

Curriculum Vita

Name: Keith M. Erikson
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updated 08/09

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Department of Nutrition
University of North Carolina Greensboro
Greensboro, NC 27402
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Education:

Postdoctoral Research Fellow, Wake Forest University School of Medicine, 2001-2003
Ph.D. in Nutrition, The Pennsylvania State University, December 2000
M.S. in Nutrition, The Pennsylvania State University, May 1997
B.A. in Physical Education, Cedarville College, 1986

Employment:

Associate Professor, Dept. of Nutrition, University of North Carolina Greensboro, 2009-present.

Assistant Professor, Dept. of Nutrition, University of North Carolina Greensboro, 2003-2009.

Postdoctoral Research Associate, Dept. Physiology/Pharmacology, Wake Forest University School of Medicine, 2001-2003.

Lecturer, Dept. of Nutrition, University of North Carolina Greensboro, Fall 2000.

Journal Publications:

Williams, B.B., Vadodaria, B.K., Anderson, J.G., Kwakye, G.F., Li, D., Aschner, M., Erikson, K.M., Bowman, A.B. (2009) Altered Manganese Homeostasis in Huntington's Disease. J Neurochem (in press).

Aschner, M., Erikson, K.M., Herrero Hernandez, E., Tjalkens, R. (2009) Manganese and its Role in Parkinson's disease: from Transport to Neuropathology. NeuroMolecular Med; ePub Aug 2006.

Messer, J.G., Kilbarger, A.K., Erikson, K.M., Kipp, D.E. (2009) Iron overload alters iron-regulatory genes and proteins, down-regulates osteoblastic phenotype, and is associated with apoptosis in fetal rat calvaria cultures. Bone; ePub July 27.

Journal Publications:

Anderson, J.G., Fordahl, S.C., Cooney, P.T., Weaver, T.L., Colyer, C.L., and Erikson, K.M. (2009) Extracellular Norepinephrine, Norepinephrine Receptor and Transporter Protein and mRNA Levels Are Differentially Altered in the Developing Rat Brain Due to Dietary Iron Deficiency and Manganese Exposure. *Brain Res* 1281:1-14.

Fitsanakis, V.A., Thompson, K.N., Deery, S.E., Milatovic, D., Shihabi, Z.K., Erikson, K.M., Brown, R.W., Aschner, M. (2009) A chronic iron deficient/high-manganese diet in rodents results in increased brain oxidative stress and behavioral deficits in the morris water maze. *Neurotox Res* 15:167-178.

Carneiro, A.M., Airey, D.C., Thompson, B., Zhu, C.B., Lu, L., Chesler, E.J., Erikson, K.M., Blakely, R.D. (2009) Functional coding variation in recombinant inbred mouse lines reveals multiple serotonin transporter-associated phenotypes. *Proc Natl Acad Sci U.S.A.* 106:2047-2052.

Zhang, N., Fitsanakis, V.A., Erikson, K.M., Aschner, M., Avison, M.J., Gore, J.C. (2009) A Model for the Analysis of Competitive Relaxation Effects of Manganese and Iron *in Vivo*. *NMR in Biomedicine* 22:391-404.

Anderson, J.G., Fordahl, S.C., Cooney, P.T., Weaver, T.L., Colyer, C.L., and Erikson, K.M. (2008) Manganese exposure alters extracellular GABA, GABA receptor and transporter protein and mRNA levels in the developing rat brain. *Neurotoxicology* Nov;29(6):1044-53.

Erikson, K.M., Dorman, D.C., Lash, L.H., Aschner, M. (2008) Duration of airborne-manganese exposure in rhesus monkeys is associated with brain regional changes in biomarkers of neurotoxicity. *Neurotoxicology* 29:377-385.

Fitsanakis, V.A., Zhang, N., Anderson, J.G., Erikson, K.M., Avison, M.J., Gore, J.C., Aschner, M. (2008) Measuring Brain Manganese and Iron Accumulation in Rats Following 14-weeks of Low-Dose Manganese Treatment Using Atomic Absorption Spectroscopy (AAS) and Magnetic Resonance Imaging (MRI). *Toxicol. Sci* 103:116-124.

Gellein, K., Flaten, T.P., Erikson, K.M., Aschner, M., Syversen, T. (2008) Leaching of trace elements from biological tissue by formalin fixation. *Biol Trace Elem Res.* 121:221-225.

Erikson, K.M., Dorman, D.C., Lash, L.H., Aschner, M. (2007) Manganese Inhalation by Rhesus Monkeys is Associated with Brain Regional Changes in Biomarkers of Neurotoxicity. *Tox Sci.* 97:459-466.

Erikson, K.M., Thompson, K., Aschner, J., and Aschner, M. (2007) Manganese Neurotoxicity: A Focus on the Neonate. *Pharmacol and Therap.* 113:369-377.

Journal Publications:

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Anderson, J.G., Cooney, P.T., Erikson, K.M. (2007) Brain Manganese Accumulation is Inversely Related to GABA Uptake in Male and Female Rats. *Toxicol. Sci.*95: 188-195.

Anderson, J.G., Cooney, P.T., Erikson, K.M. (2007) Inhibition of DAT function attenuates manganese accumulation in the globus pallidus *Environ Toxicol and Pharmacol* 23:179-184.

Fitsanakis, V.A., Erikson, K.M., Garcia, S.J., Evje, L., Syversen, T., Aschner, M. (2006) Brain Accumulation of depleted uranium in rats following 3 or 6 month treatment with implanted depleted uranium pellets. *Biol Trace Elem Res* 111: 185-197.

Taylor, M.D., Erikson, K.M., Dobson, A.W., Fitsanakis, V., Dorman, D.C., and Aschner, M. (2006) Effects of Inhaled Manganese on Biomarkers of Oxidative Stress in the Rat Brain. *Neurotoxicology* 27:788-797

Erikson, K.M., Dorman, D.C., Fitsanakis, V., Lash, L.H., Aschner, M. (2006) Alterations of oxidative stress biomarkers due to *In utero* and neonatal exposures of airborne manganese. *Biol Trace Elem Res* 111:199-215

Dobson, A.W., Lack, A.K., Erikson, K.M. and Aschner, M. (2006) Depleted uranium is not toxic to rat brain endothelial (RBE4) cells. *Biol Trace Elem Res* 110(1): 61-72.

Fitsanakis, V.A., Au, Catherine, Erikson, K.M., Aschner, M. (2006) The effects of manganese on glutamate, γ -aminobutyric acid, and dopamine regulation. *Neurochem. Intl.* 48(6-7): 426-433.

Erikson, K.M., and Aschner, M. (2006) Increased manganese uptake by primary astrocyte cultures with altered iron status is mediated primarily by divalent metal transporter. *Neurotoxicology* 27:125-130.

Erikson, K.M., John, C.E., Jones, S.R., Aschner, M. (2005) Manganese accumulation in striatum of mice exposed to toxic doses is dependent upon a functional dopamine transporter. *Environ Toxicol Pharmacol.* 20:390-394.

Erikson, K.M., Dorman, D.C., Lash, L., Aschner, M. (2005) Persistent alterations in biomarkers of oxidative stress due to combined in utero and neonatal manganese inhalation. *Biol Trace Elem Res.* 104(2):151-164.

Erikson, K.M., Syversen, T., Aschner, J.L., and Aschner M. (2005) Interactions between excessive manganese-exposure and dietary iron-deficiency in neurodegeneration. *Environ. Toxicol. Pharmacol.* 19:415-421.

Journal Publications:

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Aschner, M., Erikson, K.M., and Dorman, D.C. (2005) A Review of Manganese Toxicokinetics. *Critical Reviews in Toxicology*. 35:1-32.

Erikson, K.M., Dobson, A.W., Dorman, D.C., and Aschner, M. (2004) Does Manganese Induce Oxidative Stress in the Rat Brain? *Science and the Total Environment*. 334-335:409-416.

Erikson, K.M., Dorman, D.C., Lash, L.H., Dobson, A.W., and Aschner, M. (2004) Airborne manganese exposure differentially affects endpoints of oxidative stress in an age and sex-dependent manner *J Biol Trace Elem*. 100:49-62.

Erikson, K.M., Syversen, T., Steinnes, E., and Aschner, M. (2004) Globus Pallidus: A target brain region for divalent metal accumulation due to dietary iron deficiency. *J Nutr Biochem* 15:335-341.

Dobson, A.W., Erikson, K.M., and Aschner, M. (2004) Manganese Neurotoxicity. *Ann NYAS*, 1012:115-129.

Dobson, A.W., Weber, S., Dorman, D.C., Lash, L.K., Erikson, K.M., and Aschner, M. (2003) Oxidative Stress is Induced in the Rat Brain Following Repeated Inhalation Exposure to Manganese Sulfate. *Biol Trace Elem Res* 93(1-3) 113-126.

Erikson, K.M. and Aschner, M. (2003) Manganese neurotoxicity and GABA/glutamate interactions. *Neurochem Intl* 43(4-5):475-480.

Beard, J.L., Erikson, K.M., and Jones, B.C. (2003) Lactational iron deficiency results in irreversible changes in dopamine metabolism in the rat. *J Nutr* 133(4):1174-1179.

Erikson, K.M. and Aschner, M. (2002) Manganese causes differential regulation of glutamate transporter (GLAST), taurine transporter, and metallothionein in cultured rat astrocytes. *Neurotoxicology* 23(4-5): 595-602.

Erikson, K.M., Suber, R.L., and Aschner, M. (2002) Glutamate/aspartate transporter (GLAST), taurine transporter and metallothionein mRNA levels are differentially altered in astrocytes exposed to manganese chloride, manganese phosphate or manganese sulfate. *Neurotoxicology* 23(3): 281-288.

Weber, S., Dorman, D.C., Lash, L.H., Erikson, K., Vrana, K.E., and Aschner, M. (2002) Effects of Manganese on the developing rat brain: oxidative-stress related endpoints. *Neurotoxicology* 23(2): 169-175.

Aschner, M., Shanker, G., Erikson K., Yang, J., and Mutkus, L.A. (2002) The uptake of manganese in brain endothelial cultures. *Neurotoxicology* 23(2): 165-168.

Journal Publications:

Beard, J.L., Erikson, K.M., and Jones, B.C. (2002) Neurobehavioral analysis of developmental iron deficiency in rats. *Behav Brain Res* 134: 517-524.

Erikson, K.M, Shihabi, Z.K., Aschner, J.L., Aschner, M. (2002) Manganese accumulates in iron deficient rat brain regions in a heterogeneous fashion and is associated with neurochemical alterations. *Biol Trace Elem Res* 87(1-3): 143-156.

Gerhard, G.S., Kaufmann, E.J., Wang, X., Erikson, K.M., Abraham, J., Grundy, M., Beard, J.L., and Chorney, M.J. (2002) Genetic differences in hepatic lipid peroxidation potential and iron levels in mice. *Mech. of Age. and Develop.* 123: 167-176.

Erikson, K.M., Jones, B.C., Hess, E.J. and Beard, J.L. (2001) Altered functioning of dopamine D₁ and D₂ receptors in brains of iron deficient rats. *Pharmacol. Biochem. Behav.* 69:409-18.

Erikson, K.M., Jones, B.C. and Beard, J.L. (2000) Iron deficiency alters dopamine transporter functioning in rat striatum. *J. Nutr.* 130(11):2831-2837.

Rosales, F.J., Jing-Tsz, J., Pinero, D.J., Erikson, K.M., Beard, J.L. and Ross, A.C. (1999) Iron Deficiency in young rats alters the distribution of Vitamin A between plasma and liver, and between retinol and retinyl esters. *J. Nutr.* 129:1223-1228.

Erikson, K.M., Beard, J.L. and Connor, J.R. (1998) Distribution of brain iron, ferritin and transferrin in the 28 day old piglet. *J. Nutr. Biochem.* 9:276-284.

Nelson, C.L., Erikson, K.M., Pinero, D.J. and Beard J.L. (1997) In vivo dopamine metabolism in iron deficiency anemia. *J. Nutr.* 127:2282-2288.

Erikson, K.M., Pinero, D.J., Connor, J.R. and Beard, J.L. (1997) Regional brain iron, ferritin and transferrin concentrations during iron deficiency and iron repletion in developing rats. *J. Nutr.* 127:2030-2038.

Grants and Awards

Grants Received

<i>Title</i>	<i>Sponsor</i>	<i>Funding Period</i>	<i>Amount</i>	<i>Role</i>
Neurobiological dysfunction due to dietary iron/manganese imbalance	UNCG New Faculty	04/2004- 07/2005	\$5,000	P.I.
Neurobiological dysfunction due to dietary iron/manganese imbalance	UNCG Summer Excell.	06/2004- 08/2004	\$4,000	P.I.
Neurotoxicology of dietary iron/manganese imbalance	NIEHS DHHS- R15 ES01379 1-01	01/2005- 12/2007	\$209,500	P.I.

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Multi-detection Microplate Reader to Enhance Research Competitiveness in Nutrition	USDA	07/2005-07/2006	\$18,743	Co- PD
Mechanisms of Manganese Neurotoxicity (Michael Aschner, P.I., Vanderbilt University)	NIEHS DHHS	12/06 11/11	N/A	Consult.
Mechanisms of Manganese Neurotoxicity: Link between oxidative stress and glutathione depletion	NIEHS DHHS- R15 PA-06- 042	12/07- 11/10	\$209,500	P.I.

Awards

International Life Science Institute Future Leader Finalist, 2007
UNCG, Research Excellence Award (Junior Faculty), 2007
UNCG, School of Human Environmental Science Early Career Research Excellence Award, 2006

Primary Collaborations:

- Dr. Michael Aschner at Vanderbilt University:

We are currently measuring the manganese levels in *C. elegans* that have had different metal transporters knocked out. Dr. Aschner has a funded RO1 which employs this worm model and thus I am a consultant on this grant.

- Dr. Brad Racette at Washington University in St. Louis Medical School

Dr. Racette is currently collecting specimens from patients with liver disease and we are measuring serum manganese and iron concentrations. Dr. Racette is monitoring 856 welders for neurological signs and metal imbalances. He has enlisted us to measure the serum manganese and iron in these patients.

- Dr. Christa Colyer at Wake Forest University

Dr. Colyer has expertise in capillary electrophoresis (CE) and is analyzing the cerebrospinal fluid we are collecting in our experiments for amino acid neurotransmitters (Glutamate, GABA). CE is now regarded as the gold standard in vivo measurement for these neurotransmitters.

- Dr. Aaron Bowman at Vanderbilt University:

Since November 2007, we have worked on a collaborative project investigating the mechanism(s) involved in the altered metal metabolism associated with Huntington's

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Disease. In particular, we have been focusing on our novel finding of manganese deficiency inherent in animals and cells that express the mutant HD protein.

Teaching Experience

Spring 2009 Instructor, Introductory Nutrition (NTR-213)

Fall 2008 Instructor, Antioxidants and Bioactive Components of Food (NTR-627)

Spring 2008 Instructor, Introductory Nutrition (NTR-213)
 Instructor, Seminar in Nutrition (NTR-609)

Fall 2007 Instructor, Antioxidants and Bioactive Components of Food (NTR-627)

Teaching Experience

Spring 2007 Instructor, Antioxidants and Bioactive Components of Food (NTR-627)

Fall 2006 Instructor, Nutrition: Facts and Fantasies (NTR-213)

Spring 2006 Instructor, Antioxidants and Bioactive Components of Food (NTR-627)
 Instructor, Seminar in Nutrition (NTR-609)

Fall 2005 Instructor, Nutrition: Facts and Fantasies (NTR-213)

Spring 2005 Instructor, Antioxidants and Bioactive Components of Food (NTR-627)

Fall 2004 Instructor, Nutrition: Facts and Fantasies (NTR-213)
 Instructor, Seminar in Nutrition (NTR-609)

Spring 2004 Instructor, Nutrition: Facts and Fantasies (NTR-213)

Fall 2003 Instructor, Seminar in Nutrition (NTR-609)
 Co-Instructor, Nutrient Metabolism (NTR-625)

Fall 2000 Instructor, Introduction to Nutrition (NFS-213),
 Co-instructor, Nutrient Metabolism (NFS-625)
 Department of Nutrition and Foodservice Systems,
 University of North Carolina Greensboro

Summer 1997 Lab instructor, Introductory Foods, (Nutr120),
 Department of Nutrition, Penn State University.
 Co-instructor for course.

Fall 1995-1998 Teaching assistant, Nutrition and Disease (Nutr452),
 Department of Nutrition, Penn State University.
 Lectured several times a semester, wrote weekly

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quizzes, graded exams and papers, led review sessions.

Summer 1995

Instructor, Introduction to Nutrition (Nutr 251),
Department of Nutrition, Penn State University. Co-taught
3 credit course which involved giving 50% of the lectures,
grading exams, meeting individually with students.

Committee memberships:

National

- Society of Toxicology, Committee on K-12 Education

Committee memberships:

University

- Institutional Animal Care and Use Committee
- Russ Harter Award committee (Judge Abstracts and then papers submitted by Undergrad researchers)
- Search Committee for Nanotechnology Center Director

School

- Faculty Professional Development

Department

- Bench Research Committee
- NTR 213 Committee (develop and modify the introductory nutrition course)
- ASN Notes
- Graduate Committee
- Faculty Search committee (2005 & 2006)

Graduate Students

- Joel Anderson PhD candidate-I serve as his research mentor and co-chair of his thesis committee
- Kristen Phillips MS candidate-I serve as her research mentor and chair of her thesis committee
- Steven Fordahl MS candidate-I serve as his research mentor and chair of his thesis.
- I serve on the committee of four doctoral students and one master of science student.

Professional Activities:

Reviewer:

Journals:

Brain Research

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Biological Trace Element Research
Environmental Research
Environmental Toxicology and Pharmacology
Future Neurology
Inhalation Toxicology
InVitro Toxicology
Journal of Toxicology and Environmental Health
Journal of Neurochemistry
Neurochemical Research
Neuroscience
Neuroscience Letters

Reviewer:

Journals:

Neurotoxicology
Neurotoxicology and Teratology
Pharmacological Reports
Physiology and Behavior
Toxicological Sciences
Toxicology and Applied Pharmacology
Toxicology and Environmental Health

Professional Activities:

Reviewer:

Grants:

Canada Foundation for Innovation Grant (2004)
Center for Molecular Toxicology Pilot Study Grant, Vanderbilt University (2007)

Professional Memberships

Society of Toxicology
American Society for Nutrition

Invited Presentations:

North Carolina A&T State University, Nutrition Departmental Colloquium, October 2008. Nutritional Implications of Manganese Neurotoxicity.

Society of Toxicology, Seattle, WA March 2008. Manganese exposure alters GABA and norepinephrine transporter protein expression in the developing rat brain (My graduate Student presented this poster).

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Hamner Institutes of Health, Durham, NC July 2007. Neurobiological and nutritional implications of manganese toxicity.

Experimental Biology, Washington, DC, April 2007. Iron deficiency and manganese toxicity are associated with differential effects on neurotransmitter uptake. (My graduate student presented this poster).

Society of Toxicology, San Diego, March 2006. Determination of Brain Manganese Accumulation using Magnetic Resonance Imaging and Atomic Absorption Spectroscopy.

Presentations:

Society of Toxicology, San Diego, March 2006. Effects of Manganese Chloride on 3 isoforms of Divalent Metal Transporter Knockouts in *C. Elegans*.

Society of Toxicology, San Diego, March 2006. Effect of Dopamine Transporter Blockade on Dietary Iron/Manganese Interactions in the Developing Brain. (My graduate Student Joel Anderson presented this poster)

Society of Toxicology, San Diego, March 2006. Dietary iron modulates manganese neurotoxicity. Coauthored with Dr. Michael Aschner and presented in the symposium "Manganese Neurotoxicity: From Worms to Man"

International Neurotoxicology Conference, Research Triangle Park, NC, September 2005. Use of MRI to determine the distribution of brain Mn in male Sprague-dawley rats.

Experimental Biology, San Diego, CA April 2005. Brain manganese accumulation due to toxicity is mediated by the dopamine transporter.

Society of Toxicology, New Orleans, LA March 2005. Determination of depleted uranium (DU) in rats following 6-month exposure to surgically implanted DU pellets.

Seminar Speaker, Biology Dept., UNCG, Feb. 2004. Neurochemical and Neurotoxicological implications of iron deficiency.

Seminar Speaker, Dept. Natural Sciences, Messiah College, Grantham, PA. April, 2003. Brain manganese accumulation due to iron deficiency causes neurochemical alterations.

Society of Toxicology, Salt Lake City, UT, March 2003. Increased manganese uptake in iron deprived and iron overloaded primary astrocyte cultures is due to increased divalent metal transporter. K.M. Erikson, A.W. Dobson, M. Aschner.

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Seminar Speaker, Dept. Physiology/Pharmacology, Wake Forest University School of Medicine, February 2003. Neurochemical alterations due to Iron and Manganese interactions in the brain.

Society for Neuroscience, Orlando, FL, November, 2002. Irreversible effects of early iron-deficiency on brain dopamine systems in the rat. B. C. Jones, K. M. Erikson, J. L. Beard.

Society of Toxicology, Nashville, TN, March 2002. Iron deficiency causes region-specific manganese accumulation in developing rat brains. K. M. Erikson, M. Aschner.

Presentations:

Experimental Biology, Orlando, FL, April 2001. Iron repletion does not normalize brain dopamine metabolism. J. Beard, K. Erikson, B. Jones, Q. Zhang.

Society for Neuroscience, New Orleans, LA November, 2000. Early iron deficiency alters neurochemical and behavioral sensitivity to cocaine in rats. K.M. Erikson, B.C. Jones and J.L. Beard.

Experimental Biology, San Diego, CA, April 2000. Iron deficiency alters dopamine metabolism in rat striatum by decreasing dopamine transporter density. K.M. Erikson, B.C. Jones and J.L. Beard.

Colloquium speaker, Graduate Program in Nutrition, The Pennsylvania State University, November, 1999. Entitled: Iron Deficiency alters rat brain dopamine metabolism.

Experimental Biology, Washington DC, April 1999. Regional Differences in Rat Brain Dopamine Receptor Functioning Due to Iron Deficiency. Q. Zhang, K.M. Erikson and J.L. Beard.

Experimental Biology, Washington DC, April 1999. Dopamine Transporter Functioning is Altered in Rat Striatum Due to Iron Deficiency. K.M. Erikson, Q. Zhang and J.L. Beard.

Experimental Biology, San Francisco, CA April 1998. Tissue Transferrin Receptor, Transferrin and Ferritin ELISA Assays to Assess Levels in Iron Deficient Anemic Rats. N.Q. Li, D.J. Pinero, K. Erikson, J.R. Connor and J.L. Beard.

Experimental Biology, San Francisco, CA April 1998. Regional Brain Iron, Transferrin Receptor and Transferrin Levels in Iron Deficient Anemic Rats. J.L. Beard, N.Q. Li, D.J. Pinero, K. Erikson and J.R. Connor.

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Experimental Biology, New Orleans, LA April, 1997. Regional Brain Iron, Ferritin and Transferrin Levels in Iron Deficient Anemic Piglets. K.M. Erikson and J.L. Beard

Experimental Biology, Washington, DC April, 1996. Brain Iron, Ferritin, and Transferrin Levels in Iron Repleted Rats. K.M. Erikson and J.L. Beard.

Experimental Biology, Washington, DC April, 1996. Dopamine Reuptake in Caudate Putamen in Anemia Assessed by *in vivo* Microdialysis. C.L. Nelson, K.M. Erikson and J.L. Beard.

The American Dietetic Association, 77th Annual Meeting, Orlando, FL October, 1994. Relationship of Upper Arm Anthropometry to Body Composition in Female Athletes. K.M. Erikson, K. Witt, and D.L. Miller.