Huawei Zeng, Ph.D.

Research Interests:

Obesity related colon cancer is a significant global health concern and the impact of specific dietary components on colon cancer risk has been well recognized. Dr. Zeng's main area of research is to determine the molecular mechanisms of cancer-preventive nutrients in foods. This focus presently centers on selenium-containing foods, and the development of new molecular bio-markers for obesity related colon cancer prevention. Currently, Dr. Zeng is studying the effects of nutritional levels of selenium in supporting cellular survival signaling; and the role of the putative anti-tumorigenic Se-metabolite, methylselenol, in cell cycle progression and apoptosis in both colon cell and animal models.

Dr. Zeng is also investigating the impact of human genetic variation on optimal nutritional intake. Single nucleotide polymorphisms (SNPs) are a primary component of human genetic variation. To determine the diet that best fits certain SNPs, He examines the effects of hemochromatosis, selenoproteins and vitamin D receptor genotypes on the absorption and utilization of iron, selenium, calcium and other nutrients.

Education:
B.Sc.,Biology, Xiamen University, Xiamen, China, 1984
M.Sc., Biology, Xiamen University, Xiamen, China, 1987
Ph.D., Molecular Biology, University of Wyoming, Laramie, WY, USA, 1996

Professional Experience:

1987-1989	Researcher, Xiamen Fishery Research Institute, Xiamen, China
1989-1991	Visiting Scholar, Dept. Biological Sci., SUNY-Buffalo, Buffalo, NY.
1991-1996	Research Assistant, Dept. Molecular Biology, Univ. Wyoming, Laramie, WY.
1996-1999	Intramural Research Training Fellow, Laboratory of Molecular & Cellular Biology, NIDDK, NIH, Bethesda, MD.
1999-present	Research Molecular Biologist, USDA ARS Grand Forks Human Nutrition Research Center, Grand Forks, ND.
2009-present	Lead Scientist, New CRIS Project titled “Dietary Modulation of Obesity-Related Cancer by Selenium” NP 107 Human Nutrition, USDA, USA.
2000-present	Adjunct Professor, Dept. Biochemistry & Molecular Biology, Univ. North Dakota. USA

Honors and Awards:

a. Recipient, invitation for membership in the Honor Society of Phi Kappa Phi Honor for excellent academic achievement, 1993-1996
b. Recipient, NIH Intramural Research Training Award, 1996-1999
c. Recipient, invitation for special member of American Diabetes Association, 2005
d. 2005-2011 Manchester Who’s Who ‘Honors Edition”
e. The most productive scientist of year 2010 at Grand Forks Human Nutrition Research Center
f. Who’s Who in America in A.N. Marquis publication of 65th Edition, 2009, 2011

Offices and Committee Assignments Held in Professional and Honorary Societies:

a. Board member of Academy of Cardiovascular Research Excellence (ACRE), 2003, 2004
b. Editorial board member of American Journal of Food Technology via (EMS), 2006
c. Editor of Asian Network for Scientific information, (2006-present)
d. Editorial board member of International Journal of Cancer Research via (EMS), 2006

e. Committee member of Journal of Nutrition for the Ad Hoc Committee on the reporting of "omic" data for developing recommendations for the editorial boards of JN and AJCN to consider as policy, USA 2007
f. Chair of session 29: Molecular Oncology. BIT Life Sciences' 1st Annual World Cancer Congress, Shanghai, China 2008
g. RPES panel member, 2009, 2011
h. Invited Guest Editor of Recent Patents on Biomarker & Recent Patents on Biotechnology via Bentham Science Publisher, 2011
i. Chair of the session: Trace Element on Cell Death, Tumor, and Cancer; and committee member of oral and poster competition at the 14th conference on Trace Element in Man and Animals, Enshi, China 2011

Contribution of 6 Novel DNA sequences to GenBank:

(1) **Zeng, H.**, Kaul, S., Simons, S. S. Jr. Rattus norvegicus GMEB-2b (GMEB-2) mRNA, complete cds. Genbank# AF205780
(2) **Zeng, H.**, Kaul, S., Simons, S. S. Jr. Rattus norvegicus GMEB-2a (GMEB-2) mRNA, complete cds. Genbank# AF205779
(3) **Zeng, H.**, Kaul, S., Simons, S. S. Jr. Rattus norvegicus GMEB-2' (GMEB-2) mRNA, complete cds. Genbank# AF205778
(4) **Zeng, H.**, Kaul, S., Simons, S. S. Jr. Rattus norvegicus GMEB-2 gene, promoter region. Genbank# AF203693
(5) **Zeng, H.**, Kaul, S., Simons, S. S. Jr. Homo sapiens GMEB-1 gene, promoter region. Genbank# AF203692
(6) **Zeng, H.**, Jackson, D. A., Oshima, H., Simons, S. S. Jr. Rattus norvegicus glucocorticoid modulatory element binding protein 2 mRNA, complete cds. Genbank# AF059273

Special Invitations: (more than 80 invitations)

a. Invited speaker "Receptor activation, hormone-receptor recognition, and signal generation", the expenses paid by University of Texas Southwestern Medical Center at Dallas, Dallas, TX 1995.

b. Invited speaker "Glycoprotein hormone-receptor recognition, receptor activation and signal generation", the expenses paid by NIDDK, National Institutes of Health, Bethesda, MD. 1996.

c. Invited speaker "The effect of trace elements on cell cycle progression and apoptosis", Institute of Molecular and Cell Biology, The National University of Singapore, Singapore 2001.

d. Invited to write review article "Genomics and proteomics techniques and application in selenium research" Current Pharmacogenomics, 2003

e. Invited speaker "Understanding the mechanism of selenium's anti-cancer effect", Xiamen University, Xiamen, China 2004.

f. Invited speaker "Inhibitory effect of prolonged-butyrate treatment on migration and invasion of HT1080 tumor cells" FASEB J. San Diego, CA 2005.

g. Invited to write the review article, "Mechanistic aspects of the interaction between selenium and arsenic" J. Inorg. Biochem. 2005.

h. Served by invitation as an editor on Asian Network for Scientific information serving the interests of the academic community by the swift dissemination of information and knowledge through all possible channels (2006).

i. Invited speaker "New Findings on Protein Expression on Copper Deficient Rat Heart with Proteomic Approach" FASEB J. San Francisco, CA 2006.

j. Invited to be a committee member of Journal of Nutrition for the Ad Hoc Committee on the reporting of "omic" data, 2007. With the introduction of "omic" approaches to biology and nutrition research, the ASN needs to reflect upon the requirements for publishing this data in its journals. Responsible for developing recommendations for the editorial boards of JN and AJCN to consider as policy.

k. Invited to write the review article "Selenium as an anticancer nutrient: roles in cell proliferation and tumor cell invasion" J. Nutr. Biochem. 2008.

l. The session chair and the invited speaker "Molecular mechanisms of cancer prevention by selenium" at the 1st World Cancer Congress, Shanghai, China 2008.

m. Invited speaker "Molecular mechanisms of cancer prevention by selenium" at EHRLICH II, the 2nd World Conference on Magic Bullets, Nurnberg, Germany, 2008 (Declined due to time and priority considerations).

n. Invited to write the review article "Selenium and anticarcinogenesis: roles in cell cycle and apoptosis" at special issue "Selenium and Tellurium chemistry" of MOLECULES Journal, Basel, Switzerland, 2009.

o. Invited speaker "Molecular mechanisms of cancer prevention by selenium", the expenses paid by University of Wyoming, Laramie, WY 2009.

p. Invited to write the review article "Obesity-related colon cancer: dietary factors and their mechanisms of anticancer action" Clin Exp Pharmacol Physiol. 2010, Victoria, Australia.

q. Invited speaker "Selenite and selenomethionine promote HL-60 cell cycle progression" International Conference: Interventional Hepatology, Ravello, Italy 2011 (Declined due to time and priority considerations).

r. Invited speaker "Dietary selenium intake increases exon-specific DNA methylation of p53 gene in rat liver and colon mucosa" the 4th international meeting on Epigenomics at Harvard Medical School, Boston, MA 2011.

s. Invited guest editor "Recent Patents on Biomarkers" Journal, Bentham Science Publisher, 2011.

t. The session chair and an invited speaker "Methylselenol, a selenium metabolite, plays a critical role in inhibiting colon cancer growth in vitro and in vivo" at the 14th International Conference on Trace Elements in Man and Animals, Enshi, China, 2011.

Publications:

Peer Reviewed Journal Articles and Patents:

1. **Zeng, H.** Biology of *Hexamermis sinensis,* with especial reference to its detailed morphology and experimental hosts. Journal of Xiamen University (Natural Science) 28: 311-315. 1989.

2. Yoo, J.*, **Zeng, H.***, Ji, I., Mudoch, W.J., Ji, T. H. COOH-terminal amino acids of the α subunit play common and different roles in hCG and FSH. J. Biol. Chem. 268: 13034-13042. 1993 (*The first two authors made equal contribution).

3. Ji, I., **Zeng, H.,** Ji, T. H. Receptor-activation and signal-generation of the LH/CG receptor: Cooperation of Asp397 of the receptor and "Lys91 of the hormone. J. Biol. Chem. 268: 22971-22974. 1993.

4. Grossmann, M., Szkudlinski, M. W., **Zeng, H.**, Kraiem, Z, Ji, I., Tropea, J. E., Ji, T. H., Weintraub, B. D. Role of the carboxyterminal residues of the α subunit in the expression and bioactivity of human thyroid-stimulating hormone. Molecular Endocrinology 9: 948-958. 1995.

5. **Zeng, H.**, Ji, I., Ji, T. H. Lys91 and His90 of the α subunit are crucial for receptor binding and hormone action of FSH and play hormone-specific roles in FSH and hCG. Endocrinology 136: 2948-2953. 1995.

6. **Zeng, H.**, Jackson, D. A., Oshima, H., Simons, S. S. Jr. Cloning and characterization of a novel binding factor (GMEB-2) of the glucocorticoid modulatory element. J. Biol. Chem. 273: 17756-17762. 1998.

7. **Zeng, H.**, Kaul, S., Simons, S. S. Jr. Genomic organization of human GMEB-1 and rat GMEB-2: structural conservation of two multifunctional proteins. *Nucleic Acids Research* 28: 1819-1829. 2000.

8. **Zeng, H.**, Plisov, S. Y., Simons, S. S. Jr. Ability of the glucocorticoid modulatory element (GME) to modify glucocorticoid receptor transactivation indicates parallel pathways for the expression of GME and glucocorticoid response element activities. Mol. Cell. Endocrinol. 162: 221-234. 2000.

9. **Zeng, H.**, Phang, T., Song, Y. S., Ji, I., Ji, T. H. The role of the hinge region in the luteinizing hormone receptor in hormone interaction and signal generation. J. Biol. Chem. 276:3451-3458. 2001.

10. **Zeng, H.** Arsenic suppresses necrosis induced by selenite in human leukemia HL-60 cells. Biol. Tr. Elem. Res. 83:1-15. 2001. (**Cover Story**)

11. Davis, C. D., **Zeng, H.**, Finley, J. W. Selenium-enriched broccoli decreases intestinal tumorigenesis in multiple intestinal neoplasia mice. J. Nutr. 132: 307-309. 2002.

12. **Zeng, H**. Selenite and selenomethionine promote HL-60 cell cycle progression. J. Nutr. 132: 674-679. 2002.

13. **Zeng, H.**, Davis, C. D., Finley, J. W. Effect of selenium-enriched broccoli diet on differential gene expression in Min mouse liver. J. Nutr. Biochem. 14: 227-231. 2003.

14. Ren, J., Hintz, K. K., Roughead, Z. F., Duan, J., Colligan, P. B., Ren, B. H., Lee, K. J., **Zeng, H.** Impact of estrogen replacement on ventricular myocyte contractile function and protein kinase B/Akt activation. Am. J. Physiol. Heart Circ. Physiol. 284: H1800-1807. 2003.

15. **Zeng, H.** Genomic and proteomic techniques and their application in selenium research. Current Pharmacogenomics 1: 59-65. 2003.

16. **Zeng, H.**, Davis, C. D. Down-regulation of proliferating cell nuclear antigen gene expression occurs during cell cycle arrest induced by human fecal water in colonic HT-29 cells. J. Nutr. 133: 2682-2687. 2003.

17. Hintze, K. J., Wald, K. A., **Zeng, H.,** Jeffery. E. H., Finley, J. W. Thioredoxin reductase in human hepatoma cells is transcriptionally regulated by sulforaphane and other electrophiles via an antioxidant response element. J. Nutr. 133: 2721-2727. 2003.

18. **Zeng, H.,** Botnen, J. H. Copper may interact with selenite extracellularly in cultured HT-29 cells. J. Nutr. Biochem. 15: 179-184. 2004.

19. Hunt, J.R., **Zeng, H.** Iron absorption by heterozygous carriers of the HFE C282Y mutation associated with hemochromatosis. Am. J. Clin. Nutr. 80:924-931. 2004.

20. **Zeng, H.**, Saari, J. T. Increase type I collagen content and DNA binding activity of a single-stranded, cytosine-rich sequence in the high-salt buffer protein extract of copper-deficient rat heart. *J. Nutr. Biochem.* 15: 694-699. 2004.

21. **Zeng, H.**, Briske-Anderson, M. Prolonged-butyrate treatment inhibits migration and invasion potential of HT1080 tumor cells. J. Nutr. 135: 291-295. 2005.

22. **Zeng, H.**, Uthus, E. O., Combs, G. F. Jr. Mechanistic aspects of the interaction between selenium and arsenic. J. Inorg. Biochem. 99: 1269-1274. 2005.

23. **Zeng, H.,** Saari, J. T., Dahlen, G. M**.** Copper deficiency increases fibulin-5 (DANCE/EVEC) but decreases cytochrome C oxidase VIb subunit expression in rat heart. J. Inorg. Biochem. 100: 186-91. 2006.

24. **Zeng, H.**, Briske-Anderson, M., Idso, J. P., Hunt, C. D. The selenium metabolite methylselenol inhibits the migration and invasion potential of HT1080 tumor cells. J. Nutr. 136:1528-32. 2006.

25. Saari, J. T., Wold, L. E., Duan, J., Ren, J., Carlson, H. L., Bode, A. M., Lentsch, A. B., **Zeng, H.,** Schuschke, D. A. Cardiac nitric oxide synthases are elevated in dietary copper deficiency. J. Nutr. Biochem. 18: 443-448. 2007.

26. **Zeng, H.,** Saari, J. T., Johnson, W. T. Copper deficiency decreases complex IV but not complex I, II, III, or V in the mitochondrial respiratory chain in rat heart. J. Nutr. 137:14-8. 2007.

27. **Zeng, H.,** Botnen, J. H. Selenium is critical for cancer-signaling gene expression but not cell proliferation in human colon Caco-2 cells. Biofactors 31:155-64. 2007.

28. **Zeng, H.,** Combs, G. F. Jr. Selenium as an anticancer nutrient: roles in cell proliferation and tumor cell invasion. J. Nutr. Biochem.19: 1-7. 2008.

29. **Zeng, H.,** Botnen, J. H., Johnson, L. K. A selenium-deficient Caco-2 cell model for assessing differential incorporation of chemical or food selenium into glutathione peroxidase. Biol. Tr. Elem. Res. 123: 98-108. 2008.

30. **Zeng, H.** Selenium as an essential micronutrient: roles in cell cycle and apoptosis. Molecules 14: 1263-78. 2009.

31. **Zeng, H.,** Uthus, E. O., Ross, S.A., Davis, C. D. High dietary intake of sodium selenite does not affect gene mutation frequency in rat colon and liver. Biol. Trace Elem. Res. 131: 71-80. 2009.

32. **Zeng, H.,** Wu, M., Botnen, J. H. Methylselenol, a selenium metabolite, induces cell cycle arrest in G1 phase and apoptosis via the ERK1/2 pathway and other cancer signaling genes. J. Nutr. 139:1613-8. 2009.

33. Nielsen, F. H, Johnson, L. K., **Zeng, H**. Magnesium supplementation improves indicators of low magnesium status and inflammatory stress in adults older than 51 years with poor quality sleep. Magnes. Res. 23:158-68. 2010.

34. **Zeng, H.,** Botnen, J. H., Briske-Anderson, M. Deoxycholic acid and selenium metabolite methylselenol exert common and distinct effects on cell cycle, apoptosis, and MAP kinase pathway in HCT116 human colon cancer cells. Nutr. Cancer 62: 85-92. 2010.

35. Uthus, E., Begaye, A., Ross, S., **Zeng, H.** The von Hippel-Lindau (VHL) tumor-suppressor gene is down-regulated by selenium deficiency in Caco-2 cells and rat colon mucosa. Biol. Trace Elem. Res. 142: 223-31. 2011.

36. Wu, M., Huang, H., Zhang, W., Kannan, S., Weaver, A., McKibben, M., Herington, D., **Zeng, H.**, Gao, H. Host DNA repair proteins in response to Pseudomonas aeruginosa in lung epithelial cells and in mice. Infect Immun. 79:75-87. 2011.

37. **Zeng, H.**, Trujillo, O. N., Moyer, M. P., Botnen, J. H. Prolonged sulforaphane treatment activates survival signaling in nontumorigenic NCM460 colon cells but apoptotic signaling in tumorigenic HCT116 colon cells. Nutr. Cancer 63:248-55. 2011.

38. Zhang, S., Luo, Y., **Zeng, H.**, Wang, Q., Tian, F., Song, J., Cheng, W. H. Encapsulation of selenium in chitosan nanoparticles improves selenium availability and protects cells from selenium-induced DNA damage response. J. Nutr. Biochem. 22:1137-42. 2011.

39. Combs, G. F. Jr., Jackson, M. I., Watts, J. C., Johnson, L. K., **Zeng, H.**, Idso, J., Schomburg, L., Hoeg, A., Hoefig, C.S., Chiang, E. C., Waters, D. J., Davis, C. D., Milner, J. A. Differential responses to selenomethionine supplementation by sex and genotype in healthy adults. Br. J. Nutr. 22:1-12. 2011.

40. **Zeng, H.**, Yan, L., Cheng, W. H., Uthus, E. O. Dietary selenomethionine increases exon-specific DNA methylation of the p53 gene in rat liver and colon mucosa. J. Nutr. 141:1464-8. 2011. (**The article was cited as an Editor's pick**)

41. Combs, G. F. Jr., Watts, J. C., Jackson, M. I., Johnson, L. K., **Zeng, H.,** Scheett, A. J., Uthus, E. O., Schomburg, L., Hoeg, A., Hoefig, C. S., Davis, C. D., Milner, J. A. Determinants of selenium status in healthy adults. Nutr. J. 10:75. 2011.

42. **Zeng, H.**, Jackson, M. I., Cheng, W.H., Combs, G. F. Jr. Chemical form of selenium affects its uptake, transport, and glutathione peroxidase activity in the human intestinal Caco-2 cell model. Biol. Trace Elem. Res. 143:1209-18. 2011.

43. Holmstrom, A., Lei, K. Y., **Zeng, H.**, Cheng, W. H., Wu, R. Nutritional and supranutritional levels of selenate differentially suppress prostate tumor growth in adult but not young nude mice. J. Nutr. Biochem. (accepted 8/2/2011).

44. **Zeng, H.**, Lazarova, D. L. Obesity-related colon cancer: dietary factors and their mechanisms of anticancer action. Clin. Exp. Pharmacol. Physiol. 39:161-7. 2012.

45. **Zeng, H.**, Briske-Anderson, M., Wu, M., Moyer, M. P. Methylselenol, a selenium metabolite, plays common and different roles in cancerous colon HCT116 cell and noncancerous NCM460 colon cell proliferation. Nutr. Cancer 64:128-35. 2012

46. Cheng, W. H., Holmstrom, A., Li, X., Wu, R.T., **Zeng, H.**, Xiao, Z. Effect of dietary selenium and cancer cell xenograft on peripheral T and B lymphocyte in adult nude mice. Biol. Trace Elem. Res. (accepted 10/6/2011).

47. Li, G.P., Yuan, K., Fox, J., Gaid, M., Seeger, D.,Weaver, A.,Breitwieser, W., Bansal, A. K., **Zeng, H.**, Gao, H., Wu, M. 8-oxoguanine DNA glycosylase 1-deficiency modifies allergic airway inflammation by regulating STAT6 and IL-4 in cells and in mice. Free Radic. Biol. Med. 52:392-401. 2012.

Addition Publications:

48. **Zeng, H.** Cell Biology of *Hexamermis sinensis*. Xiamen University.1987. (M.Sc. dissertation)

49. Ji, T. H., **Zeng, H.,** Ji, I. Hormone-binding and activation of the LH/CG receptor. In Lustbader, J.W. Puett, J.D., Ruddon, R. (eds.) Glycoprotein Hormones: Structure Function and Clinical Implications, Springer-Verlag, New York. pp.226-249. 1994.

50. **Zeng, H.** Interactions of Gonadotropins and Their Receptors. University of Wyoming. 1996. (Ph.D. dissertation)

51. Cao, J. J., Gregoire, B. R., **Zeng, H.** Selenium from pinto beans is bioavailable to support normal bone structure in mice. J. Nutr. (submitted 2012).

52. **Zeng, H.**, Cheng, W. H., Johnson, L. K. Methylselenol, a selenium metabolite, inhibits colon cancer cell proliferation and the growth of MC-26 colon cancer xenografts in Balb/c Mice. J. Nutr. (submitted 2012).