

Patrick Stover

Web Bio

Information

Biography

Biographical Statement

Patrick J. Stover, Ph.D. is Professor and Director of the Division of Nutritional Sciences at Cornell University. He graduated from Saint Joseph's University with a BS degree in Chemistry and was awarded the Molloy Chemistry Award at graduation. He received a PhD degree in Biochemistry and Molecular Biophysics from the Medical College of Virginia and performed his postdoctoral studies in Nutritional Sciences at the University of California at Berkeley.

The Stover research group studies the fundamental chemical, biochemical, genetic and epigenetic mechanisms that underlie the relationships among nutrition, metabolism and risk for birth defects, cancer and neurodegenerative diseases. We focus primarily on the B-vitamins folate and vitamin B12, their influence on nuclear and mitochondrial one-carbon metabolism, their downstream effects on cellular methylation, gene expression and genome stability, and their role in preventing human pathologies.

Patrick Stover teaches three classes for graduate students: NS7040, Grant Writing; NS6200, Translational Research and Evidence-based Policy and Practice in Nutrition; and teaches the B-vitamin section of NS6310, Micronutrients: Function, Homeostasis, and Assessment.

In 2014, Patrick Stover was elected as a Fellow of the American Association for the Advancement of Science. He received the SUNY Chancellor's Award for Excellence in Scholarship and Creative Activities and the Osborne and Mendel Award for outstanding recent basic research accomplishments in nutrition from the American Society for Nutrition, and a MERIT award from NIDDK-NIH. In 1996 he received the Presidential Early Career Award for Scientists and Engineers from President Clinton, the highest honor bestowed by the U.S. government on outstanding scientists and engineers beginning their independent careers. He received the ERL Stokstad Award in Nutritional Biochemistry from the American Society for Nutritional Sciences and has been selected as an Outstanding Educator four times by Cornell Merrill Presidential Scholars. He is co-editor of the Annual Reviews of Nutrition.

Department Website Summary

Patrick J. Stover, Ph.D. is Professor and Director of the Division of Nutritional

Sciences at Cornell University. He graduated from Saint Joseph's University with a BS degree in Chemistry and was awarded the Molloy Chemistry Award at graduation. He received a PhD degree in Biochemistry and Molecular Biophysics from the Medical College of Virginia and performed his postdoctoral studies in Nutritional Sciences at the University of California at Berkeley.

The Stover research group investigates the chemical, biochemical, genetic and epigenetic mechanisms that underlie the relationships between one-carbon metabolism and human pathologies including neural tube defects, cardiovascular disease and cancer. Specific interests include the regulation of folate-mediated one-carbon metabolism and genome expression and stability, the molecular basis of the fetal origins hypothesis, development of mouse models to elucidate mechanisms of folate-related pathologies, and translational control of gene expression. Our current focus is on the role of nuclear one-carbon metabolism in de novo thymidylate synthesis in maintaining genome integrity, and its regulation by SUMOylation and UV radiation. We have developed mouse models of altered one-carbon metabolism by genetically manipulating the expression of folate-associated genes to determine the effects of altered one-carbon supply on cellular methylation potential, nucleotide biosynthesis and colon cancer susceptibility. An overarching goal of these studies is to differentiate the contributions of folate-dependent de novo nucleotide biosynthesis and folate-mediated cellular methylation in folate-associated pathologies. Patrick Stover also teaches two classes for graduate students: NS7040, Grant Writing and NS6200 Translational Research and Evidence-based Policy and Practice in Nutrition.

Patrick Stover received a MERIT award in 2012 from NIDDK-NIH. In 1996 he received the Presidential Early Career Award for Scientists and Engineers from President Clinton, the highest honor bestowed by the U.S. government on outstanding scientists and engineers beginning their independent careers. He received the ERL Stokstad Award in Nutritional Biochemistry from the American Society for Nutritional Sciences in 1999 and has been selected as an Outstanding Educator four times by Cornell Merrill Presidential Scholars. He is a current member of the National Academies of Sciences' Food and Nutrition Board. He serves on the editorial board for the Annual Reviews of Nutrition, the Journal of Biological Chemistry and the American Journal of Clinical Nutrition.

Teaching

Teaching and Advising Statement

"What really matters in college is who meets whom, and when".¹

Learning is achieved and sustained most effectively as never-ending social activity, whether it be through engagement of formal courses, research, mentoring as well as all worthwhile pursuits.

¹ How College Works. Daniel F. Chambliss and Christopher G Takacs. Harvard University Press, 2014.

Professional

Current Professional Activities

Director, Division of Nutritional Sciences

Vice President, American Society for Nutrition

Co-Editor: Annual Review of Nutrition

Cornell University Graduate Field Memberships:

Nutrition

Biochemistry, Molecular and Cellular Biology

Research

Current Research Activities

Our research program is investigating the fundamental mechanisms underlying the regulation of folate-mediated one-carbon metabolism and its role in mitochondrial and nuclear genome methylation and stability. Ongoing projects include the role of folate and vitamin B12 in nuclear de novo thymidylate synthesis, and its impact on human pathologies including neural tube defects, colon cancer, Parkinson's disease and other neurodegenerative disorders.

Extension

Current Extension Activities

The Director of the Division of Nutritional Sciences provides oversight of DNS extension activities.

Education

Education

PhD, Biochemistry and Molecular Biophysics - 1990, Medical College of Virginia,
BS, Chemistry - 1986, Saint Joseph's University

Courses

Courses Taught

BioG2000 - Research Apprenticeship

BioBM4000- Undergraduate Research

NS4000 - Directed Readings

NS4010 - Student Research

NS6200 - Translational Research and Evidence-based Policy and Practice in Nutrition

NS6310 - Micronutrients: Function, Homeostasis, and Assessment

NS7040 - Grant Writing

Websites

Related Websites

[DNS Home Page](#)

<http://www.nutrition.org/>

www.linkedin.com/profile/edit

Administration

Administrative Responsibilities

Director, Division of Nutritional Sciences

Publications

Selected Publications

- Field, M.S., Kamynina, E., Watkins, D., Rosenblatt, D.D. and Stover, P.J. 2014. Human Mutations in Methylenetetrahydrofolate Dehydrogenase 1 Impair Nuclear *de novo* Thymidylate Biosynthesis. *Proc. Natl. Acad. Sci. in press.*
- Field, M.S., [Kamynina E.](#), [Agunloye, O.C.](#), [Liebenthal, R.P.](#) [Lamarre, S.G.](#), [Brosnan, M.E.](#), [Brosnan, J.T.](#), 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.
- MacFarlane, A.J., McEntee, M.F. and Stover, P.J. 2014 Azoxymethane-induced colon carcinogenesis in mice occurs independently of *de novo* thymidylate synthesis capacity. *J. Nutr.* 144: 419-24.
- Ash JA, Jiang X, Malysheva OV, Fiorenza CG, Bisogni AJ, Levitsky DA, Strawderman MS, Caudill MA, Stover PJ, Strupp BJ. 2013. Dietary and genetic manipulations of folate metabolism differentially affect prefrontal cortical functions in mice. *Neurotoxicology and Teratology*, 38:79-91. PMID: 23684804
- Abarinov, E.V., Beaudin, A.E., Field, M.S., Perry, C., Allen, R., Stabler, S., Stover, P.J. 2013. Disruption of *Shmt1* impairs hippocampal neurogenesis and mnemonic function in mice. *J. Nutr.* 143(7):1028-35. PMC3681542

- Scotti M., Stella L., Shearer E.J., Stover P.J. 2013. Modeling cellular compartmentation in one-carbon metabolism. *Wiley Interdiscip Rev Syst Biol Med*. 5(3):343-65 PMID: 23408533
- Field, M.S., Shields, K.S., Abarinov, E., Malysheva, O.V., Allen, R.H., Stabler, S.P., Ash, J.A., Strupp, B.J., Stover, P.J., 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):41-5. PMC: 3521460
- Ohlhorst, S., Russell, R., Bier, D., Klurfeld, D., Li, Z., Mein, J., Milner, J.A., Ross, C., Stover, P., Konopka, E. 2013. Nutrition Research to impact food and a healthy lifespan. *Adv Nutr.* 4(5):579-84.
- Ohlhorst, S., Russell, R., Bier, D., Klurfeld, D., Li, Z., Mein, J., Milner, J.A., Ross, C., Stover, P., Konopka, E. 2013. Nutrition Research to impact food and a healthy lifespan. *J Nutr.* 143(8):1349-54.
- Ohlhorst, S., Russell, R., Bier, D., Klurfeld, D., Li, Z., Mein, J., Milner, J.A., Ross, C., Stover, P., Konopka, E. 2013. Nutrition Research to impact food and a healthy lifespan. *Am J Clin Nutr.* 98(2):620-5.
- Stover, P.J. 2013. Nutrient-Genome Interactions. In *Handbook of Vitamins, Fifth Edition*. Chapter 16. (Janos, Stover, Gregory, eds). Taylor and Francis Group, LLC.
- Hobin, J.A., Deschamps, A.M., Bockman, R., Cohen, S., Dechow, P., Eng, C., Galey, W., Morris, M., Prabhakar, S., Raj, U., Rubenstein, P., Smith, J.A., Stover, P., Sung, N., Talman, W., Galbraith, R. 2012. Engaging basic scientists in translational research: identifying opportunities, overcoming obstacles. *J Transl Med.* 10(1):72. PMC: 3419626
- Delisle H. 2012. Empowering our profession in Africa. *World Nutrition* 3 (6): 269-284 *co-signatory*
- Stover, P.J., Weiss, R.S. Sensitizing cancer cells: is it really all about U? *Cancer Cell.* 2012 Jul 10;22(1):3-4. PMID: 22789532
- Romagnolo, D.F., Dashwood, R., Stover, P.J., Waterland, R.A., Ziegler, T.R. 2012. Nutritional regulation of epigenetic changes. *Adv Nutr.* 3(5):749-50. PMID: 22983864
- Gu, Z., Ye, K., Stover, P.J. 2012. Nutritional Genomics. In *Genomics and Clinical Medicine*, Chapter 8, edited by Dhavendra Kumar, Oxford University Press.
- Stover, P. J. 2012. Genetic Variation: Effect of Nutrient Utilization and Metabolism. In *Modern Nutrition in Health and Disease*, 11th Edition. (C. Ross, ed.) 523-533.
- Stover, P. J. 2012. Folic Acid in *Modern Nutrition in Health and Disease*, 11th Edition. (C. Ross, ed.) 358-368.
- Swayne, B.G., Behan, N.A., Williams, A., Stover, P.J., Yauk, C.L., MacFarlane, A.J. 2012. [Supplemental dietary folic acid has no effect on chromosome damage in erythrocyte progenitor cells of mice.](#) *J Nutr.*142(5):813-7. PMC3735919
- Wernimont, S.M., Clark, A.G., Stover, P.J., Wells, M.T., Litonjua, A.A., Weiss, S.T., Gaziano, J.M., Vokonas, P.S., Tucker, K.L., Cassano, P.A. 2012. [Folate Network Genetic Variation Predicts Cardiovascular Disease Risk in Non-Hispanic White Males.](#) *J. Nutr.* 142(7):1272-9 PMC: 3374665
- Beaudin, A.E., Perry, C.A., Stabler, S.P., Allen, R.H., and Stover, P.J. 2012. Maternal *Mthfd1* disruption impairs fetal growth but does not cause NTDs in mice. *Amer. J. Clin Nutr.* 95(4):882-91. PMC: 3302363
- Anderson, D.D., Woeller, C.F., Chiang, E-P., Shane, B., and Stover, P.J. 2012. SHMT1 and SHMT2 anchor the nuclear *de novo* thymidylate synthesis

pathway to the nuclear lamina for DNA replication and repair. *J. Biol. Chem.* 287(10):7051-62. PMC: 3293584

- Beaudin, A.E., Abarinov, E.V., Malysheva, O., Perry, C.A., Caudill, M., and Stover, P.J. 2012. Dietary folate but not choline modifies neural tube defect risk in *Shmt1* knock-out mice. *Amer. J. Clin. Nutr.* 95(1):109-14. PMC: 3238454
- Stover, P. J. 2012. Folic acid and neural tube defects: Are we any closer to understanding mechanisms? *Clinical Correlation in Biochemical, Physiological, Molecular Aspects of Human Nutrition*, 3rd edition.
- Stover, P. J. 2011. Polymorphisms in 1-carbon metabolism, epigenetics and folate-related pathologies. *J. Nutrigenet. Nutrigenomics* 4:293-305.
- Yetley, E.A., Pfeiffer, C.M., Phinney, K.W., Fazili, K., Lacher, D.A., Bailey, R.L., Blackmore, S., Bock, J.L., Brody, L.C., Carmel, R., Curtin, L.R., Durazo-Arvizu, R.S., Eckfeldt, J.H., Green, R., Gregory III, J.F., Hoofnagle, A.N., Jacobsen, D.W., Jacques, P.F., Molloy, A.M., Massaro, J., Mills, J.L., Nexo, E., Rader, J.I., Selhub, J., Sempos, C., Shane, B., Stabler, S., Stover, P., Tamura, T., Tedstone, A., Thorpe, S.J., Coates, P.M., Johnson, C.L., and Picciano, M.F. 2011. Biomarkers of folate status in the National Health and Nutrition Examination Survey (NHANES): a roundtable summary. *Am J. Clin. Nutr.* 94(1):303S-312S. PMC: 3127517
- Yetley, E.A., Pfeiffer, C.M., Phinney, K.W., Bailey, R.L., Blackmore, S., Bock, J.L., Brody, L.C., Carmel, R., Curtin, L.R., Durazo-Arvizu, R.S., Eckfeldt, J.H., Green, R., Gregory III, J.F., Hoofnagle, A.N., Jacobsen, D.W., Jacques, P.F., Lacher, D.A., Molloy, A.M., Massaro, J., Mills, J.L., Nexo, E., Rader, J.I., Selhub, J., Sempos, C., Shane, B., Stabler, S., Stover, P., Tamura, T., Tedstone, A., Thorpe, S.J., Coates, P.M., Johnson, C.L., and Picciano, M.F. 2011. Biomarkers of vitamin B-12 status in the National Health and Nutrition Examination Survey (NHANES): a roundtable summary. *Am J. Clin. Nutr.* 94(1):313S-321S. PMC: 3127527
- Anderson, D.D., Eom, J.Y., and Stover, P.J. 2011. Competition between sumoylation and ubiquitylation of serine Hydroxymethyltransferase 1 determines its nuclear localization and its accumulation in the nucleus. *J. Biol. Chem.* 287(7):4790-9. PMC: 3281627
- Wernimont, S.M., Clark, A.G., Stover, P.J., Wells, M.T., [Litonjua, A.A.](#), Weiss, S.T., Gaziano, J.M., [Tucker, K.L.](#), Baccarelli, A., Schwartz, J., Bollati, V., and Cassano, P.A. 2011. Folate network genetic variation, plasma homocysteine, and global genomic methylation content: a genetic association study. *BMC Med Genet.* Nov 21;12(1):150. PMC: 3266217
- MacFarlane, A.J., Anderson, D.D., Flodby, P., Perry, C.A., Allen, R.A., Stabler, S.P., and Stover, P.J. 2011. Nuclear localization of the *de novo* thymidylate biosynthesis pathway is required to prevent uracil accumulation in DNA. *J. Biol. Chem.* 286(51):44015-22. PMC: 3243516
- Anderson, D.D., Quintero, C.M., and Stover, P.J. 2011. Identification of a *de novo* thymidylate biosynthesis pathway in mammalian mitochondria. *Proc. Natl. Acad. Sci.* 108(37):15163-8. PMC: 3174652
- 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.* 2:36.
- Beaudin, A.E., Abarinov, E.V., Noden, D.M., Perry, C.A., Chu, S., Stabler, S.P., Allen, R.H., and Stover, P. J. 2011. *Shmt1* and *de novo* thymidylate biosynthesis underlie folate-responsive neural tube defects in mice. *Am. J. Clin. Nutr.* 93(4):789-98. PMC: 3057548
- MacFarlane, A.J., Perry, C.A., McEntee, M.F., Lin, D.M., and Stover, P.J. 2011.

Mthfd1 is a Modifier of Chemically-induced Intestinal Carcinogenesis. *Carcinogenesis* 32(3):427-33. PMC: 3047240

- Wernimont, S.M., Raiszadeh, F., Stover, P.J., Rimm, E., Hunter, D., Tang, W., and Cassano, P.A. 2011. Polymorphisms in Serine Hydroxymethyltransferase 1 and Methylenetetrahydro-folate Reductase Interact to Increase Cardiovascular Disease Risk in Humans. *J Nutr.* 141(2):255-60. PMC: 3021444
- MacFarlane, A.J., Perry, C.A., McEntee, MF., Lin, D.M., and Stover, P.J. 2011 *Shmt1* Heterozygosity Impairs Folate-Dependent Thymidylate Synthesis Capacity and Modifies Risk of *Apc^{min}*-Mediated Intestinal Cancer Risk. *Can Res.* 71(6):2098-107. PMC: 3059437