

Curriculum Vitae

SUSAN ELIZABETH MURRAY, PhD

Research Assistant Professor
Department of Molecular Microbiology and Immunology
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Education:

- Ph.D. **Oregon Health & Science University**, Molecular Microbiology and Immunology, 2002
“Chronic activation of corticotropin-releasing hormone pathways impairs B cell development and thymus-dependent humoral immune responses”
Advisor: Mary Stenzel-Poore, PhD
- B.S. **University of Wisconsin-Madison**, Zoology, with Honors, 1994

Research Experience:

- 2013-current **Research Assistant Professor:** OHSU, Department of Molecular Microbiology and Immunology, Laboratory of David Parker, PhD
Area of Research: Peripheral self-tolerance and costimulation of CD4 T cells through the non-canonical NF- κ B signaling pathway
- 2010-2013 **Senior Research Associate:** OHSU, Department of Molecular Microbiology and Immunology, Laboratory of David Parker, PhD
Area of Research: Peripheral self-tolerance and costimulation of CD4 T cells through the non-canonical NF- κ B signaling pathway
- 2005-2010 **Postdoctoral Fellow:** OHSU, Department of Molecular Microbiology and Immunology, Laboratory of David Parker, PhD
Area of Research: Peripheral self-tolerance and costimulation of CD4 T cells through the non-canonical NF- κ B signaling pathway
- 2002-2003 **Postdoctoral Fellow:** OHSU, Department of Molecular Microbiology and Immunology and Vaccine and Gene Therapy Institute, Laboratories of Mary Stenzel-Poore, PhD, and Janko Nikolich-Zugich, MD, PhD
Area of Research: Immune responses and vaccination in aged and immunocompromised populations
- 1997-2002 **Graduate Research Assistant:** OHSU, Department of Molecular Microbiology and Immunology, Laboratory of Mary Stenzel-Poore, PhD
Area of Research: Effects of stress and glucocorticoid hormones on B cell development and antibody responses
- 1996-1997 **Research Assistant:** Veterans Affairs Medical Center, Portland, OR, Laboratory of Dennis Bourdette, MD
Area of Research: Auto-antigen T cell responses in multiple sclerosis

- 1995-1996 **Research Assistant:** University of Wisconsin-Madison, School of Nursing, Madison, WI, Laboratory of Donna McCarthy, RN, PhD
Area of Research: Role of pro-inflammatory cytokines in tumor-induced cachexia
- 1993-1995 **Student Research Assistant:** University of Wisconsin-Madison, University Hospital and Clinics, Laboratory of James Gern, MD
Area of Research: Effect of rhinoviral infection on antigen-specific T cell responses

Fellowships and Awards:

- 2008 **Lupus Autoimmunity Biosymposia Travel Award**, Biosymposia award committee
- 2006-2007 **Hematology Training Grant**, OHSU
- 2003-2004 **Molecular Microbiology and Immunology Training Grant**, OHSU
- 2000 **Sears Memorial Award**, Department of Molecular Microbiology and Immunology, OHSU
- 1999-2002 **Molecular Microbiology and Immunology Training Grant**, OHSU
- 1999 **Tartar Trust Fellowship**, OHSU
- 1997-1998 **Molecular and Cell Biology Fellowship**, OHSU School of Medicine
- 1994 **Senior Honors Thesis Summer Grant**, University of Wisconsin-Madison
- 1990-1994 **Wisconsin Academic Excellence Scholarship**, University of Wisconsin-Madison

Teaching Experience:

- 2013-present **Foundations of Medicine Block Lead Scientist:** OHSU, School of Medicine
- Hematology/immunology faculty leader on the curriculum transformation development team
 - One year position to develop a new curriculum for first year medical students
- 2010-2011, 2013 **Adjunct Faculty:** University of Portland, Department of Biology
- BIO 460: Immunology
 - Developed and taught this 3 credit course for 3 semesters
- 2009-2013 **Lecturer and small group discussion leader:** OHSU, School of Medicine
- MSCI 614: Biologic Basis of Disease, Immunology section
 - Gave 2-3 lectures per year from 2009-2012
 - Led 5-6 small group discussions per year
- 2000-2003 **Small group discussion leader:** OHSU, School of Medicine
- MSCI 614: Biologic Basis of Disease, Immunology section
 - Led 5-6 small group discussions per year
- 2008-2010, 2013 **Instructor and course co-organizer:** OHSU, Department of Molecular Microbiology and Immunology
- MBIM 610: Introduction to Immunology

- Developed and taught this 3 credit course for 3 years, and gave 1 lecture the 4th year
- 2004-2005 **Visiting Assistant Professor:** University of Portland, Department of Biology
- BIO 207: Introduction to Cell Biology & Genetics
 - BIO 277: Introduction to Cell Biology & Genetics Lab
 - Organized the laboratory course and co-organized the lecture course
 - Full teaching load of one lecture course and 3-4 lab sections per semester
- 2002 **Instructor:** Advanced Immunology, OHSU Department of Molecular Microbiology and Immunology
- MBIM 612: Advanced Immunology
 - Gave 2 lectures in this course
- 2000 **Guest Lecturer:** University of Portland, Department of Biology
- BIO 336: Embryology and Developmental Biology
 - Gave one guest lecture on development of the immune system
- 1994-1996 **Academic tutor:** University of Wisconsin-Madison, Athletic Department
- Individual tutor for undergraduate athletes in upper and lower division biology, mathematics, and Italian language courses
 - Tutored 2-4 students per semester, 2-6 hours per week

Research Publications:

1. Y. Koguchi, **S.E. Murray**, D.C. Parker. NF-kappa B inducing kinase negatively regulates development of invariant natural killer T cells. *Submitted* (2013)
2. **S.E. Murray**. Cell-intrinsic role for NF-kappa B-inducing kinase in peripheral maintenance but not thymic development of Foxp3⁺ regulatory T cells. *PLoS One, Accepted* (2013)
3. A.M. Rowe, **S.E. Murray**, H.P. Raué, Y. Koguchi, M.K. Slifka, D.C. Parker. A cell-intrinsic requirement for NF-kB-inducing kinase (NIK) in the generation and/or maintenance of T cell memory. *J Immunol, Accepted* (2013)
4. **S.E. Murray**, K. Gardner Toren, D.C. Parker. Peripheral CD4 T cell tolerance is induced in vivo by rare antigen-bearing B cells in follicular, marginal zone, and B-1 subsets. *Eur J Immunol* 43: 1818-1827 (2013)
5. T. Dillon, M. Takahashi, Y. Li, S. Tavisala, **S.E. Murray**, A.E. Moran, D.C. Parker, J.S. Stork. B-Raf is required for positive selection and survival of DP cells, but not for negative selection of SP cells. *Int Immunol* 25: 259-269 (2013)
6. **S.E. Murray**, F. Polesso, A. M. Rowe, S. Basak, Y. Koguchi, K. Gardner Toren, A. Hoffmann, D. C. Parker. NF-kB-inducing kinase plays an essential T cell intrinsic role in graft-versus-host disease and lethal autoimmunity in mice. *J Clin Invest* 121:4775 (2011)
7. Williams, C.A., **S.E. Murray**, A.D. Weinberg, D.C. Parker. OX40-driven Differentiation to Effector Function is Independent of Additional Costimulatory Signals but is Dependent on IL-2 Receptor Signaling. *J Immunol* 178: 7694-7702 (2007)
8. **Murray, S.E.**, H.L. Rosenzweig, M. Johnson, M.O. Husing, K. Sawicki, M.P. Stenzel-Poore. Overproduction of corticotropin-releasing hormone blocks germinal center formation: role of

- corticosterone and impaired follicular dendritic cell networks. *J Neuroimmunol* 156: 31-41 (2004)
9. **Murray, S.E.**, H.R. Lallman, A.D. Heard, M.B. Rittenberg, M.P. Stenzel-Poore. A genetic model of stress displays decreased lymphocytes and impaired antibody responses without altered susceptibility to *S. pneumoniae*. *J Immunol* 167: 691-698 (2001)
 10. Coste, S., R. Kesterson, K. Heldwein, S. Stevens, A. Heard, J. Hollis, **S. Murray**, J. Hill, G. Pantley, A. Hohimer, D. Hatton, T. Phillips, D. Finn, M. Low, M. Rittenberg, P. Stenzel, M. Stenzel-Poore. Abnormal adaptations to stress and impaired cardiovascular function in mice lacking corticotropin-releasing hormone receptor-2. *Nature Genetics* 24: 403-406 (2000)
 11. Chou, Y., D. Bourdette, D. Barnes, T. Finn, **S. Murray**, L. Unsicker, I. Robey, R. Whitham, A. Buenafe, M. Allegretta, H. Offner, A. Vandembark. IL-7 enhances human T cell response by increasing expression of IL-2R α and β chains. *J Neuroimmunol* 96: 101-111 (1999)
 12. **Murray, S.**, S. Subramanian, D. Bourdette, R. Jones. Simplified method of identifying severe combined immunodeficient (SCID) mice versus non-SCID mice by flow cytometric analysis of peripheral blood. *Cytometry* 32: 274-279 (1998)
 13. McCarthy, D., **S. Murray**, D. Galagan, J. Gern, P. Hutson. Meperidine attenuates the secretion but not the transcription of interleukin-1 beta in human mononuclear leukocytes. *Nursing Res* 47:19-24 (1998)
 14. **Murray, S.**, K. Schell, D. McCarthy, M. Albertini. Tumor growth, weight loss and cytokines in SCID mice. *Cancer Letters* 111: 111-115 (1997)
 15. Gern, J., E. Dick, W. Lee, **S. Murray**, K. Meyer, Z. Handzel, W. Busse. Rhinovirus enters but does not replicate inside monocytes and airway macrophages. *J Immunol* 156: 621-627 (1996)

Review publications:

1. **Murray, S.E.** and Stenzel-Poore, M.P. Corticotropin-releasing hormone and chronic HPA activation: Immunomodulatory consequences. In *Pituitary and Periphery: Communication In and Out*, C.J. Strasburger, Ed. (2005)
2. Coste, S.C., **S.E. Murray**, M.P. Stenzel-Poore. Gene targeted animals with alterations in corticotropin pathways: new insights into allostatic control. In *Handbook on Stress, Immunology and Behavior*, T. Steckler, Ed., Elsevier Science B.V. (2004)
3. **Murray, S.E.** and M.P. Stenzel-Poore. CRH, stress, and the immune system. In *Encyclopedia of Hormones*. H.L. Henry and A.W. Norman, Eds., Academic Press: San Diego. 325-329 (2003)
4. **Murray, S.E.***, S.C. Coste*, I. Lindberg, M.P. Stenzel-Poore. Genetic mutants with dysregulation of corticotropin pathways. In *Transgenic Models in Endocrinology*, M. Castro, Ed., Kluwer Academic Publishing: Boston. 143-173 (2001)
5. Coste, S.C.*, **S.E. Murray***, M.P. Stenzel-Poore. Animal models of CRH excess and CRH receptor deficiency display altered adaptations to stress. *Peptides* 22: 733-741 (2001)

*These authors contributed equally to this work

Abstracts and Presentations:

- 2011 **Murray, S.E.**, F. Polesso, A. M. Rowe, and D. C. Parker. NF- κ B-inducing kinase plays an essential T cell intrinsic role in graft-versus-host disease and OX40-mediated costimulation, and its overexpression causes lethal autoimmunity (**poster + oral presentation**). *American Academy of Immunologists*
- 2011 Polesso, F., **S.E. Murray**, A.M. Rowe, D.C. Parker. NIK overexpression intrinsically inhibits regulatory T cell function. *American Academy of Immunologists*
- 2009 **Murray, S.E.**, A.M. Rowe, D.C. Parker. The alternative NF-kappa B pathway is essential for OX40-induced CD4 T cell differentiation and effector function. *American Academy of Immunologists*
- 2008 **Murray, S.E.**, K. Gardner-Toren, E. Martin, D.C. Parker. Small numbers of antigen-expressing B-1 and marginal zone B cells can tolerize antigen-specific CD4 T cells in vivo (**poster + oral presentation**). *Lupus Autoimmunity Biosymposia*
- 2008 **Murray, S.E.**, A.M. Rowe, D.C. Parker. OX40-induced CD4 T cell differentiation depends on signaling via NF-kappa B-inducing kinase. *Midwinter Conference of Immunologists*
- 2007 Parker, D.C. and **S.E. Murray**. Comparison of the ability of B-1, Marginal Zone, and Follicular B cells to induce CD4 T cell tolerance in vivo. *Midwinter Conference of Immunologists*
- 2007 **Murray, S.E.** and D.C. Parker. Differential ability of B-1, Marginal Zone, and Follicular B cells to induce peripheral CD4 T cell tolerance in vivo. *Keystone Symposia—Biology of B Cells in Health and Disease*
- 2001 **Murray, S.E.**, M.O. Huisling, H.R. Lallman, M.P. Stenzel-Poore. Impaired germinal center formation and altered follicular dendritic cell networks in a genetic model of stress. *Keystone Symposia—Interfaces Between Innate and Adaptive Immunity*
- 2001 **Murray, S.E.**, H.L. Rosenzweig, M.O. Huisling, K. Sawicki, E.R. Sanders, M. Johnson, M.B. Rittenberg, M.P. Stenzel-Poore. Chronic HPA activation and exogenous corticosterone treatment inhibit germinal center formation. *FASEB: American Association of Immunologists*
- 2000 **Murray, S.E.**, H.R. Lallman, A.D. Heard, M.P. Stenzel-Poore. Altered leukocyte populations and antibody responses in a genetic model of stress. *Midwinter Conference of Immunologists*
- 2000 **Murray, S.E.**, M.O. Huisling, H.R. Lallman, A.D. Heard, M.P. Stenzel-Poore. Altered B cell responses and germinal center formation in a genetic model of stress. *FASEB: American Association of Immunologists*
- 1999 **Murray, S.**, A. Heard, M. Stenzel-Poore. Overproduction of CRH in transgenic mice: a model of immunomodulation in chronic stress. *Midwinter Conference of Immunologists*
- 1999 **Murray, S.**, A. Heard, J. Hill, M. Stenzel-Poore. CRH transgenic mice have altered leukocyte populations and decreased susceptibility to *S. pneumoniae* infection after immunization. *International Society of Neuroimmunomodulation*

- 1995 Joseph, B.E., **S.E. Murray**, J.E. Gern. Rhinovirus (RV) interferes with antigen presenting cell function through an ICAM-1-dependent pathway. *J Allergy Clin Immunol* 95 (1): abstract 252
- 1994 Joseph, B.E., **S.E. Murray**, J.E. Gern. Rhinovirus (RV) specifically inhibits antigen-specific T cell proliferation. *J Allergy Clin Immunol* 93 (1): abstract 242

Professional Service Activities:

Peer reviewer for the following journals: The Journal of Immunology, PLoSOne, Immunology and Cell Biology