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Education

B.S./M.S., Biochemistry (highest honors), Sep 1983 - Jun 1988, Moscow State University, Department of Chemical Enzymology, USSR

Ph.D., Biochemistry, Sep 1988 - May 1992, Moscow State University, Department of Chemical Enzymology, Russia

Professional appointments

Oct 1992 - Oct 1996	Visiting Fellow, Laboratory of Biochemistry, NHLBI, NIH, Bethesda, MD
Oct 1996 - Dec 1997	Visiting Fellow/Associate, Basic Research Laboratory, NCI, NIH, Bethesda, MD
Jan 1998 - Jun 2002	Assistant Professor, Dept. Biochemistry, University of Nebraska, Lincoln
Jan 2000 - present	Faculty appointment with Eppley Cancer Center, University of Nebraska Medical Center
Jul 2002 - Jun 2004	Associate Professor (with tenure), Dept. Biochemistry, University of Nebraska, Lincoln
Jul 2004 - Dec 2004	Professor, Dept. Biochemistry, University of Nebraska, Lincoln
Jan 2005 - Aug 2009	Charles Bessey Professor, Dept. Biochemistry, University of Nebraska, Lincoln
Jul 2007 - Aug 2009	Director, Nebraska Redox Biology Center
Aug 2009 - present	Professor, Genetics Division, Department of Medicine, Brigham and Women's Hospital and Harvard Medical School (in process)
Aug 2009 - present	Director, Center for Redox Medicine
Oct 2009 - present	Associate Member, Broad Institute of Harvard and MIT

Professional honors and activities

Chair or co-chair, minisymposium "Selenium". Experimental Biology/ASBMB annual meeting. New Orleans, 2002, 2004, 2007

Junior Faculty Award for Excellence in Research, IANR, University of Nebraska, 2001

Executive/mentoring committee, co-Director and Director, Redox Biology Center; 2002-2009 (since Aug 2009, member of the advisory board)

Co-Editor (with D.L.Hatfield and M.J. Berry), "Selenium: Its molecular biology and role in human health" Springer, 444 pp., 2006 (new edition in preparation for 2010)

Member, program project study sections (NCI, NIEHS), and ad hoc reviewer (INMP), NIH, 2004, 2005, 2006

Regular Member, Integrative Nutrition and Metabolic Processes (INMP) study section, NIH, 2005-2009

Keynote (opening) lectures: 8th International Symposium on Selenium in Biology and Medicine, Madison, WI, Jul 2006; FASEB summer conference on Trace Elements in Biology and Medicine, Snowmass, CO, Jun 2008; Gordon Research Conference "Thiol-based redox regulation and signaling", May 2008 (invitation), TEMA13 (Trace Elements in Men and Animals), Chile, Oct 2008; Gordon Research Conference "Thiol-based redox

regulation and signaling”, Italy, May 2010; FESTEM conference, St. Petersburg, Russia, Jun 2010
Chair, Gordon Research Conference: Thiol-Based Redox Regulation and Signaling, Biddeford, Maine, Jun 2006
Co-chair, FASEB summer conference on Trace Elements in Biology and Medicine, Snowmass, CO, Jun 2010
Visiting Professor, Kyoto University, Japan, May-Jun 2007
Distinguished Professor, Ewha Womans University, Seoul, Korea, 2009, 2010
Outstanding Scientist Award, Sigma Xi, Nebraska chapter, Apr 2008
Outstanding Research and Creative Activity Award, University of Nebraska (top research award within the University of Nebraska system), Apr 2008
Gabriel Bertrand Award from the Federation of European Societies for Trace Element and Mineral research, June 2010

Current research funding

“Identity and functions of selenoprotein genes” (PI, Vadim Gladyshev)
NIGMS, NIH, GM61603 (R01 type), July 01, 2000-June 30, 2014

“Functions of mammalian thioredoxin reductases” (PI, Vadim Gladyshev)
NIGMS, NIH, GM065204 (R01 type), May 01, 2002-Jul 31, 2010

“Selenoproteins as targets for cancer prevention” (PI, Vadim Gladyshev)
NCI, NIH, CA80946 (R01 type), March 01, 2001-June 30, 2012

“Methionine sulfoxide reduction, selenium and aging” (PI, Vadim Gladyshev)
NIA, NIH, AG021518 (R01 type), Jan 15, 2003-Apr 30, 2013

“Selenoproteins as targets for cancer prevention” (PI, Vadim Gladyshev)
NCI, NIH, 3R01CA80946-10S1 (ARRA supplement to CA80946), Oct 01, 2009-Sep 30, 2011

Invited talks (last 7 years)

Oregon State University, Feb 2002
“The Dawning of Informatics” conference, Lincoln, NE, Apr 2002
University of Massachusetts, Apr 2002
Experimental Biology/ASBMB annual meeting (minisymposium chair), New Orleans, April 2002
TEMA11. Trace Elements in Man and Animals. 11th International Conference. Berkeley, CA, Jun 2002
Monroe-Meyer Institute, UNMC, Omaha, Oct 2002
Food and Drug Administration, College Park, MD, Feb 2003
FASEB/ASBMB annual meeting, San-Diego, April 2003
American Society for Microbiology annual meeting, Washington, DC, May 2003
IUPAC workshop “Postgenomic Chemistry,” Moscow, Sep 2003
Department of Biochemistry, Kansas University Medical Center, Oct 2003
University of Nebraska Medical Center, Oct 2003
Harvard University, Department of Microbiology and Molecular Genetics, Nov 2003
30 Years of Selenoprotein Research conference, NIH, Bethesda, MD, Dec 2003
Cleveland Clinic Foundation, Feb 2004
University of Vermont, Mar 2004
University of Utah Health Sciences Center, Mar 2004
American Society for Microbiology annual meeting, New Orleans, May 2004
Department of Biological Chemistry, University of Michigan Medical Center, Ann Arbor, May 2004

Nobel conference “Redox Signaling and Cellular Function”, Stockholm, Sweden, Jun 2004
FASEB summer conference on trace elements, Snowmass, CO, Jun 2004
Minisymposium on Redox Biology of Aging, Lincoln, NE, Oct 2004
Stowers Institute, Kansas City, Oct 2004
TEMA12, 12th International Conference on Trace Elements in Man and Animals. Coleraine, Northern Ireland, Jun 2005
Advances in Science for Drug Discovery (ASDD-2005) symposium, Moscow, Jun 2005
Moscow Conference on Computational Molecular Biology (MCCMB’05), Jul 2005
University of Wisconsin, Sep 2005
Griffith University, Brisbane, Australia, Nov 2005
3rd Joint Meeting of the Society for Free Radical Research of Australasia & Japan, Gold Coast, Australia, Dec 2005
University of Nebraska - Omaha, Department of Information Science and Technology, Feb 2006
Heidelberg University, Center for Biochemistry, Germany, Mar 2006
Center for Genomic Regulation, Barcelona, Spain, Mar 2006
DFG Symposium “Selenoproteins”, Berlin, Germany, Mar 2006
EXPO’06, Lincoln, NE, Mar 2006
University of California, Los Angeles, May 2006
Laboratory of Biochemistry, NHLBI, National Institutes of Health, Bethesda, MD, Jun 2006
Gordon Research Conference: “Thiol-based redox regulation and signaling”, Biddeford, Maine, Jun 2006 (Chair)
8th International Conference on Selenium in Biology and Medicine, Madison, Wisconsin, Jul 2006 (Opening Lecture)
Society for Free Radical Research International (SFRRRI) Congress, Davos, Switzerland, Aug 2006
8th International Engelhardt Conference on Molecular Biology, Moscow, Aug 2006
Burke Medical Research Institute, New York, Oct 2006
Karolinska Institutet, Stockholm, Sweden, Oct 2006
University of Florida, Gainesville, Nov 2006
Banbury Center Conference on Redox Regulation of Signal Transduction, New York, Dec 2006
University of Michigan, Ann Arbor, Feb 2007
University of North Carolina, Chapel Hill, Mar 2007
Brigham and Women’s Hospital and Harvard Medical School, Boston, Mar 2007
Experimental Biology 2007, Washington DC (co-chair of minisymposium), Apr 2007
Pennsylvania State University, May 2007
Kyoto University, Kyoto campus, Japan, Jun 2007
Kinki University, Japan, Jun 2007
Ritsumeikan University, Japan, Jun 2007
Chiba University, Japan, Jun 2007
Osaka University, Japan, Jun 2007
Kyoto University, Uji campus, Japan, Jun 2007
Okayama University, Japan, Jun 2007
R&D Systems Inc., Minneapolis, Jul 2007
Moscow Conference on Computational Molecular Biology, Moscow, Russia, Jul 2007
Society for Free Radicals in Biology and Medicine conference, Montevideo, Uruguay, Sep 2007
Washington University School of Medicine, St. Louis, Sep 2007
Seoul National University, Seoul, Korea, Oct 2007
International Conference “Redox Networks” Jeju Island, Korea, Oct 2007
Barshop Institute, San Antonio, Jan 2008
University of Georgia, Mar 2008
Experimental Biology-2008, Apr 2008
University of Delaware, Apr 2008
Brigham and Women’s Hospital and Harvard Medical School, Boston, May 2008

4th International Conference “Genomics, Proteomics, Bioinformatics and Nanobiotechnology for Medicine”, Moscow, Russia, Jun 2008
Keynote talk at the FASEB summer conference “Trace Element Metabolism: From Model Organisms to Humans”, Snowmass, CO, Jun 2008
Karolinska Institutet, Sweden, Aug 2008
GST 2008 conference, Uppsala, Sweden, Aug 2008
Institute for Information Transmission, Moscow, Russia, Aug 2008
Copper and Interacting Metals in Biology, Italy, Oct 2008
Keynote lecture, 13th International Conference on Trace Elements in Men and Animals (TEMA13), Chile, Nov 2008
University of Nebraska Medical Center, Omaha, Jan 2009
Colorado State University, Fort Collins, CO, Mar 2009
Oregon State University, Corvallis, OR, May 2009
Gordon conference: Molybdenum and Tungsten in Biology, Il Ciocco, Italy, Jul 2009
Moscow Conference on Computational Molecular Biology, Moscow, Russia, Jul 2009
Gordon conference: Cell Biology of Metals, RI, Aug 2009
Harvard School of Public Health, Boston, Oct 2009
ASBMB conference: ”Systems Biology for Biochemists”, Lake Tahoe, CA, Oct 2009
Gordon Research Conference ‘Oxygen Radicals’, Ventura, CA, Feb 2010
Broad Institute of Harvard and MIT, Cambridge, Feb 2010
Ewha Women’s University, Seoul, Korea, Mar 2010
Seoul National University, Seoul, Korea, Apr 2010
Gordon Research Conference “Thiol-based redox regulation and signaling”, Il Ciocco, Italy, May 2010
8th International Congress on Selenium in Biology and Medicine, Kyoto, Japan, June 2010
13th FESTEM conference, St. Petersburg, Russia, June 2010
XFM conference, Chicago, Aug 2010

Publications

- 1) Gladyshev, V. N., Khangulov, S. V., and Stadtman, T. C. (1994) Nicotinic acid hydroxylase from *Clostridium barkeri*: Electron paramagnetic resonance studies show that selenium is coordinated with molybdenum in the catalytically active selenium-dependent enzyme. *Proc. Natl. Acad. Sci. USA* 91, 232-236.
- 2) Gladyshev, V. N., Khangulov, S. V., Axley, M. J., and Stadtman, T. C. (1994) Coordination of selenium to molybdenum in formate dehydrogenase H from *Escherichia coli*. *Proc. Natl. Acad. Sci. USA* 91, 7708-7711.
- 3) Gladyshev, V. N., and Lecchi, P. (1996) Identification of molybdopterin in molybdenum- and selenium-containing enzymes. *BioFactors* 5, 94-97.
- 4) Gladyshev, V. N., Khangulov, S. V., and Stadtman, T. C. (1996) Properties of selenium- and molybdenum-containing nicotinic acid hydroxylase from *Clostridium barkeri*. *Biochemistry* 35, 212-223.
- 5) Gladyshev, V. N., Boyington, J. C., Khangulov, S. V., Grahame, D. A., Stadtman, T. C., and Sun, P. D. (1996) Characterization of crystalline formate dehydrogenase H from *Escherichia coli*: stabilization, EPR spectroscopy and preliminary crystallographic analysis. *J. Biol. Chem.* 271, 8095-8100.
- 6) Tamura, T., Gladyshev, V. N., Liu, S.-Y., and Stadtman, T. C. (1996) The mutual sparring effects of selenium and vitamin E in animal nutrition may be further explained by the discovery that mammalian thioredoxin reductase is a selenoenzyme. *BioFactors* 5, 99-102.
- 7) Gladyshev, V. N., Jeang, K.-T., and Stadtman, T. C. (1996) Selenocysteine, identified as the penultimate C-terminal residue in human T-cell thioredoxin reductase, corresponds to TGA in the human placental gene. *Proc. Natl. Acad. Sci. USA* 93, 6146-6151.

- 8) Klyachko, N. L., Vakula, S. V., Gladyshev, V. N., Tishkov, V. I., and Levashov, A. V. (1997) Formate dehydrogenase in a reversed micelle system: regulation of catalytic activity and oligomeric composition of the enzyme. *Biochemistry (Moscow)* 62, 1439-1443.
- 9) Boyington, J. C., Gladyshev, V. N., Khangulov, S. V., Stadtman, T. C., and Sun, P. D. (1997) Crystal structure of formate dehydrogenase H: catalysis involving molybdenum, molybdopterin, selenocysteine and an Fe₄S₄ cluster. *Science* 275, 1305-1308.
- 10) Baek, H. J., Chittum, H. S., Yang, E. S., Park, S. I., Park, J. M., Gladyshev, V. N., Moustafa, M. E., Carlson, B. A., Diamond, A. M., Lee, B. J., and Hatfield, D. L. (1997) Response of the selenocysteine tRNA population to selenium in mammals and *Xenopus* oocytes. *Nucl. Acids Res. Symp. Ser.* 36, 157-158.
- 11) George, G. N., Colangelo, C. M., Dong, J., Scott, R. A., Khangulov, S. V., Gladyshev, V. N., and Stadtman, T. C. (1998) X-ray absorption spectroscopy of the molybdenum site of *Escherichia coli* formate dehydrogenase. *J. Am. Chem. Soc.* 120, 1267-1273.
- 12) Khangulov, S. V., Gladyshev, V. N., Dismukes, C., and Stadtman, T. C. (1998) Selenium-containing formate dehydrogenase from *E. coli*: molybdopterin enzyme that catalyzes formate oxidation without oxygen transfer. *Biochemistry* 37, 3518-3528.
- 13) Gladyshev, V. N., Jeang, K.-T., Wootton, J. C., and Hatfield, D. L. (1998) A new human selenium-containing protein: purification, characterization and cDNA sequence. *J. Biol. Chem.* 273, 8910-8915.
- 14) Gladyshev, V. N., Factor, V. M., Housseau, F., and Hatfield, D. L. (1998) Contrasting patterns of regulation of the antioxidant selenoenzymes, thioredoxin reductase and glutathione peroxidase, in cancer cells. *Biochem. Biophys. Res. Comm.* 251, 488-493.
- 15) Gladyshev, V. N., Stadtman, T. C., Hatfield, D. L., and Jeang, K.-T. (1999) Levels of major selenoproteins in T cells decrease during HIV infection and low molecular mass selenium compounds increase. *Proc. Natl. Acad. Sci. USA* 96, 835-839.
- 16) Gladyshev, V. N., and Hatfield, D. L. (1999) Selenocysteine-containing proteins in mammals. *J. Biomed. Sci.* 6, 151-60.
- 17) Hatfield, D. L., Gladyshev, V. N., Park, J., Park, S. I., Chittum, H. S., Baek, H. J., Carlson, B. A., Yang, E. S., Moustafa, M. E., and Lee, B. J. (1999) Biosynthesis of selenocysteine and its incorporation into protein as the 21st amino acid. *Comprehensive Natural Products Chemistry* 4, 353-380.
- 18) Gladyshev, V. N., Martin-Romero, F. J., Xu, X.-M., Kumaraswamy, E., Carlson, B. A., Hatfield, D. L., and Lee, B. J. (1999) Molecular biology of selenium and its role in cancer, AIDS and other human diseases. *Recent Research Developments in Biochemistry* 1, 145-167.
- 19) Gladyshev, V. N., Krause, M., Xu, X. M., Korotkov, K. V., Kryukov, G. V., Sun, Q. A., Lee, B. J., Wootton, J. C., and Hatfield, D. L. (1999) Selenocysteine-containing thioredoxin reductase in *C.elegans*. *Biochem. Biophys. Res. Commun.* 259, 244-249.
- 20) Sun, Q.-A., Wu, Y., Zappacosta, F., Jeang, K.-T., Lee, B., Hatfield, D. L., and Gladyshev, V. N. (1999) Redox regulation of cell signaling by selenocysteine in thioredoxin reductases. *J. Biol. Chem.* 274, 24522-24530.
- 21) Kryukov, G.V., Kryukov, V. M., and Gladyshev, V. N. (1999) New mammalian selenocysteine-containing proteins identified with an algorithm that searches for selenocysteine insertion sequence elements. *J. Biol. Chem.* 274, 33888-33897.
- 22) Gladyshev, V. N., and Hatfield, D. L. (2001) Analysis of selenocysteine-containing proteins. *Current Protocols in Protein Science*, 3.8.1-3.8.18.
- 23) Mansur, D. B., Hao, H., Gladyshev, V. N., Korotkov, K., Hu, Y., Moustafa, M. E., El-Saadani, M. A., Carlson, B. A., Hatfield, D. L., and Diamond, A. M. (2000) Multiple levels of regulation of selenoprotein biosynthesis revealed from the analysis of human glioma cell lines. *Biochem. Pharm.* 60, 489-497.
- 24) Kumaraswamy, E., Malykh, A., Korotkov, K. V., Kozyavkin, S. Hu, Y., Moustafa, M. E., Carlson, B., Berry, M. J., Lee, B. J., Hatfield, D. L., Diamond, A. M., and Gladyshev, V. N. (2000) Structure-expression relationships of the 15 kDa selenoprotein gene: possible role of the protein in cancer etiology. *J. Biol. Chem.* 275, 35540-35547.

- 25) Kryukov, G. V., and Gladyshev, V. N. (2000) Selenium metabolism in zebrafish: multiplicity of selenoprotein genes and expression of a protein containing seventeen selenocysteine residues. *Genes Cells* 5, 1049-1060.
- 26) Gladyshev, V. N., and Kryukov, G. V. (2001) Evolution of selenocysteine-containing proteins: significance of identification and functional characterization of selenoproteins. *BioFactors* 14, 87-92.
- 27) Sun, Q.-A., Zappacosta, F., Factor, V. M., Wirth, P., Hatfield, D. L., and Gladyshev, V. N. (2001) Heterogeneity within animal thioredoxin reductases: evidence for alternative first exon splicing. *J. Biol. Chem.* 276, 3106-3114.
- 28) Hu, Y. J., Korotkov, K. V., Mehta, R., Hatfield, D. L., Rotimi, C., Luke, A., Prewitt., T. E., Cooper, R. S., Stock, W., Vokes, E. E., Dolan, M. E., Gladyshev, V. N., and Diamond, A. M. (2001) Distribution and functional consequences of nucleotide polymorphisms in the 3'-untranslated region of the human Sep15 gene. *Cancer Res.* 61, 2307-2310.
- 29) Korotkov, K. V., Kumaraswamy, E., Zhou, Y., Hatfield, D. L., and Gladyshev, V. N. (2001) Association between the 15 kDa selenoprotein and UDP-glucose:glycoprotein glucosyltransferase in the endoplasmic reticulum of mammalian cells. *J. Biol. Chem.* 276, 15330-15336.
- 30) Gladyshev, V. N., Liu, A., Novoselov, S. V., Krysan, K., Sun, Q. A., Kryukov, V. M., Kryukov, G. V., and Lou, M. F. (2001) Identification and characterization of a new mammalian glutaredoxin (thioltransferase) Grx2. *J. Biol. Chem.* 276, 30374-30380.
- 31) Sun, Q.-A., Kirnarsky, L., Sherman, S., and Gladyshev, V. N. (2001) Selenoprotein oxidoreductase with specificity for thioredoxin and glutathione systems. *Proc. Natl. Acad. Sci. USA* 98, 3673-3678.
- 32) Moustafa, M. E., Carlson, B. A., El-Saadani, M. A., Kryukov, G. V., Sun, Q.-A., Harney, J. W., Hill, K. E., Combs, G. F., Feigenbaum, L., Mansur, D. B., Burk, R. F., Berry, M. J., Diamond, A. M., Lee, B. J., Gladyshev, V. N., and Hatfield, D. L. (2001) Selective inhibition of selenocysteine tRNA maturation and selenoprotein synthesis in transgenic mice expressing isopentenyladenosine mutant selenocysteine tRNA transgenes. *Mol. Cell. Biol.* 21, 3840-3852. (featured as cover article).
- 33) Gladyshev, V. N. Identity, evolution and functions of selenoproteins and selenoprotein genes. In "*Selenium: its molecular biology and role in human health*", ed., Hatfield, D. L., Kluwer Academic Publishers, pp. 99-113, 2001.
- 34) Gladyshev, V. N., Diamond, D. L., and Hatfield, D. L. Sep15: functional analysis and role in cancer etiology. In "*Selenium: its molecular biology and role in human health*", ed., Hatfield, D. L., Kluwer Academic Publishers, pp. 147-155, 2001
- 35) Gladyshev, V. N. Selenium in biology and human health: controversies and perspectives. In "*Selenium: its molecular biology and role in human health*", ed., Hatfield, D. L., Kluwer Academic Publishers, pp. 313-317, 2001.
- 36) Kryukov, G. V., Lobanov, A. V., and Gladyshev, V. N. (2001) New selenocysteine-containing proteins identified with a program that searches for an mRNA structural element. In "Currents in computational molecular biology" (ed., El-Mabrouk, N., Lengauer, T. & Sankoff, D.) Les Publications CRM, 45-46.
- 37) Gladyshev, V. N., and Hatfield, D. L. (2001) Analysis of selenocysteine-containing proteins. *Curr. Protoc. Protein Sci.*, 3, Unit 3.8.
- 38) Martin-Romero, F. J., Kryukov, G. K., Lobanov, A. V., Carlson, B. A., Lee, B. J., Gladyshev, V. N., and Hatfield, D. L. (2001) Selenium metabolism in *Drosophila*: Selenoproteins, selenoprotein mRNA expression, fertility and mortality. *J. Biol. Chem.* 276, 29798-29804.
- 39) Kumaraswamy, E., Korotkov, K. V., Diamond, A. M., Gladyshev, V. N., and Hatfield, D. L. (2002) Genetic and functional analysis of mammalian Sep15 selenoprotein. *Methods Enzymol.* 347, 188-198.
- 40) Kryukov, G. V., and Gladyshev, V. N. (2002) Mammalian Selenoprotein Gene Signature: identification and functional analysis of selenoprotein genes using bioinformatics methods. *Methods Enzymol.* 347, 84-100.
- 41) Sun, Q.-A., and Gladyshev, V. N. (2002) Redox regulation of cell signaling by thioredoxin reductase. *Methods Enzymol.* 347, 451-461.
- 42) Gladyshev, V. N. (2002) Thioredoxin and peptide methionine sulfoxide reductase: convergence of similar structure and function in distinct structural folds. *Proteins: structure, function and genetics* 46,

- 149-152. (featured as cover article)
- 43) Korotkov, K. V., Novoselov, S. V., Hatfield, D. L., and Gladyshev, V. N. (2002) Mammalian selenoprotein in which selenocysteine incorporation is supported by a new form of SECIS element. *Mol. Cell. Biol.* 22, 1402-1411.
 - 44) Gladyshev, V. N. Comparison of selenium-containing molybdoenzymes. In "*Molybdenum and Tungsten. Their roles in biological systems,*" *Metal Ions in Biological Systems* (ed., Sigel and Sigel), v.39, chapter 18, 655-672, 2002.
 - 45) Kryukov, G. V., Kumar, R. A., Koc, A., Sun, Z. and Gladyshev, V. N. (2002) Selenoprotein R is a zinc-containing stereospecific methionine sulfoxide reductase. *Proc. Natl. Acad. Sci. USA* 99, 4245-4250.
 - 46) Hatfield, D. L., and Gladyshev, V. N. (2002) How selenium has altered our understanding of the genetic code. *Mol. Cell. Biol.* 22, 3565-3576.
 - 47) Novoselov, S. V., Rao, M., Onoshko, N. V., Zhi, H., Kryukov, G. V., Xiang, Y., Weeks, D. P., Hatfield, D. L. and Gladyshev, V. N. (2002) Selenoproteins and selenocysteine insertion system in the model plant cell system, *Chlamydomonas reinhardtii*. *EMBO J.* 21, 3681-3693.
 - 48) Xu, X., Carlson, B. A., Grimm, T. A., Kutza, J., Berry, M. J., Arreola, R., Fields, K. H., Shanmugam, I., Jeang, K.-T., Oroszlan, S., Combs, G. F., Marx, P. A., Gladyshev, V. N., Clouse, K. A., and Hatfield, D. L. (2002) Rhesus monkey SIV infection as a model for assessing the role of selenium in AIDS. *J. AIDS* 31, 453-463.
 - 49) Kumar, R. A., Koc, A., Cerny, R. L., and Gladyshev, V. N. (2002) Reaction mechanism, evolutionary analysis and role of zinc in *Drosophila* methionine-R-sulfoxide reductase. *J. Biol. Chem.* 277, 37527-37535.
 - 50) Fomenko, D. E., and Gladyshev, V. N. (2002) CxxS: fold-independent redox motif revealed by genome-wide searches for thiol/disulfide oxidoreductase function *Protein Sci.* 11, 2285-2296.
 - 51) Kumaraswamy, E., Carlson, B. A., Morgan, F., Miyoshi, K., Robinson, G., Su, D., Wang, S., Southon, E., Tessarollo, L., Lee, B. J., Gladyshev, V. N., Hennighausen, L., and Hatfield, D. L. (2003) Selective removal of the selenocysteine tRNA[Ser]Sec gene (Trsp) in mouse mammary epithelium. *Mol. Cell. Biol.* 23, 1477-1488.
 - 52) Novoselov, S. V., and Gladyshev, V. N. (2003) Non-animal origin of animal thioredoxin reductases: Implications for selenocysteine evolution and evolution of protein function through carboxy-terminal extensions. *Protein Sci.* 12, 372-378.
 - 53) Kryukov, G. V., Castellano, S., Novoselov, S. V., Lobanov, A. V., Zehtab, O., Guigo, R., and Gladyshev, V. N. (2003) Characterization of mammalian selenoproteomes. *Science* 300, 1439-4313.
 - 54) Thisse, C., Degraeve, A., Kryukov, G. V., Gladyshev, V. N., Obrecht-Pflumio, S., Krol, A., Thisse, B., and Lescure, A. (2003) Spatial and temporal expression patterns of selenoprotein genes during embryogenesis in zebrafish. *Gene Expr. Patterns* 3, 525-532.
 - 55) Rao, M., Carlson, B. A., Novoselov, S. V., Weeks, D. P., Gladyshev, V. N., and Hatfield, D. L. (2003) *Chlamydomonas reinhardtii* selenocysteine tRNA. *RNA* 9, 923-930.
 - 56) Fomenko, D. E., and Gladyshev, V. N. (2003) Genomics perspective on disulfide bond formation. *Antioxid. Redox Signal.* 5, 397-402.
 - 57) Fomenko, D. E., and Gladyshev, V. N. (2003) Identity and functions of CxxC-derived motifs. *Biochemistry* 42, 11214-11225.
 - 58) Kwon, S. Y., Badenhorst, P., Martin-Romero, F. J., Carlson, B. A., Paterson, B. M., Gladyshev, V. N., Lee, B. J., and Hatfield, D. L. (2003) The *Drosophila* selenoprotein BthD is required for survival and has a role in salivary gland development. *Mol. Cell. Biol.* 23, 8495-8504.
 - 59) Castellano, S., Novoselov, S. V., Kryukov, G. V., Lescure, A., Blanco, E., Krol, A., Gladyshev, V. N. & Guigo, R. (2004) Reconsidering the evolution of eukaryotic selenoproteins: a novel non-mammalian family with scattered phylogenetic distribution. *EMBO Rep.* 5, 71-77.
 - 60) Carlson, B. A., Novoselov, S. V., Kumaraswamy, E., Lee, B. J., Anver, M. R., Gladyshev, V. N., and Hatfield, D. L. (2004) Specific excision of the selenocysteine tRNA[Ser]Sec (Trsp) gene in mouse liver demonstrates an essential role of selenoproteins in liver function. *J. Biol. Chem.* 279, 8011-8017.
 - 61) Wang, C., Scott, S., Tao, Q., Fomenko, D. E., and Gladyshev, V. N. (2004) New Techniques for

- Generation and Analysis of Evolutionary Trees. *2004 International Conference on Mathematics and Engineering Techniques in Medicine and Biological Sciences*, 283-289.
- 62) Kim, H.-Y., and Gladyshev, V. N. (2004) Methionine sulfoxide reduction in mammals: characterization of methionine-R-sulfoxide reductases. *Mol. Biol. Cell* 15, 1055-1064.
 - 63) Kim, H.-Y., and Gladyshev, V. N. (2004) Characterization of mouse endoplasmic reticulum methionine-R-sulfoxide reductase. *Biochem. Biophys. Res. Comm.*, 320, 1277-1283.
 - 64) Koc, A., Gasch, A. P. Rutherford, J. C., Kim, H.-Y., and Gladyshev, V. N. (2004) Methionine sulfoxide reductase regulation of yeast lifespan reveals ROS-dependent and ROS-independent components of aging. *Proc. Natl. Acad. Sci. USA* 101, 7999-8004.
 - 65) Kryukov, G. V. and Gladyshev, V. N. (2004) The prokaryotic selenoproteome. *EMBO Rep.* 5, 1-6.
 - 66) Gladyshev, V. N., Kryukov, G. V., Fomenko, D. E., and Hatfield, D. L. (2004) Identification of trace element-containing proteins in genomic databases. *Annual Review of Nutrition* 24, 579-596.
 - 67) Carlson, B. A., Xu, X.-M., Kryukov, G. V., Rao, M., Berry, M. J., Gladyshev, V. N., and Hatfield, D. L. (2004) Identification and characterization of phosphoseryl-tRNA^{[Ser]^{Sec}} kinase. *Proc. Natl. Acad. Sci USA*, 101, 12848-12853.
 - 68) Su, D., and Gladyshev, V. N. Cell Signaling by thioredoxin reductase. In *Nutrients and Cell Signaling*, Marcel Dekker, Inc. New York, NY, 2004.
 - 69) Su, D., and Gladyshev, V. N. (2004) Alternative splicing involving thioredoxin reductase module in mammals: a glutaredoxin-containing thioredoxin reductase 1. *Biochemistry* 43, 12177-12188.
 - 70) Carlson, B. A., Xu, X. M., Gladyshev, V. N., and Hatfield, D. L. (2005) Selective rescue of selenoprotein expression in mice lacking a highly specialized methyl group in selenocysteine tRNA. *J. Biol. Chem.* 280, 5542-5548.
 - 71) Taskov, K., Chapple, C., Kryukov, G.V., Castellano, S., Lobanov, A.V., Korotkov, K. V., Guigó, R. and Gladyshev, V. N. (2005) Nematode selenoproteome: the use of the selenocysteine insertion system to decode one codon in an animal genome? *Nucl. Acids Res.* 33, 2227-2238.
 - 72) Zhang, Y., Fomenko, D. E., and Gladyshev, V. N. (2005) The microbial selenoproteome of the Sargasso Sea. *Genome Biology* 6, R37.
 - 73) Zhang, Y., and Gladyshev, V. N. (2005) An algorithm for identification of bacterial selenocysteine insertion sequence elements and selenoprotein genes. *Bioinformatics* 21, 2580-2589.
 - 74) Zhang, Y., Baranov, P. V., Atkins, J. F., and Gladyshev, V. N. (2005) Pyrrolysine and selenocysteine use dissimilar decoding strategies. *J. Biol. Chem.* 280, 20740-20751.
 - 75) Shrimali, R. K., Lobanov, A. V., Xu, X. M., Rao, M., Carlson, B. A., Mahadeo, D. C., Parent, C. A., Gladyshev, V. N., and Hatfield, D. L. (2005) Selenocysteine tRNA identification in the model organisms *Dictyostelium discoideum* and *Tetrahymena thermophila*. *Biochem. Biophys. Res. Commun.* 329, 147-151.
 - 76) Romero, H., Zhang, Y., Gladyshev, V. N., and Salinas, G. (2005) Evolution of selenium utilization traits. *Genome Biol.* 6, R66.
 - 77) Kim, H. Y., and Gladyshev, V. N. (2005) Role of structural and functional elements of mouse methionine-s-sulfoxide reductase in its subcellular distribution. *Biochemistry* 44, 8059-8067.
 - 78) Su, D., Novoselov, S. V., Sun, Q. A., Moustafa, M. E., Zhou, Y., Oko, R., Hatfield, D. L., and Gladyshev, V. N. (2005) Mammalian selenoprotein thioredoxin/glutathione reductase: Roles in disulfide bond formation and sperm maturation. *J. Biol. Chem.* 280, 26491-26498.
 - 79) Su, D., Li, Y., and Gladyshev, V. N. Selenocysteine insertion directed by the 3'-UTR SECIS element in *Escherichia coli*. (2005) *Nucleic Acids Res.* 33, 2486-2492.
 - 80) Biterova, E. I., Turanov, A. A., Gladyshev, V. N., and Barycki, J. J. (2005) Crystal structures of oxidized and reduced mitochondrial thioredoxin reductase provide molecular details of the reaction mechanism. *Proc. Natl. Acad. Sci. USA* 102, 15018-15023.
 - 81) Labunskyy, V. M., Ferguson, A. D., Fomenko, D. E., Chelliah, Y., Hatfield, D. L., and Gladyshev, V. N. (2005) A novel cysteine-rich domain of SEP15 mediates the interactions with UDP-glucose: Glycoprotein glucosyltransferase. *J. Biol. Chem.* 280, 37839-37845.

- 82) Xu, X. M., Mix, H., Carlson, B. A., Grabowski, P. J., Gladyshev, V. N., Berry, M. J., and Hatfield, D. L. (2005) Evidence for direct roles of two additional factors, SECp43 and SLA, in the selenoprotein synthesis machinery. *J. Biol. Chem.* 280, 41568-41575.
- 83) Castellano, S., Lobanov, A. V., Chapple, C., Novoselov, S. V., Albrecht, M., Hua, D., Lescure, A., Lengauer, T., Krol, A., Gladyshev, V. N., and Guigó, R. (2005) Diversity and functional plasticity of eukaryotic selenoproteins: Identification and characterization of the SelJ family. *Proc. Natl. Acad. Sci. USA* 102, 16188-16193.
- 84) Sun, Q. A., Su, D., Novoselov, S. V., Carlson, B. A., Hatfield, D. L., and Gladyshev, V. N. (2005) Reaction mechanism and regulation of mammalian thioredoxin/glutathione reductase. *Biochemistry* 44, 14528-14537.
- 85) Novoselov, S. V., Calvisi, D. V., Labunskyy, V. M., Factor, V. M., Carlson, B. A., Fomenko, D. E., Moustafa, M. E., Hatfield, D. L. and Gladyshev, V. N. (2005) Selenoprotein deficiency and high levels of selenium compounds can effectively inhibit hepatocarcinogenesis in transgenic mice. *Oncogene* 24, 8003-8011.
- 86) Kim, H. Y., and Gladyshev, V. N. (2005) Different Catalytic Mechanisms in Mammalian Selenocysteine- and Cysteine-Containing Methionine-R-Sulfoxide Reductases. *PLoS Biol.* 3, e375.
- 87) Ferguson, A. D., Labunskyy, V. M., Fomenko, D. E., Arac, D., Chelliah, Y., Amezcua, C. A., Rizo, J., Gladyshev, V. N., and Deisenhofer, J. (2006) NMR structures of the selenoproteins Sep15 and SelM reveal redox activity of new thioredoxin-like family. *J. Biol. Chem.* 281, 3536-3543.
- 88) Novoselov, S. V., Hua, D., Lobanov, A. V., and Gladyshev, V. N. (2006) Identification and characterization of Fep15, a new selenocysteine-containing member of the Sep15 protein family. *Biochem J.* 394, 575-579.
- 89) Kim, H. Y., and Gladyshev, V. N. (2006) Alternative first exon splicing regulates subcellular distribution of methionine sulfoxide reductases. *BMC Mol. Biol.* 7, 11.
- 90) Lobanov, A.V., Delgado, C., Rahlfs, S., Novoselov, S.V., Kryukov, G.V., Gromer, S., Hatfield, D.L., Becker, K., and Gladyshev, V. N. (2006) The Plasmodium selenoproteome. *Nucleic Acids Res.* 34, 496-505.
- 91) Salinas, G., Romero, H., Xu, X. M., Carlson, B. A., Hatfield, D. L. and Gladyshev, V. N. Evolution of Sec decoding and the key role of selenophosphate synthetase in the pathway of selenium utilization. In *Selenium: Its molecular biology and role in human health* (ed., Hatfield, D. L., Berry, M. J., Gladyshev, V. N.) Springer, pp. 41-52, 2006.
- 92) Carlson, B. A., Xu, X. M., Shrimali, R., Sengupta, A., Yoo, M. H., Zhong, N., Hatfield, D. L., Irons, R., Davis, C., Lee, B. J., Novoselov, S. V., and Gladyshev, V. N. Mouse models for assessing the role of selenoproteins in health and development. In *Selenium: Its molecular biology and role in human health* (ed., Hatfield, D. L., Berry, M. J., Gladyshev, V. N.) Springer, pp.337-346, 2006.
- 93) Carlson, B.A., Xu, X.M., Shrimali, R., Sengupta, A., Yoo, M.H., Irons, R., Zhong, N., Hatfield, D.L., Lee, B.J., Lobanov, A.V., and Gladyshev, V.N. Mammalian and other eukaryotic selenocysteine tRNAs. In *Selenium: Its molecular biology and role in human health* (ed., Hatfield, D.L., Berry, M.J., Gladyshev, V.N.) Springer, pp. 31-40, 2006.
- 94) Gladyshev, V.N. Selenoproteins and selenoproteomes. In *Selenium: Its molecular biology and role in human health* (ed., Hatfield, D.L., Berry, M.J., Gladyshev, V.N.) Springer, pp. 101-112, 2006.
- 95) Kim, H.Y., and Gladyshev, V.N. Selenium and methionine sulfoxide reduction. In *Selenium: Its molecular biology and role in human health* (ed., Hatfield, D.L., Berry, M.J., Gladyshev, V.N.) Springer, pp. 125-136, 2006.
- 96) Labunskyy, V.M., Gladyshev, V.N., and Hatfield, D.L. The 15-kDa selenoprotein (Sep15): functional analysis and role in cancer. In *Selenium: Its molecular biology and role in human health* (ed., Hatfield, D.L., Berry, M.J., Gladyshev, V.N.) Springer, pp. 143-150, 2006.
- 97) Salinas, G., Lobanov, A. V., and Gladyshev, V. N. Selenium in parasites. In *Selenium: Its molecular biology and role in human health* (ed., Hatfield, D. L., Berry, M. J., Gladyshev, V. N.) Springer, pp. 359-370, 2006.

- 98) Hatfield, D. L., Carlson, B. A., Xu, X. M., Mix, H., and Gladyshev, V. N. (2006) Selenocysteine incorporation machinery and the role of selenoproteins in development and health. *Prog. Nucleic Acid Res. Mol. Biol.* 81, 197-142.
- 99) Eckenroth, B., Harris, K., Turanov, A. A., Gladyshev, V. N., Raines, R. T., and Hondal, R. J. (2006) Semisynthesis and characterization of mammalian thioredoxin reductase. *Biochemistry* 45, 5158-5170.
- 100) Lobanov, A. V., Kryukov, G. V., Hatfield, D. L., and Gladyshev, V. N. (2006) Is there a 23rd amino acid in the genetic code? *Trends Genetics* 22, 357-360.
- 101) Yoo M. H., Xu X. M., Carlson B.A., Gladyshev V. N., and Hatfield D. L. (2006) Thioredoxin reductase 1 deficiency reverses tumor phenotype and tumorigenicity of lung carcinoma cells. *J. Biol. Chem.* 281, 13005-13008.
- 102) Turanov, A. A., Su, D., and Gladyshev, V. N. (2006) Mouse mitochondrial thioredoxin reductase: Characterization of alternative cytosolic forms and cellular targets. *J. Biol. Chem.* 281, 22953-22963.
- 103) Lobanov, A. V., Gromer, S., Salinas, G., and Gladyshev, V. N. (2006) Selenium metabolism in Trypanosoma: characterization of selenoproteomes and identification of a Kinetoplastida-specific selenoprotein. *Nucl. Acids Res.* 34, 4012-4024.
- 104) Zhang, Y., Romero, H., Salinas, G., and Gladyshev, V. N. (2006) Dynamic evolution of selenocysteine utilization in bacteria: a balance between selenoprotein loss and evolution of selenocysteine from redox-active cysteine residues. *Genome Biol.* 7, R94.
- 105) Kim, H.-Y., Fomenko, D. E., Yoon, Y.-E., and Gladyshev, V. N. (2006) Catalytic advantages provided by selenocysteine in methionine-S-sulfoxide reductases. *Biochemistry* 45, 13697-13704.
- 106) Fernando, M. R., Lechner, J. M., Lofgren, S., Gladyshev, V. N., and Lou, M. F. (2006) Mitochondrial thioltransferase (glutaredoxin 2) has GSH-dependent and thioredoxin reductase-dependent peroxidase activities *in vitro* and in lens epithelial cells. *FASEB J.* 20, 2645-2647.
- 107) Xu, X.-M., Carlson, B. A., Mix, H., Zhang, Y., Saira, K., Glass, R. S., Berry, M. J., Gladyshev, V. N., and Hatfield, D. L. (2007) Biosynthesis of selenocysteine on its tRNA in eukaryotes. *PLoS Biol.* 5, E4.
- 108) Mix, H., Lobanov, A. V., and Gladyshev, V. N. (2007) SECIS elements in the coding regions of selenoprotein transcripts are functional in higher eukaryotes. *Nucl. Acids Res.* 35, 414-423.
- 109) Fomenko, D. E., Xing, W., Adair, B. M., Thomas, D. J., and Gladyshev, V. N. (2007) High-throughput identification of catalytic redox-active cysteine residues. *Science* 135, 387-389.
- 110) Labunskyy, V. M., Hatfield, D. L., and Gladyshev, V. N. (2007) The Sep15 protein family: roles in disulfide bond formation and quality control in the endoplasmic reticulum. *IUBMB Life* 59, 1-5.
- 111) Grossman, A. R., Croft, M., Gladyshev, V. N., Merchant, S., Posewitz, M. C., Prochnik, S., and Spalding, M. H. (2007) Novel metabolism in Chlamydomonas through the lens of genomics. *Curr. Opinion Plant Biol.* 10, 190-198.
- 112) Shrimali, R. K., Weaver, J. A., Miller, G. F., Carlson, B. A., Starost, M. F., Novoselov, S. V., Kumaraswamy, E., Gladyshev, V. N., Hatfield, D. L. (2007) Selenoprotein expression is essential in endothelial cell development and cardiac muscle function. *Neuromusc. Dis.* 17, 135-142.
- 113) Koc, A., and Gladyshev, V. N. (2007) Methionine sulfoxide reduction and the aging process, *Ann. N. Y. Acad. Sci.* 1100, 383-386.
- 114) Novoselov, S. V., Kryukov, G. V., Xu, X.-M., Carlson, B. A., Hatfield, D. L., and Gladyshev, V. N. (2007) Selenoprotein H is a nucleolar thioredoxin-like protein with a unique expression pattern. *J. Biol. Chem.* 282, 11960-11968.
- 115) Novoselov, S. V., Lobanov, A. V., Hua, D., Kasaikina, M. V., Hatfield, D. L., and Gladyshev, V. N. (2007) A new, highly efficient form of SECIS element in protozoan parasites and its use in mammalian cells. *Proc. Natl. Acad. Sci. USA* 104, 7857-7862.
- 116) Gladyshev V.N. Selenoproteins. In Redox Biochemistry (editor: Banerjee, R., associate editors: Gladyshev, V. N., Ragsdale, S. W., Becker, D.), John Wiley & Sons, pp. 317, 2007.
- 117) Fomenko D.E., Gladyshev V.N. Bioinformatics Methods to Study Thiol-Based Oxidoreductases. In Redox Biochemistry (editor: Banerjee, R., associate editors: Gladyshev, V. N., Ragsdale, S. W., Becker, D.), John Wiley & Sons, pp. 317, 2007

- 118) Gladyshev V.N. Methionine Sulfoxide Reductases (editor: Banerjee, R., associate editors: Gladyshev, V. N., Ragsdale, S. W., Becker, D.), John Wiley & Sons, pp. 317, 2007
- 119) Yoo, M.-H., Xu, X.-M., Turanov, A. A., Carlson, B. A., Gladyshev, V. N., and Hatfield, D. L. (2007) A new strategy for assessing selenoprotein function: siRNA knockdown/knock-in targeting the 3'-UTR. *RNA* 13, 921-929.
- 120) Xu, X. M., Carlson, B. A., Irons, R., Mix, H., Zhong, N., Gladyshev, V. N., and Hatfield, D. L. (2007) Selenophosphate synthetase 2 is essential for selenoprotein synthesis. *Biochem. J.* 404, 115-120.
- 121) Dikiy, A., Novoselov, S. V., Fomenko, D. E., Sengupta, A., Carlson, B. A., Cerny, R., Ginalski, K., Grishin, N. V., Hatfield, D. L., and Gladyshev, V. N. (2007) SelT, SelH, SelW and Rdx12: genomics and molecular insights into functions of selenoproteins of a novel thioredoxin-like family. *Biochemistry* 46, 6871-6882.
- 122) Su, D., Berndt, C., Holmgren, A., and Gladyshev, V. N. (2007) A conserved *cis*-proline precludes metal binding by the active site thiolates in members of the thioredoxin family of proteins. *Biochemistry* 46, 6903-6910.
- 123) Sal, L. S., Aachmann, F. L., Kim, H. Y., Gladyshev, V. N., and Dikiy, A. (2007) NMR assignments of ¹H, ¹³C and ¹⁵N spectra of methionine sulfoxide reductase B1 from *Mus musculus*. *Biomol. NMR Assign.* 1, 131-133.
- 124) Zhang, Y., and Gladyshev, V. N. (2007) High content of proteins containing 21st and 22nd amino acids, selenocysteine and pyrrolysine, in a symbiotic deltaproteobacterium of gutless worm *Olavius algarvensis*. *Nucleic Acids Res.* 35, 4952-4963.
- 125) Shchedrina, V. A., Novoselov, S. V., Malinouski, M. Y., and Gladyshev, V. N. (2007) Identification and characterization of a selenoprotein family containing a diselenide bond in a redox motif. *Proc. Natl. Acad. Sci. USA* 104, 13919-13924.
- 126) Xu, X. M., Carlson, B. A., Zhang, Y., Mix, H., Kryukov, G. V., Glass, R. S., Berry, M.J., Gladyshev, V. N., and Hatfield, D. L. (2007) New developments in selenium biochemistry: selenocysteine biosynthesis in eukaryotes and archaea. *Biol. Trace Elem. Res.* 119, 234-241.
- 127) Kim, H.-Y., and Gladyshev, V. N. (2007) Methionine Sulfoxide Reductases: Selenoprotein Forms and Roles in Antioxidant Protein Repair in Mammals. *Biochem. J.* 407, 321-329.
- 128) Merchant SS, Prochnik SE, Vallon O, Harris EH, Karpowicz SJ, Witman GB, Terry A, Salamov A, Fritz-Laylin LK, Maréchal-Drouard L, Marshall WF, Qu LH, Nelson DR, Sanderfoot AA, Spalding MH, Kapitonov VV, Ren Q, Ferris P, Lindquist E, Shapiro H, Lucas SM, Grimwood J, Schmutz J, Cardol P, Cerutti H, Chanfreau G, Chen CL, Cognat V, Croft MT, Dent R, Dutcher S, Fernández E, Fukuzawa H, González-Ballester D, González-Halphen D, Hallmann A, Hanikenne M, Hippler M, Inwood W, Jabbari K, Kalanon M, Kuras R, Lefebvre PA, Lemaire SD, Lobanov AV, Lohr M, Manuell A, Meier I, Mets L, Mittag M, Mittelmeier T, Moroney JV, Moseley J, Napoli C, Nedelcu AM, Niyogi K, Novoselov SV, Paulsen IT, Pazour G, Purton S, Ral JP, Riaño-Pachón DM, Riekhof W, Rymarquis L, Schroda M, Stern D, Umen J, Willows R, Wilson N, Zimmer SL, Allmer J, Balk J, Bisova K, Chen CJ, Elias M, Gendler K, Hauser C, Lamb MR, Ledford H, Long JC, Minagawa J, Page MD, Pan J, Pootakham W, Roje S, Rose A, Stahlberg E, Terauchi AM, Yang P, Ball S, Bowler C, Dieckmann CL, Gladyshev VN, Green P, Jorgensen R, Mayfield S, Mueller-Roeber B, Rajamani S, Sayre RT, Brokstein P, Dubchak I, Goodstein D, Hornick L, Huang YW, Jhaveri J, Luo Y, Martínez D, Ngau WC, Otillar B, Poliakov A, Porter A, Szajkowski L, Werner G, Zhou K, Grigoriev IV, Rokhsar DS, Grossman AR. (2007) The *Chlamydomonas* genome reveals the evolution of key animal and plant functions. *Science* 318, 245-250.
- 129) Carlson, B. A., Moustafa, M. E., Sengupta A, Schweizer U, Shrimali, R., Rao, M., Zhong, N., Wang, S., Feigenbaum, L., Lee, B. J., Gladyshev, V. N., and Hatfield, D. L. (2007) Selective restoration of the selenoprotein population in a mouse hepatocyte selenoproteinless background with different mutant selenocysteine tRNAs lacking Um34. *J. Biol. Chem.* 282, 32591-32602.
- 130) Lobanov, A. V., Fomenko, D. E., Zhang, A., Sengupta, A., Hatfield, D. L., and Gladyshev, V. N. (2007) Evolutionary dynamics of eukaryotic selenoproteomes: large selenoproteomes may associate with aquatic life and small with terrestrial life. *Genome Biol.* 8, R198.

- 131) Yoo, M. H., Xu, X. M., Carlson, B. A., Patterson, A. D., Gladyshev, V. N., and Hatfield, D. L. (2007) Targeting thioredoxin reductase 1 reduction in cancer cells inhibits self-sufficient growth and DNA replication. *PLoS ONE* 2, e1112.
- 132) Aachmann, F. L., Fomenko, D. E., Soragni, A., Gladyshev, V. N., and Dikiy, A. (2007) Solution structure of selenoprotein W and NMR analysis of its interaction with 14-3-3 proteins. *J. Biol. Chem.* 282, 37036-37044.
- 133) Lobanov, A. V., Hatfield, D. L., and Gladyshev, V. N. (2008) Selenoproteinless animals: selenophosphate synthetase SPS1 functions in a pathway unrelated to selenocysteine biosynthesis. *Protein Sci.* 17, 176-182.
- 134) Breivik AS, Aachmann FL, Sal LS, Kim HY, del Conte R, Gladyshev, V. N., Dikiy A. (2008) 1H, 15N and 13C NMR assignments of mouse methionine sulfoxide reductase B2. *Biomol NMR Assign.* 2, 199-201.
- 135) Sengupta, A., Carlson, B. A., Hoffmann, V. J., Gladyshev, V. N., and Hatfield, D. L. (2008) Loss of housekeeping selenoprotein expression in mouse liver modulates lipoprotein metabolism. *Biochem. Biophys. Res. Commun.* 365, 446-452.
- 136) Ridge, P. G., Zhang, Y., Gladyshev, V. N. (2008) Comparative genomic analyses of copper transporters and cuproproteomes reveal evolutionary dynamics of copper utilization and its link to oxygen. *PLoS ONE* 3, e1378.
- 137) Papp L.V., Wang J., Kennedy D., Boucher D., Zhang Y., Gladyshev V.N., Singh R.N., Khanna K.K. (2008) Functional characterization of alternatively spliced human SECISBP2 transcript variants. *Nucleic Acids Res.* 36, 7192-7206.
- 138) Lee B.C., Le D.T., Gladyshev V.N. (2008) Mammals reduce methionine-S-sulfoxide with MsrA, are unable to reduce methionine-R-sulfoxide, and this function can be restored with a yeast reductase. *J Biol Chem.* 283, 28361-28369.
- 139) Fomenko D.E., Marino S.M., Gladyshev V.N. (2008) Functional Diversity of Cysteine Residues in Proteins and Unique Features of Catalytic Redox-Active Cysteines in Thiol Oxidoreductases. *Mol Cells.* 26, 228-235.
- 140) Shrimali R.K., Irons R.D., Carlson B.A., Sano Y., Gladyshev V.N., Park J.M., Hatfield D.L. (2008) Selenoproteins mediate T cell immunity through an antioxidant mechanism. *J Biol Chem.* 283, 20181-20185.
- 141) Sengupta A., Carlson B.A., Weaver J.A., Novoselov S.V., Fomenko D.E., Gladyshev V.N., Hatfield D.L. (2008) A functional link between housekeeping selenoproteins and phase II enzymes. *Biochem J.* 413, 151-161
- 142) Bonilla M., Denicola A., Novoselov S.V., Turanov A.A., Protasio A., Izmendi D., Gladyshev V.N., Salinas G. (2008) Platyhelminth mitochondrial and cytosolic redox homeostasis is controlled by a single thioredoxin glutathione reductase and dependent on selenium and glutathione. *J Biol Chem.* 283, 17898-17907.
- 143) Zhang Y., Gladyshev V.N. (2008) Molybdoproteomes and evolution of molybdenum utilization. *J Mol Biol.* 379, 881-899.
- 144) Zhang Y., Gladyshev V.N. (2008) Trends in selenium utilization in marine microbial world revealed through the analysis of the global ocean sampling (GOS) project. *PLoS Genet.* 4, e1000095.
- 145) Zhang Y., Turanov A.A., Hatfield D.L., Gladyshev V.N. (2008) In silico identification of genes involved in selenium metabolism: evidence for a third selenium utilization trait. *BMC Genomics* 9, 251.
- 146) Le D.T., Liang X., Fomenko D.E., Raza A.S., Chong C.K., Carlson B.A., Hatfield D.L., Gladyshev V.N. (2008) Analysis of Methionine/Selenomethionine Oxidation and Methionine Sulfoxide Reductase Function Using Methionine-Rich Proteins and Antibodies against Their Oxidized Forms. *Biochemistry*, May 28 [Epub ahead of print].
- 147) Ganichkin O.M., Xu X.M., Carlson B.A., Mix H., Hatfield D.L., Gladyshev V.N., Wahl M.C. (2008) Structure and catalytic mechanism of eukaryotic selenocysteine synthase. *J Biol Chem.* 283, 5849-5865.
- 148) Zhang Y., Zhou Y., Schweizer U., Savaskan N.E., Hua D., Kipnis J., Hatfield D.L., Gladyshev V.N. (2008) Comparative analysis of selenocysteine machinery and selenoproteome gene expression in

- mouse brain identifies neurons as key functional sites of selenium in mammals. *J Biol Chem.* 283, 2427-2438.
- 149) Lobanov A.V., Hatfield D.L., Gladyshev V.N. (2008) Reduced reliance on the trace element selenium during evolution of mammals. *Genome Biol.* 9, R62.
 - 150) Castellano S., Gladyshev V.N., Guigó R., Berry M.J. (2008) SelenoDB 1.0 : a database of selenoprotein genes, proteins and SECIS elements. *Nucleic Acids Res.* 36, D332-338.
 - 151) Glass R.S., Berry M.J., Block E., Boakye H.T., Carlson B.A., Gailer J., George G.N., Gladyshev V.N., Hatfield D.L., Jacobsen N.E., Johnson S., Kahakachchi C., Kaminski R., Manley S.A., Mix H., Pickering I.J., Prenner E.J., Saira K., Skowronska A., Tyson J.F., Uden P.C., Wu Q., Xu X-M., Yamdagni R., Zhang Y. (2008) Insights into the Chemical Biology of Selenium. *Phosphorus, Sulfur, and Silicon and the Related Elements* 183, 924-930.
 - 152) Lobanov A.V., Hatfield D.L., Gladyshev V.N. (2009) Eukaryotic Selenoproteins and Selenoproteomes. *Biochim Biophys Acta.* 1790, 1424-8.
 - 153) Zhang Y., Gladyshev V.N. (2009) Comparative Genomics of Trace Elements: Emerging Dynamic View of Trace Element Utilization and Function. *Chem Rev.* 109, 4828-61.
 - 154) Marino S.M., Gladyshev V.N. (2009) A structure-based approach for detection of thiol oxidoreductases and their catalytic redox-active cysteine residues. *PLoS Comput Biol.* 5, e1000383.
 - 155) Kaya A., Karakaya H.C., Fomenko D.E., Gladyshev V.N., Koc A. (2009) Identification of a novel system for boron transport: Atr1 is a main boron exporter in yeast. *Mol Cell Biol.* 29, 3665-3674.
 - 156) Shchedrina V.A., Vorbruggen G., Lee B.C., Kim H.Y., Kabil H., Harshman L.G., Gladyshev V.N. (2009) Overexpression of methionine-R-sulfoxide reductases has no influence on fruit fly aging. *Mech Ageing Dev.* 130, 429-443.
 - 157) Lee B.C., Dikiy A., Kim H.Y., Gladyshev V.N. (2009) Functions and evolution of selenoprotein methionine sulfoxide reductases. *Biochim Biophys Acta* 1790, 1471-7.
 - 158) Kehr S., Malinouski M., Finney L., Vogt S., Labunskyy V.M., Kasaikina M.V., Carlson B.A., Zhou Y., Hatfield D.L., Gladyshev V.N. (2009) X-ray fluorescence microscopy reveals the role of selenium in spermatogenesis. *J Mol Biol.* 389, 808-818.
 - 159) Hatfield D.L., Yoo M.H., Carlson B.A., Gladyshev V.N. (2009) Selenoproteins that function in cancer prevention and promotion. *Biochim Biophys Acta* 1790, 1541-5
 - 160) Kim H.Y., Zhang Y., Lee B.C., Kim J.R., Gladyshev V.N. (2009) The selenoproteome of *Clostridium* sp. OhLAs: characterization of anaerobic bacterial selenoprotein methionine sulfoxide reductase A. *Proteins* 74, 1008-1017.
 - 161) Fomenko D.E., Novoselov S.V., Natarajan S.K., Lee B.C., Koc A., Carlson B.A., Lee T.H., Kim H.Y., Hatfield D.L., Gladyshev V.N. (2009) MsrB1 (Methionine-R-sulfoxide reductase 1) knockout mice: roles of MsrB1 in redox regulation and identification of a novel selenoprotein form. *J Biol Chem.* 284, 5986-5993.
 - 162) Carlson B.A., Schweizer U., Perella C., Shrimali R.K., Feigenbaum L., Shen L., Speransky S., Floss T., Jeong S.J., Watts J., Hoffmann V., Combs Jr G.F., Gladyshev V.N., Hatfield D.L. (2009) The selenocysteine tRNA STAF-binding region is essential for adequate selenocysteine tRNA status, selenoprotein expression and early age survival of mice. *Biochem J.* 418, 61-71.
 - 163) Le D.T., Lee B.C., Marino S.M., Zhang Y., Fomenko D.E., Kaya A., Hacıoglu E., Kwak G.H., Koc A., Kim H.Y., Gladyshev V.N. (2009) Functional analysis of free methionine-R-sulfoxide reductase from *Saccharomyces cerevisiae*. *J Biol Chem.* 284, 4354-4364.
 - 164) Zhang Y., Rodionov D.A., Gelfand M.S., Gladyshev V.N. (2009) Comparative genomic analyses of nickel, cobalt and vitamin B12 utilization. *BMC Genomics* 10, 78.
 - 165) Hatfield D.L., Gladyshev V.N. (2009) The Outcome of Selenium and Vitamin E Cancer Prevention Trial (SELECT) Reveals the Need for Better Understanding of Selenium Biology. *Mol. Interv.* 9, 18-21.
 - 166) Hirosawa-Takamori M., Ossipov D., Novoselov S.V., Turanov A.A., Zhang Y., Gladyshev V.N., Krol A., Vorbruggen G., Jackle H. (2009) A novel stem loop control element-dependent UGA read-through system without translational selenocysteine incorporation in *Drosophila*. *FASEB J.* 23, 107-113.

- 167) Turanov A.A., Lobanov A.V., Fomenko D.E., Morrison H.G., Sogin M.L., Klobutcher L.A., Hatfield D.L., Gladyshev V.N. (2009) Genetic code supports targeted insertion of two amino acids by one codon. *Science* 323, 259-261.
- 168) Labunskyy VM, Yoo MH, Hatfield DL, Gladyshev V.N. (2009) Sep15, a thioredoxin-like selenoprotein, is involved in the unfolded protein response and differentially regulated by adaptive and acute ER stresses. *Biochemistry* 48, 8458-65.
- 169) Xu XM, Yoo MH, Carlson BA, Gladyshev VN, Hatfield DL. (2009) Simultaneous knockdown of the expression of two genes using multiple shRNAs and subsequent knock-in of their expression. *Nature Protoc.* 4, 1338-1348.
- 170) Carlson BA, Yoo MH, Tsuji PA, Gladyshev VN, Hatfield DL. (2009) Mouse models targeting selenocysteine tRNA expression for elucidating the role of selenoproteins in health and development. *Molecules* 14, 3509-3527.
- 171) Sengupta A, Carlson BA, Labunskyy VM, Gladyshev VN, and Hatfield DL. (2009) Selenoprotein T deficiency alters cell adhesion and elevates Selenoprotein W expression in murine fibroblast cells. *Biochem. Cell. Biol.* 87, 953-961.
- 172) Jin BY, Sartoretto JL, Gladyshev VN, Michel T. (2009) Endothelial nitric oxide synthase negatively regulates hydrogen peroxide-stimulated AMP-activated protein kinase in endothelial cells. *Proc. Natl. Acad. Sci. USA* 106, 17343-17348.
- 173) Carlson BA, Yoo MH, Sano Y, Sengupta A, Kim JY, Irons R, Gladyshev VN, Hatfield DL, Park JM. Selenoproteins regulate macrophage invasiveness and extracellular matrix-related gene expression. (2009) *BMC Immunol.* 10, 57.
- 174) Marino S.M., Gladyshev V.N. (2010) Structural analysis of cysteine S-nitrosylation: A modified acid-based motif and the emerging role of trans-nitrosylation. *J. Mol. Biol.* 395, 844-859.
- 175) Yoo MH, Gu X, Xu XM, Kim JY, Carlson BA, Patterson AD, Cai H, Gladyshev VN, Hatfield DL. (2010) Delineating the role of glutathione peroxidase 4 in protecting cells against lipid hydroperoxide damage and in Alzheimer's disease. *Antioxid. Redox Signal.* 12, 819-827.
- 176) Shchedrina VA, Zhang Y, Labunskyy VM, Hatfield, DL, Gladyshev V. (2010) Structure-function relationships, physiological roles and evolution of mammalian ER-resident selenoproteins. *Antioxid. Redox Signal.* 12, 839-849.
- 177) Bekaert M, Firth AE, Zhang Y, Gladyshev VN, Atkins JF, Baranov PV. (2010) Recode-2: new design, new search tools, and many more genes. *Nucleic Acids Res.* 38, D69-74.
- 178) Gerashchenko M.V., Su D., Gladyshev V.N. (2010) CUG start codon generates thioredoxin/glutathione reductase isoforms in mouse testes. *J. Biol. Chem.* 285, 4595-602.
- 179) Zhang Y, Gladyshev VN (2010) General trends in trace element utilization revealed by comparative genomic analyses of Co, Cu, Mo, Ni and Se. *J. Biol. Chem.* 285, 3393-405.
- 180) Novoselov S, Kim H-Y, Hua D, Lee BC, Astle C, Harrison D, Friguet B, Moustafa M, Carlson B, Hatfield D.L., Gladyshev V.N. (2010) Regulation of Selenoproteins and Methionine Sulfoxide Reductases A and B1 by Age, Calorie Restriction, and Dietary Selenium in Mice. *Antioxid. Redox Signal.* 12, 829-838.
- 181) Otero L., Bonilla M., Protasio A.V., Fernandez C., Gladyshev V.N., Salinas G. (2010) Thioredoxin and glutathione systems differ in parasitic and free-living platyhelminths. *BMC Genomics* 11, 237.
- 182) Carlson, BA, Yoo, M.H., Shrimali, R.K., Irons, R., Gladyshev, V.N., Hatfield, D.L., Park, J.M. (2010) Role of selenium-containing proteins in T cell and microphage function, *Proc. Nutr. Soc.*, 1-11.
- 183) Turanov, A.A., Kehr, S., Marino, S.M., Yoo, M.H., Carlson, B.A., Hatfield, D.L., Gladyshev VN. (2010) Mammalian thioredoxin reductase 1: roles in redox homeostasis and characterization of cellular targets. *Biochem J.*, 430, 285-293.
- 184) Aachmann, F.L., Sal, L.S., Kim, H.Y., Marino, S.M., Gladyshev, V.N., Dikiy, A. (2010) Insights into function, catalytic mechanism and fold evolution of selenoprotein methionine sulfoxide reductase B1 through structural analysis. *J. Biol. Chem.*, in press.

- 185) Liang, X., Fomenko, D. E., Hua, D., Kaya, A., Gladyshev, V. N. (2010) Diversity of protein and mRNA forms of mammalian methionine sulfoxide reductase B1 due to intronization and protein processing. *PLoS ONE*, 5, e11497.
- 186) Turanov, A.A., Hatfield, D.L., Gladyshev, V.N. (2010) Characterization of Protein Targets of Mammalian Thioredoxin Reductases. *Methods Enzymol.* 474, 245-254.
- 187) Lobanov, A.V., Turanov, A.A., Hatfield, D.L., Gladyshev, V.N. (2010) Dual functions of codons in the genetic code. *Crit Rev Biochem Mol Biol.* 45, 257-65.
- 188) Yoo, M.H., Carlson, B.A., Tsuji, P., Irons, R., Gladyshev V.N., Hatfield D.L. (2010) Alteration of thioredoxin reductase 1 levels in elucidating cancer etiology. *Methods Enzymol.* 474, 255-275.
- 189) Irons, R., Tsuji, P.A., Carlson, B.A., Ouyang, P., Yoo, M.H., Xu, X.M., Hatfield, D.L., Gladyshev, V.N., Davis, C.D. (2010) Deficiency in the 15-kDa Selenoprotein Inhibits Tumorigenicity and Metastasis of Colon Cancer Cells. *Cancer Prev Res*, 3, 630-639.
- 190) Zhang, Y., Gladyshev, V.N. (2010) dbTEU: a protein database of trace element utilization. *Bioinformatics* 26, 700-702.
- 191) Sengupta, A., Lichti, U.F., Carlson, B.A., Ryscavage, A.O., Gladyshev, V.N., Yuspa, S.H., Hatfield, D.L. (2010) Selenoproteins are essential for proper keratinocyte function and skin development. *PLoS One* 5, e12249.
- 192) Marino, S.M., Li, Y., Fomenko, D.E., Agisheva, N., Cerny, R.L., Gladyshev, V.N. (2010) Characterization of surface-exposed reactive cysteine residues in *Saccharomyces cerevisiae*. *Biochemistry* 49, 7709-7721.
- 193) Kaya, A., Koc, A., Lee, B.C., Fomenko, D.E., Rederstorff, M., Krol, A., Lescure, A., Gladyshev, V.N. (2010) Compartmentalization and Regulation of Mitochondrial Function by Methionine Sulfoxide Reductases in Yeast. *Biochemistry*, in press.
- 194) Marino, S.M., Gladyshev, V.N. (2010) Redox Biology: Computational Approaches to the Investigation of Functional Cysteine Residues. *Antioxid Redox Signal*, in press.

Books edited

- Selenium: Its molecular biology and role in human health (ed., Hatfield, D. L., Berry, M. J., Gladyshev, V. N.) Springer, pp. 444, 2006 (new edition is currently in preparation)
- Redox Biochemistry (ed., Banerjee, R., Assoc. ed., Gladyshev, V. N., Ragsdale, S. W., Becker, D.), John Wiley & Sons, 2007

Teaching

University of Nebraska

Spring 1999	Biochemistry 431/831 (3 credit hours; 50%), 150 students
Spring 2000	Biochemistry 432/832 (3 credit hours; 50%), 61 students
Fall 2000	Biochemistry 432/832 (3 credit hours; 50%), 27 students
Spring 2001	Biochemistry 432/832 (3 credit hours; 50%), 75 students
Fall 2001	Biochemistry 432/832 (3 credit hours; 50%), 57 students
Spring 2002	Biochemistry 432/832 (3 credit hours; 50%), 108 students
Fall 2002	Biochemistry 432/832 (3 credit hours; 50%), 70 students
Spring 2003	Biochemistry 432/832 (3 credit hours; 50%), 93 students
Fall 2003	Biochemistry 432/832 (3 credit hours; 50%), 72 students
Spring 2004	Biochemistry 432/832 (3 credit hours; 50%), 80 students
Spring 2005	Proteins 932 (3 credit hours, 100%), 24 students
Spring 2006	Proteins 932 (3 credit hours, 100%), 16 students
Spring 2007	Proteins 932 (3 credit hours, 100%), 25 students

Fall 2008 Proteins 932 (3 credit hours, 100%), 22 students
Spring 2009 Proteins 932 (3 credit hours, 100%), 24 students

Co-organizer and host, International graduate course on redox biology (University of Nebraska – Karolinska Institutet), Lincoln, May 2009