

Martha S. Field, Ph.D
Assistant Professor
Division of Nutritional Sciences
Cornell University
113 Savage Hall
Ithaca, NY
mas246@cornell.edu

Education

Ph.D in Biochemistry, Molecular and Cell Biology 2007
Cornell University, Ithaca, NY
Thesis Adviser: Prof. Patrick J. Stover

Bachelor of Science in Chemistry 2000
Butler University, Indianapolis, IN

Postdoctoral Training

Postdoctoral Research Associate 2007-09
Cornell University, Ithaca, NY
Mentor: Patrick Stover

Academic Appointments and Research Activities

Lecturer 2015-2018
Division of Nutritional Sciences, Cornell University, Ithaca, NY

Research Associate 2010-2016
Division of Nutritional Sciences, Cornell University, Ithaca, NY

Senior Research Associate 2016-June 2018
Division of Nutritional Sciences, Cornell University, Ithaca, NY

Assistant Professor July 1, 2018 - present
Division of Nutritional Sciences, Cornell University, Ithaca, NY

Other Appointments

Department Safety Representative 2014-2018
Served as the university's primary contact and coordinator for laboratory safety issues (including use of biohazardous and radioactive materials) in the Division of Nutritional Sciences at Cornell University

Professional Development and Training

- Cornell Faculty Leadership Development Program, 2018
- WHO/Cochrane Institute, Cornell University, 2014
- Cornell Center for Technology Enterprise and Commercialization: Pre-Seed Workshop, Cornell University, 2013
- Effective Interactions in Organizations Workshop, Cornell University, 2006
- Trained in handling/use of radioactive materials, Cornell University, 2006
- Mouse handling and husbandry training, Cornell University, 2007
- Trained in handling/use of biohazardous materials, Cornell University, 2000

Scientific and Professional Societies

- American Society for Nutrition, 2013-present
- American Society for Biochemistry and Molecular Biology, 2012-present
- The American Association for the Advancement of Science, 2012-present

Professional Service

- Cornell University Faculty Senate Representative for the Division of Nutritional Sciences, 2019-2022
- Member of the Cornell University Radiation Safety Committee, Dec 2018-present
- Member of American Society for Nutrition Committee on Advocacy and Science Policy, July 2018-June 2021
- External Review Committee Member for Sackler Institute at the New York Academy of Sciences, September 2017
- Reviewer for the 2016 USDA/ODS John A. Milner fellowship program

Meetings Organized

- Co-organizer for First International Conference on Precision Nutrition and Metabolism in Public Health and Medicine, Chania, Crete, Greece, 2018
- Co-organizer for Precision Nutrition Cornell Intercampus Symposium, 2019

Invited Seminars

“Novel activities of two human dehydrogenase enzymes affect glucose metabolism in a variant-specific manner,” Precision Nutrition Cornell Intercampus Symposium, 2019.

“Evidence for mechanistic interaction between excess folate/folic acid vitamin B₁₂ interactions--insights from human and animal data,” NIH Workshop on Metabolic Interaction between excess Folates/Folic acid and Vitamin B₁₂ deficiency, National Institutes of Health, 2019.

“Gene-nutrient interactions that lead to disease—a focus on folate and the nervous system,” Burke Neurological Institute, 2019.

“Endogenous production of erythritol and its association with weight gain in young adults,” Memorial Sloan Kettering Cancer Center, 2018.

- “Endogenous production of erythritol and its association with weight gain in young adults,” First International Conference on Precision Nutrition and Metabolism in Public Health and Medicine, Chania, Crete, Greece, 2018.
- “Blood-Brain Barrier Dysfunction and Resulting Brain Nutrient Deficiencies,” Examining Special Nutritional Requirements in Disease States: A Workshop. National Academy of Sciences, Washington D.C., 2018.
- “Systems approaches to understanding metabolism,” Nutrition Obesity Research Center Seminar Series, University of Alabama, Birmingham, 2018.
- “Identification of a novel biomarker of weight gain”, 13th China Nutrition Science Congress, Shanghai, China 2017
- “The effect of folate on vitamin B₁₂ depletion-induced inhibition of nuclear thymidylate biosynthesis and neural tube defects”, 11th International Conference on Homocysteine and One-Carbon Metabolism, Aarhus, Denmark, 2017
- “Systems Understanding of the One-Carbon Metabolism Network” Braunschweig Biological Lectures, University of Braunschweig, Braunschweig, Germany, 2017
- “Vitamin B12 deficiency perturbs nuclear one-carbon metabolism leading to genome instability,” 11th Structural Birth Defects Meeting, 2017.
- “Vitamin B12 deficiency perturbs nuclear one-carbon metabolism leading to genome instability,” Aging, Inflammation, Metabolism, and Stress Seminar Series, Cornell University, 2017.
- “Effects of dietary nucleotides on folate-mediated one-carbon metabolism,” Folate Receptor Meeting, 2016.
- “Defining B Vitamin Requirements in Non-Healthy People,” FASEB Summer Conference: Folic Acid, Vitamin B12 and One-Carbon Metabolism, 2016.
- “In search of a common pathway for folic acid-responsive neural tube defects, cancers and neurodegeneration” The Microsoft Research - University of Trento Centre for Computational and Systems Biology, Italy, 2016.
- “Determinants and consequences of uracil in DNA,” Aging, Inflammation, Metabolism, and Stress Seminar Series, Cornell University, 2015.
- “Biological mechanisms underlying the successes of folic acid fortification,” The Workshop: CRN’s Day of Science, Council for Responsible Nutrition, 2014
- “Determinants and consequences of uracil in DNA,” Division of Nutritional Sciences Field of Nutrition Seminar, Cornell University, 2014.
- “Determinants and physiological ramifications of uracil incorporation into DNA,” FASEB Summer Conference: Folic Acid, Vitamin B12 and One-Carbon Metabolism, 2014.
- “Folate-iron interactions in the heavy-chain ferritin knockout mouse,” Molecular and Human Nutrition Seminar Series, 2007.
- “Regulation of the 5-Formyltetrahydrofolate Futile Cycle and *DE NOVO* Purine Biosynthesis by 5,10-Methenyltetrahydrofolate Synthetase,” Dissertation Seminar, Cornell University, December 2006.
- “Methenyltetrahydrofolate synthase-mediated regulation of purine biosynthesis,” Molecular and Human Nutrition Seminar Series, 2006.

Publications

- Schlicker, L., Szebenyi, D.M.E., Ortiz, S.R., Heinz, A., Hiller, K., and **Field, M.S.** (2019) Unexpected roles for ADH1 and SORD in catalyzing the final step of erythritol biosynthesis. *J. Biol. Chem.*, **294**, 16095-16108.
- Chon, J., **Field, M.S.**, and Stover, P.J. (2019) Deoxyuracil in DNA and disease: genomic signal or managed situation? *DNA Repair*, **77**: 36-44.
- Tiani, K.A., Stover, P.J., and **Field, M.S.** (2019) Nutrition and the blood-brain barrier. *Ann. Rev. Nutr.*, **39**: 147-173.
- Misselbeck, K., Marchetti, L., Priami, C., Stover, P.J., and **Field, M.S.** (2019) An extended hybrid-stochastic model of folate-mediated one-carbon metabolism: 5-formyltetrahydrofolate futile cycle regulates *de novo* purine synthesis and reduces pathway stochasticity. *Sci Rep.*, **9**: 4322.
- Garza, C., Stover, P.J., Ohlhorst, S.D., **Field, M.S.**, Steinbrook, R., Rowe, S., Woteki, C., and Campbell, E., (2019) Best practices in nutrition science to earn and keep the public's trust. *Amer. J. Clin. Nutr.*, **0**: 1-19.
- Alonzo, J.R., Venkataraman, C., **Field, M.S.**, and Stover, P.J. (2018) The mitochondrial inner membrane protein MPV17 prevents uracil accumulation in mitochondrial DNA. *J. Biol. Chem.*, **293**: 20285-20294.
- Lan, X., **Field, M.S.**, and Stover, P.J. (2018) Cell Cycle Regulation of Folate-Mediated One-Carbon Metabolism. *Wiley Interdisciplinary Reviews: Systems Biology and Medicine*, **10**:e1426.
- Field, M.S.**, Kamynina, E., Chon, J., and Stover, P.J. (2018) Nuclear Folate Metabolism. *Ann. Rev. Nutr.*, **38**: 219-43.
- Field, M.S.**, Lan, X., Stover, D.M., and Stover, P.J. (2018) Uridine modifies tumorigenesis in the *Apc^{Min/+}* model of intestinal cancer. *Curr. Dev. Nutr.*, **2**: nzy013
- Field, M.S.** and Stover, P.J. (2017) Safety of folic acid. *Ann. NY Acad. Sci.*, **1414**: 59-71.
- Stover, P.J., Durga, J., and **Field, M.S.** (2017) Folate and blood-brain barrier dysfunction. *Curr. Opin. Biotechnol.*, **44**: 146-152.
- Palmer, A.M., Kamynina, E., **Field, M.S.**, and Stover, P.J. (2017) Folate rescues vitamin B12 depletion-induced inhibition of nuclear thymidylate biosynthesis and genome instability. *Proc. Natl. Acad. Sci.*, **114**: E4095-4102
- Kamynina, E., Lachenauer, E., DiRisio, A.C., Liebenthal, R.P., **Field, M.S.**, and Stover, P.J. (2017) Arsenic trioxide targets MTHFD1 and SUMO-dependent nuclear *de novo* thymidylate biosynthesis. *Proc. Natl. Acad. Sci.*, **114**: E2319-E2326.
- Misselbeck, K., Marchetti, L., **Field, M.S.**, Scotti, M., Priami, C., and Stover, P.J. (2017) A hybrid stochastic model of folate-mediated one-carbon metabolism: Effect of the common C677T *MTHFR* variant on *de novo* thymidylate biosynthesis. *Sci Rep.*, **11**: 797.
- Bae, S., Chon, J., **Field, M.S.**, and Stover, P.J. (2017) Alcohol dehydrogenase 5 is a source of formate for *de novo* purine biosynthesis in HepG2 cells. *J. Nutr.*, **147**: 499-505.
- Chon, J., Stover, P.J., and **Field, M.S.** (2017) Targeting Nuclear Thymidylate Biosynthesis. *Molecular Aspects of Medicine*, **53**: 48-56.
- Stover, P.J., Berry, R.J., and **Field, M.S.** (2016) Time to think about nutrient needs in chronic disease. *JAMA Internal Medicine*, **176**: 1451-1452

- Field, M.S.**, Stover, P.J., and Kisliuk, R. (2016) Thymidylate Synthesis. In: eLS. John Wiley & Sons, Ltd: Chichester. DOI: 10.1002/9780470015902.a0001397.pub3
- Field, M.S.**, Kamynina E., Watkins, D., Rosenblatt, D.S., Stover, P.J. (2016) MTHFD1 regulates nuclear de novo thymidylate biosynthesis and genome stability. *Biochimie*, **126**: 27-30.
- Field, M.S.**, Kamynina E., Watkins, D., Rosenblatt, D.S., Stover, P.J. (2015) New insights into the metabolic and nutritional determinants of severe combined immunodeficiency. *Rare Diseases*, **3**: 1, e1112479.
- MacFarlane, A.J., Behan, N.A., **Field, M.S.**, Williams, A., Stover, P.J., and Yauk, C.L. (2015) Dietary folic acid protects against genotoxicity in the red blood cells of mice. *Mutat. Res.*, **779**: 105-111.
- Stover, P.J., MacFarlane, A.J., and **Field, M.S.** (2015) Bringing clarity to the role of MTHFR variants in neural tube defect prevention. *Am. J. Clin. Nutr.*, **101**: 111-2.
- Martiniova, L, **Field, M.S.**, Finkelstein, J.L., Perry, C.A. and Stover, P.J. (2015) Maternal dietary uridine causes, and deoxyuridine prevents, neural tube closure defects in a mouse model of folate-responsive neural tube defects. *Am. J. Clin. Nutr.*, **101**: 860-9.
- Field, M.S.**, Kamynina E., Watkins, D., Rosenblatt, D.S., Stover, P.J. (2015) Human Mutations in Methylenetetrahydrofolate Dehydrogenase 1 Impair Nuclear *de novo* Thymidylate Biosynthesis. *Proc. Natl. Acad. Sci.*, **112**: 400-405.
- Field, M.S.**, Kamynina E., Agunloye, O.C., Liebenthal, R.P., Lamarre, S.G., Brosnan, M.E., Brosnan, J.T., and Stover, P.J. (2014) Nuclear enrichment of folate cofactors and methylenetetrahydrofolate dehydrogenase 1 (MTHFD1) protect de novo thymidylate biosynthesis during folate deficiency. *J. Biol. Chem.* **289**: 29642-50.
- Stover, P.J. and **Field, M.S.** (2014) Pyridoxal, pyridamine, and pyridoxine (B6) *Adv. Nutr.*, **6**: 132-3.
- Field, M.S.**, Shields, K.S., Abarinov, E.V., Malysheva, O.V., Allen, R.H., Stabler, S.P., Ash, J.A., Strupp, B.J., Stover, P.J., and Caudill, M.A. (2013) Reduced MTHFD1 activity in male mice perturbs folate- and choline-dependent one-carbon metabolism as well as transsulfuration. *J. Nutr.* **143**: 1-5.
- Abarinov, E.V., Beaudin, A.E., **Field, M.S.**, Perry, C.A., Allen, R.H., Stabler, S.P. and Stover, P.J. (2013) Disruption of *Shmt1* impairs hippocampal neurogenesis and mnemonic function in mice (2013) *J. Nutr.* **143**: 1028-35.
- Stover, P.J. and **Field, M.S.** (2011) Trafficking of Intracellular Foliates. *Adv. Nutr.* **2**: 325-31.
- Field, M.S.**, Anderson, D.D., and Stover, P.J. (2011) *Mthfs* is an essential gene in mice and a component of the purinosome. *Front. Gene.* **2**: 1-13.
- Field, M.S.**, Anguera, M.C., Page R., and Stover, P.J. (2009) 5,10-Methenyltetrahydrofolate synthase activity is increased in tumors and modified the efficacy of antipurine LY309887. *Arch. Biochem. Biophys.* **481**: 145-50.
- Field, M.S.**, Young, M.F., and O'Brien, K.O. "Maternal iron status and transfer of iron to the fetus" In *Physiology of Mother-Fetus Relationship*. (2010) Ed. Lafond, J., and Vaillancourt, C. Kerala: Research Signpost.
- Field, M.S.**, Szebenyi, D.M.E., and Stover, P.J. (2006) Regulation of de novo purine biosynthesis by methenyltetrahydrofolate synthetase in neuroblastoma. *J. Biol. Chem.* **281**: 4215-22.
- Field, M.S.**, Szebenyi, D.M.E., Perry, C.A., and Stover P.J. (2007) Inhibition of 5,10-methenyltetrahydrofolate synthetase. *Arch. Biochem. Biophys.* **458**: 194-201.

Field, M.S. and Stover, P.J. (2007) Regulation of the 5-formyltetrahydrofolate futile cycle and purine biosynthesis by methenyltetrahydrofolate synthetase, p 300-316 in *The Proceedings of the 13th International Symposium on Chemistry and Biology of Pteridines and Folates*.

Anguera, M.C., **Field, M.S.**, Perry, C., Ghandour, H., Chiang, E.P., Selhub J., Shane, B., and Stover, P.J. (2006) Regulation of folate-mediated one-carbon metabolism by 10-formyltetrahydrofolate dehydrogenase. *J. Biol. Chem.* **281**: 18335-18342.

Poster Presentations

“Dietary uridine supplementation decreases tumor number in Apc^{Min/+} mice,”
Experimental Biology, San Diego, California, April 2014

“Nuclear localization of MTHFD1 is folate responsive and regulates 5,10-methylenetetrahydrofolate partitioning,” 9th International Conference Homocysteine and One-Carbon Metabolism, Dublin, Ireland, September 2013

“5,10-Methenyltetrahydrofolate Synthetase Co-Localizes with the Purinosome,” FASEB Summer Research Conference on Folic Acid, Vitamin B12 and One-Carbon Metabolism, Carefree, Arizona, August 2010

“Regulation of the 5-Formyltetrahydrofolate Futile Cycle and Purine Biosynthesis,” 5th International Conference on Homocysteine, Milan, Italy, June 2005

“Preliminary Structural Studies of 5,10-Methenyltetrahydrofolate Synthetase (MTHFS) from *Mus musculus*,” FASEB Summer Research Conference on Folic Acid, Vitamin B12 and One-Carbon Metabolism, Snowmass Village, Colorado, August 2004

“Investigation of Phosphorylation as a Molecular Switch and Binding Modulator of c-Src SH3 via ¹⁵N Backbone Dynamics Measurements.” Experimental Nuclear Conference, Savannah, Georgia, April 2004

“The Effects of Phosphorylation on the Binding Properties and Dynamics of the c-Src SH3 Domain.” Experimental Nuclear Conference, Asilomar Conference Center, Monterrey, California, April 2003

Research Support

2019 President’s Council of Cornell Women Affinito-Stewart Grant \$10,000

Title: Novel methods to detect uracil misincorporation in mitochondrial DNA at near base-pair resolution

Role: Principal Investigator

Mentored Students and Scholars

Post-doctoral Research Associates

Joanna Fiddler, Cornell University, 2019-present

Graduate Students

Semira Ortiz, PhD candidate, Cornell University, 2018-present

Yuwen Xiu, MS degree candidate, Cornell University, 2018-present

Kendra Tiani, PhD candidate, Cornell University, 2018-present

Katarina Heyden, PhD candidate, Cornell University, 2019-present

Undergraduate Students

Rodrigo Gutierrez, Cornell University, 2017-2019

Hannah Stein, Cornell University, 2017-2019

NaYeon Kim, 2018-present

Allison MacDonald, University, summer 2019

Erica Rosario, CUNY Hunter College, summer 2019

Blake Antal, University of Binghamton, summer 2019

Amer Ahmed, Cornell University, 2019-present

Sanjna Das, Cornell University, 2019-present

Vincent Lam, Cornell University, 2019-present

Visiting Scholars

Lisa Schlicker, PhD, University of Braunschweig, Spring 2017 and February 2019

Editorial/Review

Editorial Boards

- Scientific Reports, 2019-present
- Nutrition and Metabolism, 2018-present
- Journal of Trace Elements in Medicine and Biology, 2013-present

Journals (ad hoc reviewer)

Journal of Nutrition, Nutrition Reviews, PLoS ONE, Journal of Trace Elements in Medicine and Biology, Environmental and Molecular Mutagenesis, American Journal of Clinical Nutrition, Trends in Cancer, Nutrients, Scientific Reports, Nucleic Acids Research, Proceedings of the National Academy of Sciences, Molecular Metabolism

Volunteer Organizations

Cornell MS Society, Faculty Advisor, 2017-present

Children's Liturgy of the Word Instructor, St. Mary's of the Lake, 2017-present

Schuyler County Little League, Tee Ball Coach, Spring 2015

Awards

- Graduate Student Poster/Travel Award, FASEB Summer Research Conference on Folic Acid, Vitamin B12 and One-Carbon Metabolism, Snowmass Village, Colorado, 2004
- Butler University Top 100 Outstanding Students, 1998.

Other Professional Experience

Graduate Research Assistant

2000- 2007

Cornell University, Ithaca, NY

- Investigated the effects of 5,10-methenyltetrahydrofolate synthetase (MTHFS) expression on folate-mediated one-carbon metabolism
- Performed comprehensive study of the determinants of MTHFS substrate and inhibitor binding affinity
- Identified MTHFS as a 10-formyltetrahydrofolate, the folate cofactor required for purine synthesis, tight-binding protein
- Determined that MTHFS expression enhances *de novo* purine biosynthesis *in vivo*

Intern, Lilly Research Laboratories

1999-2000

Eli Lilly, Indianapolis, IN

- Studied the transport properties of cell membrane β -lactam antibiotic and dipeptide transporters PepT1 and hpt-1 using cell culture models.
- Characterized the tissue-specific expression patterns of these transporters.

Teaching Experience

Cornell University, Ithaca, NY

2001-2015

- Instructor, Methods in Nutritional Sciences Laboratory (NS3320, 3 Credits)
- Teaching assistant for Introduction to Human Biochemistry (NS320), 2005. Supervisor: Prof. Patrick Stover.
- Teaching assistant for Principles of Biochemistry: Proteins and Metabolism (BioBM331), 2001. Supervisor: Prof. Gerald Feigenson.
- Teaching assistant for Principles of Biochemistry: Molecular Biology (BioBM332), 2002. Supervisor: Prof. Bik Tye.

New York Chiropractic College, Seneca Falls, NY

2007

- Taught introductory macronutrient metabolism course as part of the Master's in Clinical Nutrition program.
- Designed curriculum which covered biochemistry of amino acid, carbohydrate and lipid metabolism and regulation thereof.

Butler University, Indianapolis, IN

1996-1999

- Organic chemistry laboratory assistant, 1998-1999. Supervisor: Prof. Carlson.
- Butler University Writers' Studio Tutor, Fall 1997-1999.

Patents

PCT International Application No. PCT/US12/34963, filed 25 April 2012, for USE OF URIDINE AND DEOXYURIDINE IN THE TREATMENT OF FOLATE-RESPONSIVE PATHOLOGIES, claiming priority of U.S. Provisional Application Serial Nos. 61/478,669, filed 25 April 2011, and 61/515,356, filed 5 August 2011 (Applicant: Cornell University) (Cornell Ref. 5476-03-PC) (Inventor: Patrick J. Stover and Martha S. Field)

PCT International Application No. PCT/US2017/040898, filed 06 July 2017, for STABLE PRO-VITAMIN DERIVATIVE COMPOUNDS, PHARMACEUTICAL AND DIETARY COMPOSITIONS, AND METHODS OF THEIR USE, claiming priority to U.S. Provisional Application Serial No. 62/359,040, filed 06 July 2016 (Applicant: Cornell University) (Cornell Reference No.: 7416-02-PC) (Inventors: Patrick J. Stover and Martha S. Field)