & Biomedical Sciences  
Skaggs Bldg., Room 284  
University of Montana  
Missoula, MT 59812

(406) 243-2224 (ph)  
(406) 243-2807 (fax)  
david.shepherd@umontana.edu

## EDUCATION

- 1987            B.S., FLORIDA INSTITUTE OF TECHNOLOGY, Melbourne, FL. Department of Biology.  
Major in Molecular Biology.
- 1999            Ph.D., OREGON STATE UNIVERSITY, Corvallis, OR. Department of Environmental and  
Molecular Toxicology. Major in Toxicology.

## HONORS AND AWARDS

- 2000            NRSA Postdoctoral Fellowship, NIH/NHLBI
- 2001            Paper of the year (Toxicological Sciences), Immunotoxicology Specialty Section, SOT
- 2006            Junior Faculty Award, American Association of Immunologists
- 2007            PACE External Mentor Award
- 2012, 2013, 2016    Teacher of the Month (UM Pharmacy program)
- 2009            Outstanding Young Investigator Award, Immunotoxicology Specialty Section, SOT
- 2012-2013        International Faculty Exchange Award, University of Montana  
Short-Term Academic Enrichment Award, University of Montana  
(Malaghan Institute of Medical Research; Wellington, New Zealand; 10/19/12-4/14/13)
- 2015-2019        Member, Innate Immunity & Inflammation (III) Study Section, NIH/CSR
- 2016            AAI Careers in Immunology Fellowship Mentor

## PROFESSIONAL EXPERIENCE

### Research

- 2014-present     Full Professor of Environmental Immunology  
Tenured faculty member in the Department of Biomedical and Pharmaceutical Sciences at the  
University of Montana, Missoula, MT.
- 2013-present     Associated Professor of Immunology  
Appointed as an Associated faculty member in the Cellular, Molecular & Microbial Biology  
Program in the Division of Biological Sciences at the University of Montana, Missoula, MT.
- 2007-present     Associate Professor of Environmental Immunology  
Tenured faculty member in the Department of Biomedical and Pharmaceutical Sciences and the  
Center for Environmental Health Sciences at the University of Montana, Missoula, MT.
- 2002-2007        Assistant Professor of Environmental Immunology  
Tenure-track faculty member in the Department of Biomedical and Pharmaceutical Sciences  
and the Center for Environmental Health Sciences at the University of Montana, Missoula, MT.

- 2002 NHLBI Postdoctoral Fellow  
Investigated the role of CTIP-1 in immune cell development. Laboratory of Dr. Mark Leid, Laboratory of Molecular Pharmacology, College of Pharmacy, and Environmental Health Sciences Center, Oregon State University, Corvallis, OR.
- 2000-2002 NIEHS Postdoctoral Trainee  
Characterization of novel genes involved in the transcriptional regulation of immune cells. Laboratory of Dr. Mark Leid, Laboratory of Molecular Pharmacology, College of Pharmacy, and Environmental Health Sciences Center, Oregon State University, Corvallis, OR.
- 1999-2000 Postdoctoral Research Associate  
Elucidation of the cellular mechanisms involved in TCDD-induced immune suppression. Laboratory of Dr. Nancy I. Kerkvliet, Department of Environmental and Molecular Toxicology, and Environmental Health Sciences Center, Oregon State University, Corvallis, OR.
- 1993 to 1999 Doctoral Research  
The effects of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD) on T lymphocyte activation. Laboratory of Dr. Nancy I. Kerkvliet, Department of Environmental and Molecular Toxicology, and Environmental Health Sciences Center, OSU, Corvallis, OR.
- 1988-1993 Research Assistant  
Cellular and molecular interactions involved in B and T lymphocyte activation. Laboratory of Dr. Randolph J. Noelle, Department of Microbiology, Dartmouth Medical School, Hanover, NH.

### Teaching

#### • Medicinal Plants

- 2014-present BMED 324, Developed and coordinated a pharmacy elective course on phytomedicinals, ethnopharmacology and natural products. Skaggs School of Pharmacy, University of Montana.

#### • Vaccines & Vaccinology

- 2011, 2013, 2015 BMED 391, Pharmacy elective. Co-developed and lectured on the fundamentals of vaccines, vaccine development and the role that immunizations play in history and current society. Skaggs School of Pharmacy, University of Montana.

#### • Physiological Systems II

- 2005-present BMED 342, Lecture on the basic concepts of the immune system and how pharmaceuticals modulate immune function. Skaggs School of Pharmacy, University of Montana.

#### • Toxicology II

- 2005-2015 BMED 642, Lecture on the toxicity of plants, and animal venom. Department of Biomedical & Pharmaceutical Sciences, University of Montana.

#### • Pharmacology/Toxicology

- 2005-present BMED 444, Lecture on the basic concepts of immunotoxicology and how pharmaceuticals affect immune function. Skaggs School of Pharmacy, University of Montana.

#### • Basic Immunology

- 2005-2014 MICB 411, Lecture on the basic concepts of immunotoxicology and how xenobiotics affect immune function. Division of Biological Sciences, University of Montana.

#### • Fundamentals of Immunotoxicology & Immunopharmacology

- 2003, 2005, 2007, 2009, 2011, 2015 BMED 445/644, Developed and taught an upper-level undergraduate and graduate course in the basic cellular and molecular aspects of immunotoxicology and immunopharmacology. Department of Biomedical & Pharmaceutical Sciences, University of Montana.

### •Pharmacy Student & Undergraduate Student Mentoring

2003-present Trained professional Pharmacy students and undergraduate science majors in the biomedical sciences including projects that focused on defining the effects of herbal medicines and nanomaterials on immune function, and the characterization of cancer-related genes in immune cells. Department of Biomedical & Pharmaceutical Sciences, and Skaggs School of Pharmacy, University of Montana.

### •Cellular and Molecular Toxicology

2002-2014 BMED 643, Toxicology III. Coordinated and lectured on the fundamentals of signal transduction with an emphasis on the effects of toxicants on cell signaling. Department of Biomedical & Pharmaceutical Sciences, University of Montana.

## PROFESSIONAL ACTIVITIES AND COMMUNITY OUTREACH

### National/International Committees and Service

2017-2018 SOT Immunotoxicology Specialty Section Awards Committee Member  
Participated in the review of scientific presentations/papers.

2015-2019 Member of III Study Section at NIH/CSR

2015 LE STUDIUM Grant Reviewer  
Reviewed research fellowship laboratory applications for the Loire Valley Institute for Advanced Studies (Orléans, France)

2005, 2009, 2012, 2013, 2014 NIH/CSR Ad hoc Study Section Reviewer  
Served on panels that reviewed grants and/or contracts for NIEHS (ZES1), NTP, and Innate Immunity and Inflammation (III).

2012 NC Biotech Center Grant Reviewer  
Reviewed immunomodulatory grants for the NC Collaborative Funding Grant Program

2011 Broad Foundation Grant Reviewer  
Reviewed inflammatory bowel disease grants for the Broad Medical Research Program

2008 Pharmacognosy consultant  
Worked as a research consultant for the design of studies to test natural products for AloeCorp, and Biotics Research Corporation.

2004-2006 PANWAT Councilor  
Served as an officer in the Northwest Regional chapter of SOT.

2005-2008 Editorial Board member for Toxicology Letters  
Provided expert analysis and critique of submitted papers related to immunotoxicology.

2000-2002 SOT Immunotoxicology Specialty Section Program Committee Member  
Participated in the development and organization of scientific programs.

Misc. years Ad hoc journal reviewer for Toxicological Sciences, Journal of Leukocyte Biology, PLoSOne, Trends in Immunology, Toxicology and Applied Pharmacology, Toxicology Letters, Food and Chemical Toxicology, Journal of Pharmacy & Pharmacology, Molecular Nutrition & Food Research, Pharmaceutical Biology, Phytotherapy Research, Toxicology In Vitro, International Immunopharmacology, and Journal of Immunotoxicology

2000, 2004, 2005, 2007, 2008 SOT Conference Session Chair/Co-Chair  
Chaired a poster session on Immunotoxicology (2000), Natural Products (2004), and platform sessions on Mechanisms of Immunotoxicity (2005, 2007 & 2008) at the SOT meeting.

## **University Committees and Service**

2004-2005	<u>Mentor</u> , Summer Undergraduate Diversity Research Program, UM NSF-EPSCoR
2002-Present	<u>Member</u> , Department of Biomedical & Pharmaceutical Sciences (BMED) Faculty Evaluation Committee
2003-Present	<u>Pre-Pharmacy Student Advisor</u> , Skaggs School of Pharmacy
2003-Present	<u>Member</u> , UM Pharmacy Admissions Committee
2003-2013	<u>Chair</u> , UM Toxicology Program Graduate Curriculum & Standards Committee
2003-Present	<u>Judge</u> , Montana State Science Fair
2005-2008	<u>Coordinator</u> , BMED Departmental Seminar Program
2007-2013	<u>Member</u> , UM Institutional Animal Care and Use Committee
2008-2012	<u>Mentor</u> , Summer Undergraduate Research Program, Center for Environmental Health Sciences
2009	<u>Chair</u> , BMED Faculty Evaluation Committee
2009	<u>Chair</u> , BMED Faculty Search Committee, Assistant Professor of Environmental Health
2009	<u>Member</u> , BMED Faculty Search Committee, Assistant Professor of Health Disparities
2010	<u>Member</u> , Ad hoc BMED Committee to Draft New Unit Standards
2010-2011	<u>Chair</u> , College of Health Professions & Biomedical Sciences Accreditation Self-Study (Administration and Organization)
2013-2016	<u>Member</u> , UM Faculty Senate
2013-2016	<u>Member</u> , UM Research Advisory Council, Office of VP for Research & Creative Scholarship
2015-2016	<u>Member</u> , UM Parking & Integrated Transportation Committee
2015-2017	<u>Member</u> , CHPBS Research Advisory Council
2017-Present	<u>Internal Advisory Committee Member</u> , Center for Translational Medicine

### *Graduate Programs*

2002-2007	<u>Committee Chair</u> , Ava Rhule, Pharmaceutical Sciences Program, UM (PhD awarded July, 2007)
2004-2008	<u>Committee Member</u> , Sheetal Thakur, Toxicology Program, UM (PhD awarded October, 2008)
2006-2009	<u>Committee Chair</u> , Jaishree Bankoti, Toxicology Program, UM (PhD awarded October, 2009)
2007-2009	<u>Committee Member</u> , Teri Girtsman, Toxicology Program, UM (PhD awarded October, 2009)
2007-2011	<u>Committee Chair</u> , Jenna Benson, Toxicology Program, UM (PhD awarded December, 2011)
2007-2012	<u>Committee Chair</u> , Thomas Simones, Toxicology Program, UM (PhD awarded May, 2012)
2008-2013	<u>Committee Member</u> , Douglas (Grant) Osborne, Division of Biological Sciences, UM (PhD awarded January, 2013)
2009-2011	<u>Committee Member</u> , Ellen Lark, Division of Biological Sciences, UM
2009-2011	<u>Committee Member</u> , Lindsay Thueson, Division of Biological Sciences, UM (MS awarded November, 2011)
2011-2013	<u>Committee Co-Chair</u> , Hayley Blackburn, Pharmaceutical Sciences Program, UM (PharmD awarded May, 2013)
2013-2014	<u>Committee Member</u> , Tiffany Emmons, Division of Biological Sciences, UM (MS awarded August, 2014)
2013-present	<u>Committee Chair</u> , Joanna Kreitinger, Division of Biological Sciences, UM
2015-present	<u>Mentor</u> , Shelby Cole, Pharmacy Program/DBS, UM
2015-2018	<u>Mentor</u> , Dalton Cook, Pharmacy Program, UM
2015- present	<u>Committee Member</u> , Jim Reed, Division of Biological Sciences, UM
2017- present	<u>Committee Member</u> , Laura Berg, Toxicology Program, UM
2017-present	<u>Mentor</u> , Maya Dahlgren, Pre-Pharmacy Program, UM

## **PUBLICATIONS**

### Peer-reviewed articles

- S. Kado, W.L. Chang, A.N. Chi, C. Campbell, M. Wolny, D.M. SHEPHERD, and C.F. Vogel. (2017). Aryl hydrocarbon receptor signaling modifies Toll-like receptor-regulated responses in human dendritic cells. *Arch Toxicol.*, 91: 2209-2221.
- R.J. Noelle, M. Roy, D.M. SHEPHERD, I. Stamenkovic, J.A. Ledbetter, and A. Aruffo. (2016). Pillars Article: A 39-kDa protein on activated helper T cells binds CD40 and transduces the signal for cognate activation of B cells. *Proc. Natl. Acad. Sci. U.S.A.* 89: 6550-6554. *J Immunol.*, 197: 4185-4190.

- J.M. Kreitinger, C.A. Beamer and D.M. SHEPHERD. (2016). Environmental Immunology: Lessons learned from exposure to a select panel of immunotoxicants. (Invited review). *J Immunol.*, 196: 3217-3225.
- C.A. Beamer, L.M. Shaw, B.P. Seaver, J.L. Harper and D.M. SHEPHERD. (201X). Indole-3-carbinol (I<sub>3</sub>C), a dietary AhR ligand, suppresses ovalbumin-induced acute allergic asthma (manuscript in preparation).
- J.M. Kreitinger, T. Simones, C.A. Beamer and D.M. SHEPHERD. (201X). AhR activation in inflammatory murine bone marrow-derived dendritic cells disrupts antigen-specific CD4<sup>+</sup> T cell responses in vitro (manuscript in preparation).
- G.L. Beamer, B.P. Seaver, D.M. SHEPHERD, and C.A. Beamer. (2016). Crystalline silica modifies detection of microbial ligands through altered expression of pattern recognition receptors on macrophages. *Front Immunol.*, 7: 49.
- J.M. Kreitinger, S. Navarro, J. Bankoti, S.A. Wetzel, C.A. Beamer, T. Simones and D.M. SHEPHERD. (201X). TCDD suppresses antigen-specific in vivo interactions between OT-II CD4<sup>+</sup> T cells and OVA-loaded dendritic cells. (manuscript in revision).
- L.E. Thueson, T.R. Emmons, D.L. Browning, J.M. Kreitinger, D.M. SHEPHERD and S.A. Wetzel. (2015). In vitro exposure to the herbicide atrazine inhibits T cell activation, proliferation, and cytokine production and significantly increases the frequency of Foxp3<sup>+</sup> regulatory T cells. *Toxicol. Sci.*, 143: 418-429.
- C.A. Beamer and D.M. SHEPHERD. (2013). Role of the aryl hydrocarbon receptor (AhR) in lung inflammation. (Invited review). *Semin. Immunopathol.*, 35: 693-704.
- J.M. Benson, C.A. Beamer, B.P. Seaver and D.M. SHEPHERD. (2012). Indole-3-carbinol exerts sex-specific effects in murine colitis. *European J Inflamm.*, 10: 335-346.
- C.A. Beamer, B.P. Seaver, and D.M. SHEPHERD. (2012). The Aryl hydrocarbon receptor (AhR) regulates silica-induced inflammation, but not fibrosis. *Toxicol. Sci.*, 126: 554-568.
- C.A. Beamer and D.M. SHEPHERD. (2012). Inhibition of TLR ligand- and interferon- $\gamma$ -induced murine microglial activation by *Panax notoginseng*. *J. Neuroimmune Pharmacol.*, 7: 465-476.
- J.M. Benson and D.M. SHEPHERD. (2011). Dietary ligands of the aryl hydrocarbon receptor induce anti-inflammatory and immunoregulatory effects on murine dendritic cells. *Toxicol. Sci.*, 124: 327-338.
- J.M. Benson and D.M. SHEPHERD. (2011). Aryl hydrocarbon receptor activation by TCDD reduces inflammation associated with Crohn's disease. *Toxicol. Sci.*, 120: 68-78.
- T. Simones and D.M. SHEPHERD. (2011). Consequences of AhR activation in steady-state dendritic cells. *Toxicol. Sci.*, 119: 293-307.
- A.K. Miller, J.M. Benson, D.N. Muanza, J.R. Smith and D.M. SHEPHERD. (2011). Anti-inflammatory effects of natural product formulations on murine dendritic cells. *Journal of Dietary Suppl.*, 8: 19-33.
- J.M. Benson, A.K. Miller, N. Cooper, D.N. Muanza, J.R. Smith, D.M. SHEPHERD. (2010). Anti-inflammatory effects of natural product formulations on murine macrophages. *Journal of Dietary Suppl.*, 7: 227-239.
- J. Bankoti, B. Rase, T. Simones and D.M. SHEPHERD. (2010). Functional and phenotypic effects of AhR activation in inflammatory dendritic cells. *Toxicol. Appl. Pharm.*, 246: 18-28.
- J. Bankoti, A. Burnett, S. Navarro, A.K. Miller, B. Rase and D.M. SHEPHERD. (2010). Effects of TCDD on the fate of naïve dendritic cells. *Toxicol. Sci.*, 115: 422-434.
- J.M. Benson, A.J. Pokorny, A.G. Rhule, C.A. Wenner, N.B. Cech, V. Kandhi and D.M. SHEPHERD. (2010). *Echinacea Purpurea* extracts modulate murine dendritic cell fate and function. *Food Chem Toxicol.*, 48: 1170-1177.
- A.G. Rhule, B. Rase, J.R. Smith, and D.M. SHEPHERD. (2008). Toll-like receptor ligand-induced activation of murine DC2.4 cells is attenuated by *Panax Notoginseng*. *J. Ethnopharm.*, 116: 179-186.
- A.G. Rhule, S. Navarro, J.R. Smith, and D.M. SHEPHERD. (2006). *Panax Notoginseng* Attenuates LPS-Induced Pro-Inflammatory Mediators in RAW264.7 cells. *J. Ethnopharm.*, 106: 121-128.
- C.J. Funatake, E.A. Dearstyne, L.B. Steppan, D.M. SHEPHERD, E.S. Spanjaard, A. Marshak-Rothstein, and N.I. Kerkvliet. (2004). Early consequences of 2,3,7,8-Tetrachlorodibenzo-*p*-dioxin exposure on the activation and survival of antigen-specific T cells. *Toxicol. Sci.*, 82: 129-142.
- M. Leid, J.E. Ishmael, D. Avram, D. SHEPHERD, V. Fraulob, and P. Dollé. (2004). CTIP1 and CTIP2 are differentially expressed during mouse embryogenesis. *Gene Expr. Patterns*, 4: 733-739.
- T. Senawong, V.J. Peterson, D. Avram, D.M. SHEPHERD, R.A. Frye, S. Minucci, and M. Leid. (2003). Involvement of the histone deacetylase SIRT1 in COUP-TF-interacting protein 2-mediated transcriptional repression. *J. Biol. Chem.*, 278: 43041-43050.

- N.I. Kerkvliet, D.M. SHEPHERD, and L.B. Steppan. (2002). T lymphocytes are direct, aryl hydrocarbon receptor (AhR)-dependent targets of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD): AhR expression in both CD4<sup>+</sup> and CD8<sup>+</sup> T cells is necessary for full suppression of a cytotoxic T lymphocyte response by TCDD. *Toxicol. Appl. Pharmacol.*, **185**: 146-152.
- D.M. SHEPHERD, L.B. Steppan, O.R. Hedstrom, and N.I. Kerkvliet. (2001). Anti-CD40 treatment of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD)-exposed C57Bl/6 mice induces activation of antigen presenting cells yet fails to overcome TCDD-induced suppression of allograft immunity. *Toxicol. Appl. Pharmacol.* **170**: 10-22.
- D.M. SHEPHERD, E.A. Dearstyne, and N.I. Kerkvliet. (2000). The effects of TCDD on the activation of ovalbumin (OVA)-specific DO11.10 transgenic CD4<sup>+</sup> T cells in adoptively transferred mice. *Toxicol. Sci.* **56**: 340-350.
- D.M. SHEPHERD and N.I. Kerkvliet. (1999). Disruption of CD154:CD40 blocks generation of allograft immunity without affecting APC activation. *J. Immunol.* **163**: 2470-2477.
- N.I. Kerkvliet, L. Baecher-Steppan, D.M. SHEPHERD, J.A. Oughton, B.A. Vorderstrasse, and G.D. DeKrey. (1996). Inhibition of TC-1 cytokine production, effector cytotoxic T lymphocyte development and alloantibody production by 2,3,7,8-tetrachlorodibenzo-*p*-dioxin. *J. Immunol.* **157**: 2310-2319.
- L.M. Marshall, D.M. SHEPHERD, J.A. Ledbetter, A. Aruffo, and R.J. Noelle. (1994). Signalling events during helper T cell-dependent B cell activation. I. Analysis of the signal transduction pathways triggered by activated helper T cell in resting B cells. *J. Immunol.* **152**: 4816-4825.
- A.J. Van den Eertwegh, R.J. Noelle, M. Roy, D.M. SHEPHERD, A. Aruffo, J.A. Ledbetter, W.M. Boersma, and E. Claassen. (1993). In vivo CD40-gp39 interactions are essential for thymus-dependent humoral immunity. I. In vivo expression of CD40 ligand, cytokines, and antibody production delineates sites of cognate T-B cell interactions. *J. Exp. Med.* **178**: 1555-1565.
- T.M. Foy, D.M. SHEPHERD, F.H. Durie, A. Aruffo, J.A. Ledbetter, and R.J. Noelle. (1993). In vivo CD40-gp39 interactions are essential for thymus-dependent humoral immunity. II. Prolonged suppression of the humoral immune response by an antibody to the ligand for CD40, gp39. *J. Exp. Med.* **178**: 1567-1575.
- J.R. Daum, D.M. SHEPHERD, and R.J. Noelle. (1993). Immunotoxicology of cadmium and mercury on B lymphocytes-- I. Effects on lymphocyte function. *Int. J. Immunopharmacol.* **15**: 383-394.
- R.J. Noelle, L.M. Marshall, M. Roy, D.M. SHEPHERD, I. Stamenkovic, J.A. Ledbetter, A. Aruffo, and H.P. Fell. (1992). Role of contact and soluble factors in the growth and differentiation of B cells by helper T cells. *Adv. Exp. Med. Biol.* **323**: 131-138.
- R.J. Noelle, D.M. SHEPHERD, and H.P. Fell. (1992). Cognate interaction between T helper cells and B cells. VII. Role of contact and lymphokines in the expression of germline and mature gamma 1 transcripts. *J. Immunol.* **149**: 1164-1169.
- R.J. Noelle, M. Roy, D.M. SHEPHERD, I. Stamenkovic, J.A. Ledbetter, and A. Aruffo. (1992). A 39-kDa protein on activated helper T cells binds CD40 and transduces the signal for cognate activation of B cells. *Proc. Natl. Acad. Sci. U.S.A.* **89**: 6550-6554.
- R.J. Noelle, J.R. Daum, W.C. Bartlett, J. McCann, and D.M. SHEPHERD. (1991). Cognate interactions between helper T cells and B cells. V. Reconstitution of T helper cell function using purified plasma membranes from activated Th1 and Th2 T helper cells and lymphokines. *J. Immunol.* **146**: 1118-1124.
- D.M. SHEPHERD and R.J. Noelle. (1991). The lack of memory B cells in immune bone marrow. *Transplantation* **52**: 97-100.
- W.C. Bartlett, J. McCann, D.M. SHEPHERD, M. Roy, and R.J. Noelle. (1990). Cognate interactions between helper T cells and B cells. IV. Requirements for the expression of effector phase activity by helper T cells. *J. Immunol.* **145**: 3956-3962.

#### Invited book chapters/essays

- J.M. Kreitinger and D.M. SHEPHERD. (2017). Dendritic cell assays. *Immunotoxicity Testing: Methods and Protocols*, Springer Protocols, (chapter accepted for publication).
- C.A. Beamer, B. Seaver and D.M. SHEPHERD. (2012). The role of the AhR in lung inflammation and fibrosis. *Immunotoxicity, Immune Dysfunction and Chronic Disease*, Springer., pp. 313-344.
- T. Simones, M. Mosier and D.M. SHEPHERD. (2010). Dendritic Cells. *Comprehensive Toxicology*, 2<sup>nd</sup> edition. (C. McQueen), Elsevier Ltd., pp. 155-170.

- R.W. Luebke, C.A. Beamer, C. Bowman, J.C. DeWitt, K. Gowdy, V.J. Johnson, D.M. SHEPHERD, and D.R. Germolec. (2009). *Immunotoxicology. General & Applied Toxicology*, 3<sup>rd</sup> Edition. (T. Marrs, B. Ballantyne and T. Syversen), John Wiley & Sons, pp.1561-1583.
- A. Pokorny and D.M. SHEPHERD. (2006). Exploring nature's pharmacy: A look at Echinacea. *The New Montana Pharmacist* 30(2): 6-8.
- D.M. SHEPHERD. (2006). Immunomodulation by Nutraceuticals and Functional Foods, in: *Immunotoxicology and Immunopharmacology*, 3<sup>rd</sup> Edition, Eds: R. House and R. Luebke. CRC Press LLC, pp. 185-203.
- D.M. SHEPHERD. (2004). Natural Killer Cells, in: *Encyclopedic Reference of Immunotoxicology*, Eds: J. Dean, D. Germolec, M. Holsapple, R. House, M.I. Luster, P. Ulrich, H. Van Loveren, and K. White. Springer-Verlag.
- D.M. SHEPHERD. (2004). Immunoglobulin: subclasses and functions, in: *Encyclopedic Reference of Immunotoxicology*, Eds: J. Dean, D. Germolec, M. Holsapple, R. House, M.I. Luster, P. Ulrich, H. Van Loveren, and K. White. Springer-Verlag.
- J.R. Daum, D.M. SHEPHERD, and R.J. Noelle. (1995). Physical interactions and early signaling between helper T lymphocytes and B lymphocytes, in: *Methods in Immunotoxicology*, Eds: G.R. Burleson, J.H. Dean, and A.E. Munson. John Wiley & Sons, New York. Vol. 1, pp. 469-481.

### INVITED PRESENTATIONS (SEMINARS) during the past 6 years

- 2017 "Consequences of Aryl hydrocarbon Receptor Activation in Dendritic Cells"; Department of Microbiology & Immunology, University of Iowa, March 1, 2017.
- 2017 "Consequences of Aryl hydrocarbon Receptor Activation in Dendritic Cells"; Department of Environmental Toxicology, University of California-Davis, February 23, 2017.
- 2017 "Consequences of Aryl hydrocarbon Receptor Activation in Dendritic Cells"; College of Pharmacy, University of Arizona, January 11, 2017.
- 2016 "Consequences of Aryl hydrocarbon Receptor Activation in Dendritic Cells and Their Therapeutic Potential"; AHR International Scientific Conference 2016, Rochester, NY, August 6, 2016.
- 2016 "Consequences of Aryl hydrocarbon Receptor Activation in Dendritic Cells and Their Therapeutic Potential"; Department of Biology, Florida Institute of Technology, March 31, 2016.
- 2016 "Consequences of Aryl hydrocarbon Receptor Activation in Dendritic Cells and Their Therapeutic Potential"; Department of Microbiology & Immunology, Montana State University, March 22, 2016.
- 2016 "The Aryl hydrocarbon Receptor (AhR): Environmental Sensor of the Immune System"; Skaggs School of Pharmacy, University of Montana, March 11, 2016.
- 2014 "Tolerogenic dendritic cells: Generating a magic bullet via the Aryl hydrocarbon receptor"; College of Pharmacy, Oregon State University, May 29, 2014.
- 2013 "Consequences of Aryl hydrocarbon Receptor Activation in Dendritic Cells and Their Therapeutic Potential"; Center for Neurologic Diseases, Brigham & Women's Hospital, Harvard Medical School, November 13, 2013.
- 2012 "Consequences of Aryl hydrocarbon Receptor Activation in Dendritic Cells and Their Therapeutic Potential"; Malaghan Institute of Medical Research, Victoria University of Wellington, New Zealand, November 16, 2012.
- 2012 "Consequences of Aryl hydrocarbon Receptor Activation in Dendritic Cells and Their Therapeutic Potential"; Division of Biological Sciences, University of Montana, April 30, 2012.
- 2012 "Consequences of Aryl hydrocarbon Receptor Activation in Dendritic Cells"; School of Public Health, University of Wisconsin-Milwaukee, February 24, 2012.
- 2011 "Consequences of Aryl hydrocarbon Receptor Activation in Dendritic Cells"; Vaccine Development Division, Glaxo-Smith Kline Biologicals, December 12, 2011.

### PRESENTATIONS AT SCIENTIFIC MEETINGS

#### Platforms

- J.M. Kreitinger F. Astruc-Diaz, S.A. Cole, C.A. Beamer, and D.M. SHEPHERD. (2016). Liposomal nanoparticles and dendritic cells: A targeted drug delivery system for immune-mediated diseases. UM GradCon, Missoula, MT.
- J.M. Kreitinger and D.M. SHEPHERD. (2015). Effects of aryl hydrocarbon receptor activation in CD11c+ dendritic cells and therapeutic applications. DBS, Missoula, MT.

- J.M. Kreitinger and D.M. SHEPHERD. (2014). Consequences of aryl hydrocarbon receptor activation in dendritic cells. DBS, Missoula, MT.
- J.M. Benson and D.M. SHEPHERD. (2011). Dietary ligands of the aryl hydrocarbon receptor alter the immune responsiveness of antigen presenting cells. UM GSFRC, Missoula, MT.
- K. Finsaas, J.M. Benson, A. Miller and D.M. SHEPHERD. (2011) Dietary AhR ligands modulate maturation of dendritic cells. UMCUR, Missoula, MT.
- T. Simones, J. Bankoti, J.M. Benson and D.M. SHEPHERD. (2011). Aryl hydrocarbon receptor-activated dendritic cells generate CD4<sup>+</sup>CD25<sup>+</sup>FoxP3<sup>+</sup> regulatory T cells. Keystone Symposia, Park City, UT.
- J.M. Benson and D.M. SHEPHERD. (2010). Aryl hydrocarbon receptor activation reduces the inflammation associated with Crohn's disease. UM GSFRC, Missoula, MT.
- T. Simones, J. Bankoti and D.M. SHEPHERD. (2010). Dioxin alters dendritic cell growth and phenotype. UM GSFRC, Missoula, MT.
- J. Bankoti, T. Simones, B. Rase and D.M. SHEPHERD. (2009). Generation of novel "regulatory" dendritic cells via AhR activation. *The Toxicologist* **108**: 213.
- T. Simones, J. Bankoti, A. Miller, P. Gunderson and D.M. SHEPHERD. (2009). Generation of TCDD-induced regulatory phenotypes in bone marrow-derived APCs. PANWAT, Seattle, WA.
- T. Simones and D.M. SHEPHERD. (2009). Generation of TCDD-induced regulatory phenotypes in bone marrow-derived antigen presenting cells. UM GSFRC, Missoula, MT.
- J.M. Benson, A.J. Pokorny, A.G. Rhule, C.A. Wenner, V. Kandhi, N.B. Cech and D.M. SHEPHERD. (2009). *Echinacea purpurea* extracts differentially modulate the development and function of murine dendritic cells. UM GSFRC, Missoula, MT.
- J. Bankoti, B. Rase and D.M. SHEPHERD. (2008). Aryl hydrocarbon receptor (AhR) agonists modulate the innate function of "inflammatory" murine bone marrow-derived dendritic cells. PANWAT, Corvallis, OR.
- J. Bankoti, B. Rase and D.M. SHEPHERD. (2008). Innate control of adaptive immunity: Dendritic cells and TCDD. *The Toxicologist* **102**: 123.
- J. Bankoti, B. Rase, D.M. SHEPHERD. (2007). TCDD alters the differentiation and innate function of murine bone marrow-derived dendritic cells. PANWAT, Seattle, WA.
- J. Bankoti, A. Burnett, S. Navarro, P. Shaw and D.M. SHEPHERD. (2007). The effects of TCDD on the fate of naïve dendritic cells. *The Toxicologist* **96**: 284.
- A.G. Rhule, J.R. Smith, and D.M. SHEPHERD. (2006). *Panax notoginseng*: Panacea or poison? A synopsis of its effects on murine bone marrow-derived dendritic cells. PANWAT, Missoula, MT.
- A.G. Rhule, J.R. Smith, and D.M. SHEPHERD. (2006). *Panax Notoginseng* decreases antigen-specific interactions between murine bone marrow-derived dendritic cells and CD4<sup>+</sup> T cells. Montana Academy of Sciences, Butte, MT.
- A. Burnett, S. Navarro, and D.M. SHEPHERD. (2006). Effects of aryl hydrocarbon receptor activation in naïve dendritic cells. Montana Academy of Sciences, Butte, MT.
- A.G. Rhule, S. Navarro, J.R. Smith, and D.M. SHEPHERD. (2005). An assessment of the immunomodulatory effects of Notoginseng in murine bone marrow-derived dendritic cells. PANWAT, Astoria, OR.
- S. Navarro and D.M. SHEPHERD. (2005). TCDD suppresses antigen-specific interactions between OT-II CD4<sup>+</sup> T cells and OVA-loaded dendritic cells. *The Toxicologist* **84**: 364.
- S. Navarro and D.M. SHEPHERD. (2004). Consequences of aryl hydrocarbon receptor (AhR)-mediated signaling in dendritic cells. PANWAT, Bend, OR.
- A.G. Rhule, S. Navarro, J.R. Smith, and D.M. SHEPHERD. (2004). Immunomodulatory effects of Notoginseng on cultured phagocytic cells. PANWAT, Bend, OR.
- S. Navarro, and D.M. SHEPHERD. (2004). Consequences of aryl hydrocarbon receptor (AhR)-mediated signaling in dendritic cells. Montana Academy of Sciences, Billings, MT.
- A.G. Rhule, S. Navarro, J. Errett, B. Seaver, J.R. Smith, and D.M. SHEPHERD. (2004). Immunomodulatory effects of Notoginseng on phagocytic cells. Montana Academy of Sciences, Billings, MT.
- D.M. SHEPHERD. (2003). The Effects of Nutrients on Immune Function: Eating and drinking your way to better health. Pacific Northwest Association of Toxicologists, Bend, OR.
- D.M. SHEPHERD. (2003). Immunomodulation of antigen presenting cell activity by synthetic and natural chemicals. Northwest Immunotoxicology Conference, Salmon Lake, MT.
- D.M. SHEPHERD, D. Avram and M. Leid. (2001). COUP-TF Interacting Protein 1 (CTIP1): A putative genetic regulator of immune cell development. College of Pharmacy Retreat, Corvallis, OR.

Posters

- C.F. Vogel, S. Kado, W. Chang, A. Nguyen Chi, M. Wolny and D.M. SHEPHERD. (2017). Deregulated TLR responses by AhR ligands in human dendritic cells. *The Toxicologist* 156: 169.
- C.A. Beamer, S.A. Cole, B.P. Seaver, J.M. Kreitinger, and D.M. SHEPHERD. (2016). Aryl hydrocarbon receptor (AhR) signaling modifies *Pseudomonas aeruginosa*-regulated responses in murine dendritic cells. AhR International Scientific Conference 2016. Rochester, NY.
- J.M. Kreitinger, F. Astruc-Diaz, S.A. Cole, C.A. Beamer, and D.M. SHEPHERD. (2016). Delivery of AhR agonist to bone marrow-derived dendritic cells using PEGylated liposomal nanoparticles. AhR International Scientific Conference 2016. Rochester, NY.
- S.L. Cole, J.M. Kreitinger, B.P. Seaver, C.A. Beamer, and D.M. SHEPHERD. (2016). Impact of AhR activation on the phenotype and function of bone marrow derived dendritic cells after exposure to *Pseudomonas aeruginosa*. Tribal Environmental Health Summit. Flagstaff, AZ.
- J.M. Kreitinger, B.P. Seaver, C.A. Beamer, and D.M. SHEPHERD. (2016). Aryl hydrocarbon receptor activation in CD11c<sup>+</sup> cells mediates effects of TCDD on T lymphocyte development in the thymus. *The Toxicologist* 150: 85.
- S.L. Cole, J.M. Kreitinger, B.P. Seaver, C.A. Beamer, and D.M. SHEPHERD. (2016). Impact of AhR activation on the phenotype and function of bone marrow derived dendritic cells after exposure to *Pseudomonas aeruginosa*. *The Toxicologist* 150: 87.
- D.M. SHEPHERD, J.M. Kreitinger, B.P. Seaver, C. Andrews, S. Durum and C.A. Beamer. (2015). Effects of aryl hydrocarbon receptor (AhR) activation on pulmonary innate lymphoid cells and dendritic cells. ICMI, Berlin, Germany.
- J.M. Kreitinger, B.P. Seaver, C.A. Beamer and D.M. SHEPHERD. (2015). Consequences of TCDD exposure in CD11c<sup>+</sup> splenic dendritic cells during systemic immune responses in mice. *The Toxicologist* 144:242.
- D.M. SHEPHERD, B.P. Seaver and C.A. Beamer. (2015). AhR-mediated activation of respiratory innate lymphocyte cells. *The Toxicologist* 144: 292.
- J.M. Kreitinger, B.P. Seaver, C.A. Beamer and D.M. SHEPHERD. (2014). Consequences of aryl hydrocarbon receptor activation in CD11c<sup>+</sup> cells during antigen-specific immune responses in mice. PANWAT, Seattle, WA.
- D.M. SHEPHERD, B.P. Seaver and C.A. Beamer. (2014). Ah receptor activation alters the phenotype and function of pulmonary innate lymphocytes. *The Toxicologist* 138: 325.
- T. Simones and D.M. SHEPHERD. (2012). Ah receptor activation induces regulatory dendritic cells and antigen-specific regulatory T cells *in vivo*. *The Toxicologist* 126: 339.
- J.M. Benson and D.M. SHEPHERD. (2011). TCDD suppresses disease severity in a murine model of chemically induced colitis. *The Toxicologist* 120: 241.
- C.A. Beamer, J.M. Benson, T. Simones and D.M. SHEPHERD. (2011). Aryl hydrocarbon receptor regulates silica-induced inflammatory responses. NISBRE, Washington, D.C.
- T. Simones, J. Bankoti and D.M. SHEPHERD. (2011). Ah receptor activation generates regulatory dendritic cells capable of inducing CD4<sup>+</sup> CD25<sup>+</sup> FoxP3<sup>+</sup> regulatory T cells. *The Toxicologist* 120: 326.
- J.M. Benson and D.M. SHEPHERD. (2010) Beneficial effects of aryl hydrocarbon receptor activation in a murine model of Crohn's disease. Crohn's & Colitis Foundation Conference, Miami, FL.
- K. Finsaas, A. Miller and D.M. SHEPHERD. (2010) AhR ligand-specific effects on dendritic cell activation. OREOS, Missoula, MT.
- J.M. Benson and D.M. SHEPHERD. (2010) Aryl hydrocarbon receptor activation reduces the inflammation in a murine model of Crohn's disease. IDEA, Washington, D.C.
- T. Simones, J. Bankoti and D.M. SHEPHERD. (2010). Generation of TCDD-induced regulatory phenotypes in bone marrow-derived dendritic cells. *The Toxicologist* 114: 241.
- J. Bankoti, B. Rase and D.M. SHEPHERD. (2009). Induction of "regulatory" dendritic cells via AhR activation. *J. Immunol* 182: 89. 15.
- T. Simones and D.M. SHEPHERD. (2009). Deriving murine steady-state dendritic cells in the presence of a potent AhR ligand produces modulatory dendritic cells. *J. Immunol* 182: 89.18.
- J.M. Benson, A.J. Pokorny, A.G. Rhule, C.A. Wenner, V. Kandhi, N.B. Cech and D.M. SHEPHERD. (2009). Immunomodulatory effects of *Echinacea purpurea* on the development and function of murine dendritic cells. American Society of Pharmacognosy, Honolulu, HI.
- P. Gunderson, A. Miller and D.M. SHEPHERD. (2009) Investigating the effects of Aryl hydrocarbon receptor activation in macrophages. OREOS, Missoula, MT.

- T. Simones and D.M. SHEPHERD. (2008). TCDD-induced modulation of “steady state” bone marrow-derived dendritic cells. PANWAT, Corvallis, OR.
- J.M. Benson, A.J. Pokorny, A.G. Rhule, J.R. Smith, C.A. Wenner, N.B. Cech, B. Rase and D.M. SHEPHERD. (2008). Effects of *Echinacea purpurea* extracts on murine dendritic cells: Immunostimulatory or immunosuppressive? PANWAT, Corvallis, OR.
- A. Miller, N. Cooper, A. Burnett, J.R. Smith and D.M. SHEPHERD. (2008). Modulation of murine dendritic cells by the complex polyherbal extract, BRC-301. PANWAT, Corvallis, OR.
- A.G. Rhule, J.R. Smith and D.M. SHEPHERD. (2007). *Panax Notoginseng* attenuates dendritic cell function through inhibition of NFκB activation. *The Toxicologist* 96: 361.
- D.M. SHEPHERD, A.G. Rhule, J.R. Smith, C.A. Wenner, N.B. Cech, B. Rase and A.J. Pokorny. (2007). *Echinacea Purpurea* extracts modulate dendritic cell fate and function. *The Toxicologist* 96: 363.
- J. Bankoti, A. Burnett, S. Navarro, P. Shaw and D.M. SHEPHERD. (2006). Effects of aryl hydrocarbon receptor activation in naïve dendritic cells. PANWAT, Missoula, MT (August 25, 2006).
- D.M. SHEPHERD, A. Burnett and S. Navarro. (2006). Consequences of aryl hydrocarbon receptor (AhR) activation in dendritic cells. NISBRE, Washington, D.C.
- D.M. SHEPHERD, A. Burnett, and S. Navarro. (2006). Consequences of aryl hydrocarbon (Ah) receptor activation in dendritic cells. *J. Immunol* 176: S176.
- A.G. Rhule, J. Smith, and D.M. SHEPHERD. (2006). Attenuation of pro-inflammatory mediator production and LDL uptake in murine dendritic cells by *Panax Notoginseng*. *J. Immunol* 176: S9.
- A.G. Rhule, J. Smith, and D.M. SHEPHERD. (2006). Notoginseng reduces LPS-induced pro-inflammatory mediators and LDL uptake in murine bone marrow-derived dendritic cells. *The Toxicologist* 92: 1110.
- A.G. Rhule, S. Navarro, J. Smith, and D.M. SHEPHERD. (2005). Notoginseng attenuates LPS-induced pro-inflammatory mediators in antigen presenting cells. *The Toxicologist* 84: 1420.
- V. Grijalva, S. Navarro, A.G. Rhule, and D.M. SHEPHERD. (2004). The immunomodulatory effects of Amentoflavone on cultured macrophages (RAW264.7) and dendritic cells (DC2.4). PANWAT, Bend, OR.
- S.N. Navarro, J.M. Wilham, A.G. Rhule, B. Seaver, J.R. Smith and D.M. SHEPHERD. (2004). Immunomodulatory effects of nutraceuticals on phagocytic cells. *The Toxicologist* 78: 811.
- C.J. Funatake, E.A. Dearstyne, L.B. Steppan, D.M. SHEPHERD, E.S. Spanjaard, A. Marshak-Rothstein and N.I. Kerkvliet. (2003). Consequences of TCDD exposure on proliferation, migration, and death of antigen-specific T cells. Northwest Immunotoxicology Conference, Salmon Lake, MT.
- N.I. Kerkvliet, L.B. Steppan and D.M. SHEPHERD. (2001). Immune suppression by TCDD requires Ah receptor expression in T lymphocytes. *The Toxicologist* 66: 177.

## SCIENTIFIC AND PROFESSIONAL SOCIETIES

Pacific Northwest Association of Toxicologists (since 1995)  
 Society of Toxicology (since 1998)  
 American Association for the Advancement of Science (since 1999)  
 American Association of Immunologists (since 2003)  
 American Association of Colleges of Pharmacy (since 2003)  
 American Society of Pharmacognosy (since 2005)

## GRANT ACTIVITY

### Current

*\*Consequences of AhR activation in dendritic cells*

**Principal Investigators:** David M. Shepherd (PI); Celine A. Beamer (Co-Investigator)

**Agency:** National Institute of Environmental Health Sciences/National Institute of General Medical Sciences

**Type:** 2R01 (ES013784), Period: 8/7/13-5/31/18

*\*Development of a novel platform for the selective delivery of AhR agonists to DCs.*

**Principal Investigators:** David M. Shepherd (PI), Fanny Diaz (Co-Investigator); Celine A. Beamer (Co-Investigator)

**Agency:** National Institute of Environmental Health Sciences

**Type:** R03 (ES025286) Period: 4/1/2015-3/31/2018

*\*Development of a novel platform for the selective delivery of AhR antagonists to DCs and T cells.*

**Principal Investigators:** David M. Shepherd (PI), Fanny Diaz (Co-Investigator); B. Paige Lawrence (Co-Investigator)

**Agency:** National Institute of Environmental Health Sciences

**Type:** R01 (ES013784-08S1) Period: 6/1/2016-5/31/2019

*\*Elucidating the role of the AhR in PAH-induced skin inflammatory diseases*

**Principal Investigators:** Celine A. Beamer (PI); David M. Shepherd (Co-Investigator)

**Agency:** Skaggs Scholar Foundation

**Type:** Research Award, Period: 7/1/2017 -6/30/2019

*\*Understanding how activation of the AhR regulates IL-22 production in ILC3s*

**Principal Investigators:** Celine A. Beamer (PI); David M. Shepherd (Collaborator)

**Agency:** National Institute of Environmental Health Sciences

**Type:** R15 (ES027648), Period: 8/15/2017 -8/14/2020

### Submitted/Pending

*\*Role and regulation of type 3 innate lymphoid cells (ILC3s) in non-allergic asthma.*

**Principal Investigators:** Celine A. Beamer (PI); David M. Shepherd (Co-Investigator)

**Agency:** National Institute of Environmental Health Sciences

**Type:** R01; submission date: 6/5/2017

### In Preparation

*\*AhR activation in thymic dendritic cells regulates the development of innate and adaptive lymphocytes.*

**Principal Investigators:** David M. Shepherd (PI); Celine A. Beamer (Co-Investigator)

**Agency:** National Institute of Environmental Health Sciences

**Type:** R01; submission date: 2/5/2018

### Completed

*\*AAI Careers in Immunology Fellowship.*

**Principal Investigators:** David M. Shepherd (PI); Joanna Kreitingner (Mentee)

**Agency:** American Association of Immunologists

**Type:** Immunology Fellowship, Period: 9/1/16-8/31/17

*\*Fate and effects of nanomaterials in the gastrointestinal tract*

**Principal Investigators:** Celine A. Beamer (PI); David M. Shepherd (Co-Investigator)

**Agency:** National Institute of Environmental Health Sciences

**Type:** R15 (ES020993), Period: 5/1/2012 -4/30/2015

This proposal examined the health effects of nanomaterials in the GI tract during homeostasis and IBD.

*\*Aryl hydrocarbon receptor mediated regulation of pulmonary innate lymphocytes*

**Principal Investigators:** Celine A. Beamer (PI); David M. Shepherd (Co-Investigator)

**Agency:** National Institute of General Medical Sciences

**Type:** P30 (GM103338), Period: 9/1/2013 -8/31/2014

This pilot project investigated the role of AhR activation in ILC function in the lungs.

*\*Consequences of AhR Activation in Dendritic Cells*

**Principal Investigator:** David M. Shepherd

**Agency:** National Institute for Environmental Health Sciences

**Type:** RO1 (ES013784), Period: 2/1/06-1/31/13

The aims of this project were to define the effects of Aryl hydrocarbon (Ah) receptor activation in dendritic cells.

*\*Short Term Educational Experiences for Research*

**Principal Investigators:** Andrij Holian (PI); David M. Shepherd (Co-Investigator)

**Agency:** National Institute for Environmental Health Sciences

**Type:** R25 (ES016247), Period: 6/1/07-8/31/12

The aim of this project is to provide summer research experiences for undergraduate students.

*\*Anti-inflammatory effects of protein cage nanoparticles in the gut*

**Principal Investigators:** Andrij Holian (PI); David M. Shepherd (Pilot project Co-PI)

**Agency:** National Center for Research Resources

**Type:** P20 (RR017670), Period: 6/1/11-5/31/13

The aims of this pilot project are to generate preliminary data on the effects of protein cage nanoparticles on gut homeostasis and inflammation in murine models of colitis.

*\*Consequences of Aryl hydrocarbon receptor activation in Crohn's disease*

**Principal Investigators:** Andrij Holian (PI); David M. Shepherd (Pilot project PI)

**Agency:** National Center for Research Resources

**Type:** P20 (RR017670), Period: 6/1/10-5/31/11

The aim of this pilot project was to generate preliminary data on the effects of AhR activation in a murine model of Crohn's disease.

*\*Consequences of Aryl Hydrocarbon Receptor Activation in Crohn's Disease*

**Principal Investigators:** Jenna Benson (PI); David M. Shepherd (Mentor)

**Agency:** National Center for Complementary & Alternative Medicine

**Type:** F32 (AT005557), Period: 8/1/10-12/31/11

The aim of this Pre-doctoral fellowship was to investigate AhR activation in a murine model of Crohn's disease.

*\*Consequences of AhR activation in Dendritic Cells*

**Principal Investigator:** David M. Shepherd

**Agency:** National Institute for Environmental Health Sciences

**Type:** RO1 (ES013784-S1), Period: 5/18/09-8/14/09

The aim of this project was to mentor an undergraduate student on a research project to investigate the effects of Aryl hydrocarbon (Ah) receptor activation in macrophages.

*\*Characterization of Botanical Dietary Supplements*

**Co-Investigators:** David M. Shepherd and Jerry R. Smith

**Agency:** Biotics Research Corporation (Rosenberg, TX)

**Type:** Research Contract, Period 10/01/05 - 10/31/08

This contractual research evaluated the anti-inflammatory effects of complex dietary supplements that are either currently being sold or are in development by Biotics Research Corp.

*\*Consequences of AhR-mediated Signaling in Dendritic Cells*

**Principal Investigator:** David M. Shepherd

**Agency:** National Center for Research Resources

**Type:** P20 (RR17670-01, Project 5), Period: 9/30/02-1/31/06

The aims of this project were to define the specific mechanisms of action of ligands for the Aryl hydrocarbon (Ah) receptor in dendritic cells.

*\*The Immunomodulatory Effects of Select Chinese Herbal Extracts*

**Co-Investigators:** David M. Shepherd and Charles Thompson

**Agency:** NSF EPSCoR

**Type:** MSU # GC154-02-436802, Period 8/01/02-1/31/04

A pilot project to characterize the immunomodulatory effects of several medicinal herbs including Echinacea, Notoginseng and Thunder God Vine.

*\*Characterization of CTIP1 in Immune Cells*

**Principal Investigator:** David M. Shepherd

**Agency:** National Heart, Lung, and Blood Institute

**Type:** F32 (HL69680), Period: 1/2/02 - 7/31/02

The goal of this project was to investigate a novel transcription factor, CTIP1 (Bcl11a), in the immune system.

## STUDENT RESEARCH MENTORING

### Undergraduate/Post-baccalaureate Student Research

*Veronica Grijalva	(NSF-EPSCoR Diversity Student, Summer 2004)
Ben L. Rase	(Pre-Med Student/NSF-EPSCoR Research Award, Spring 2005-Spring 2006)
*Saad Kahn	(NSF-EPSCoR Diversity Student, Summer 2005)
*Troy Chunkapura	(UM Pre-Pharmacy student, Spring 2007)
Natalie Cooper	(UM Pre-Pharmacy student, Fall 2007)
Elizabeth DeMarois	(UM Pre-Pharmacy student, Fall 2008 & Spring 2009)
Alison Kearns	(UM post- baccalaureate student, Fall 2008 & Spring 2009)
Paige Gunderson	(UM undergraduate student, Spring & Summer 2009)
Krissy Finsaas	(UM undergraduate student, Summer 2010- Spring 2011)
Maranda Herner	(UM post-baccalaureate student, Spring 2012- Summer 2012)
Lexi Duce	(UM Pre-Pharmacy student, Spring 2015)
*Shelby Cole	(Biology undergraduate student, Fall 2017- present)
Maya Dahlgren	(UM Pre-Pharmacy student, Spring 2017- present)

### Graduate/Professional Students

Jennifer Errett	(PharmD Student, Fall 2003)
*Mary Hassani	(graduate student rotation, Spring 2003)
*Ava-Gaye Rhule	(Ph.D. research, Summer 2003 – <b>Graduated Summer 2007</b> )
Jason Wilham	(graduate student rotation, Summer 2003)
*Cherokee Rova	(graduate student rotation, Fall 2004)
Amy Erbe	(graduate student rotation, Spring 2005)
Amanda J. Pokorny	(PharmD Student, Fall 2005 & Spring 2006)
*Jaishree Bankoti	(Ph.D. student, Summer 2005 – <b>Graduated Fall 2009</b> )
Brent Dehring	(PharmD Student, Spring 2006)
Jenna Benson	(Ph.D. student, Fall 2007- <b>Graduated Fall 2011</b> )
Thomas Simones	(Ph.D. student, Fall 2007- <b>Graduated Spring 2012</b> )
Natalie Cooper	(PharmD student, Fall 2008- Spring 2009)
Hayley Blackburn	(PharmD/M.S. student, Fall 2011- <b>Graduated Spring 2012</b> )

Alison Kearns	(Ph.D. rotation student, Fall 2009)
Carly Maloney	(PharmD student, Fall 2009)
Joanna Kreitinger	(Ph.D. student, Fall 2013- present)
*Shelby Cole	(PharmD student, Spring 2015- Spring 2017)
Dalton Cook	(PharmD student, Spring 2015- present)

\* **denotes minority/underrepresented student**