

**BIOGRAPHICAL SKETCH**

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.  
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Steven H. Zeisel, M.D., Ph.D.	POSITION TITLE Professor		
eRA COMMONS USER NAME stevenzeisel			
EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)			
INSTITUTION AND LOCATION	DEGREE (if applicable)	YEAR(s)	FIELD OF STUDY
Massachusetts Institute of Technology	Postdoc	1980-1981	Neurochemistry
Children's Hospital, Boston	Fellow	1978-1981	Human Nutrition
Massachusetts Institute of Technology	Ph.D.	1977-1980	Nutrition
Yale-New Haven Hospital	Resident	1975-1977	Pediatrics
Harvard Medical School	M.D.	1971-1975	Medicine

**A. POSITIONS:**

Kenan Distinguished University Professor, University of North Carolina, 2005-present.

Associate Dean for Research, School of Public Health, University of North Carolina, 1999-present.

Professor and Chair, Department of Nutrition, School of Medicine and School of Public Health,  
University of North Carolina at Chapel Hill, 1990-2005.

Professor, Department of Pediatrics, University of North Carolina at Chapel Hill, 1990-present.

Professor of Pathology and Pediatrics, Boston University School of Medicine, 1990-1990; Associate Professor,  
1987-1990; Assistant Professor, 1982-1987.

**Professional Activities:**

American Society for Nutritional Sciences, 1987-present, (President 2002) and Long Range Planning Chair,  
2003-2005.

American Society for Clinical Nutrition, Councilor 1991-1994.

American Society for Parenteral and Enteral Nutrition, 1990-present.

American College of Nutrition, 1988-present.

Society for Pediatric Research, 1987-present.

International Society for Research for Human Milk and Lactation, 1998-present.

International Society for Neurochemistry, 1998-present.

Member, Board of Scientific and Policy Advisors, American Council on Science and Health, 2000-present.

Member, Editorial Board, FASEB Journal, 2005-present.

Member, Editorial Committee, Annual Review of Nutrition, 2003 – present.

Panel on Recommended Dietary Intake of Folate and B-vitamins, National Academy of Sciences, 1996-1998

FDA Food Advisory Committee, Center for Food Safety and Applied Nutrition, Dietary Supplements 2001-2005.

Chairman NIH Integrative Nutrition and Metabolic Processes study section 2000-2006.

**B. PUBLICATIONS:** Dr. Zeisel is the author of more than 230 scientific publications, including:

1. Albright, C.D., Mar, M., Friedrich, C.B., Brown, E.C., **Zeisel, S.H.** 2001. Maternal choline availability alters the localization of p15Ink4B and p27Kip1 cyclin-dependent kinase inhibitors in developing fetal rat brain hippocampus. *Developmental Neuroscience*, 23(2):100-106.
2. Zhu, X., Song, J., Mar, M-H., Edwards, L.J., **Zeisel, S.H.** 2003. Phosphatidylethanolamine-N-methyltransferase (PEMT) knockout mice have hepatic steatosis and abnormal hepatic choline metabolite concentrations despite ingesting a recommended dietary intake of choline. *Biochemical Journal*, 370(pt 3):987-993.
3. Craciunescu, C.N., Albright, C.D., Mar, M-H, Song, J. and **Zeisel, S.H.** 2003. Choline availability during embryonic development alters progenitor cell mitosis in developing mouse hippocampus. *Journal of Nutrition*, 133(11):3614-3618.
4. Watkins, S.M., Zhu, X., and **Zeisel, S.H.** 2003. Phosphatidylethanolamine-N-methyltransferase activity and dietary choline regulate liver-plasma lipid flux and essential fatty acid metabolism. *Journal of Nutrition*, 133(11):3386-3391.

5. Craciunescu, C.N., Brown, E.C., Mar, M-H, Albright, C. D., Nadeau, M.R., and **Zeisel, S.H.** 2004. Folic acid deficiency during late gestation decreases progenitor cell proliferation and increases apoptosis in fetal mouse brain. *Journal of Nutrition*, 134(1):162-166.
6. Zhu, X., Song, J., Mar, M., Albright, C., Craciunescu, C., and **Zeisel, S. H.** 2004. Deletion of the Pemt gene increases progenitor cell mitosis, DNA and protein methylation and decreased calretinin expression in embryonic day 17 mouse hippocampus. *Developmental Brain Research*. 149:121-129.
7. Schwahn, B., Wendel, U., Lussier-Cacan, S., Mar, M., **Zeisel, S. H.**, Leclerc, D., Castro, C., Garrow, T., Rozen, R. 2004. Effects of betaine in a murine model of mild Cystathionine- $\beta$ -Synthasedeficiency. *Metabolism*, 53: 594-599.
8. Niculescu, M., Yamamuro, Y., **Zeisel, S. H.** 2004. Choline availability modulates human neuroblastoma cell proliferation and alters the methylation of the promoter region of the cyclin-dependent kinase inhibitor 3 gene. *Journal of Neurochemistry* 89:1252-1259.
9. Stott, W.T., Radtke, B.J., Linscombe, V.A., Mar, M.H., **Zeisel, S.H.** 2004. Evaluation of the potential of triethanolamine to alter hepatic choline in female B6C3F1 mice. *Toxicological Sciences* 79:242-247.
10. da Costa, K-A., Badea, M., Fischer, L., **Zeisel, S.H.** 2004. Elevated serum creatine phosphokinase in choline deficient humans: mechanistic studies in C2C12 mouse myoblast cells. *American Journal of Clinical Nutrition* 80: 163-170.
11. Busby, M., Fischer, L., da Costa, K., Thompson, D., Mar, M-H, **Zeisel, S.H.** 2004. Choline and betaine defined diets for use in clinical research and for the management of trimethylaminuria. *Journal of the American Dietetic Association* 104:1836-1845
12. Albright, CD, da Costa, K, Craciunescu, CN, Klem, E, Mar, M-H, **Zeisel, S.H.** 2005. Regulation of choline deficiency apoptosis by epidermal growth factor in CWSV-1 rat hepatocytes. *Cellular Physiology and Biochemistry* 15:59-68.
13. da Costa, K.A., Gaffney, C., Fischer, L., **Zeisel, S.H.** 2005. Choline deficiency in mice and humans is associated with increased plasma homocysteine after a methionine load. *American Journal of Clinical Nutrition* 81:440-444.
14. Niculescu, M., Craciunescu, N., **Zeisel, S.H.** 2005. Gene expression profiling of choline-deprived neural precursor cells isolated from mouse brain. *Molecular Brain Research* 134: 309-322.
15. Zhu, X., Zeisel, S.H. 2005 Gene expression profiling in phosphatidylethanolamine N-methyltransferase knockout mice. *Molecular Brain Research* 134: 239-255.
16. Fischer, L., Scearce, J., Mar, M., Blanchard, R., Macintosh B., Busby, M., **Zeisel, S.H.** 2005. Ad libitum choline intake in healthy individuals meets or exceeds the proposed adequate intake level. *Journal of Nutrition* 135: 826-829.
17. Kohlmeier, M., da Costa, K-A., Fischer, L., **Zeisel, S.H.** (2005) Genetic variation of folate-mediated one-carbon transfer pathway predicts susceptibility to choline deficiency in humans. *Proceedings of the National Academy of Sciences* 44: 16025-16030.
18. Wijekoon, E., Hall, B., Ratnam, S., Brosnan, M., **Zeisel, S.H.**, Brosnan, J. (2005) Homocysteine metabolism in ZDF (Type 2) diabetic rats. *Diabetes* 54(11): 3245-3251.
19. Song, J., da Costa, K-A., Fischer, L., Kohlmeier, M., Kwock, L., **Zeisel, S.H.** 2005. Polymorphism of the PEMT gene and susceptibility to nonalcoholic fatty liver disease. (NAFLD). *FASEB* 19:1266-71.
20. Albright, C.D., Mar, M, Craciunescu, C. Song, J., **Zeisel, S.H.** (2005) Maternal dietary choline availability alters the balance of Netrin-1 and DCC neuronal migration proteins in fetal mouse brain hippocampus. *Developmental Brain Research* 159:149-54.
21. **Zeisel, S.H.** (2005) Choline, homocysteine and pregnancy. *American Journal of Clinical Nutrition* 82:719-720.
22. Gossell-Williams, M., Fletcher, H., McFarlane-Anderson, N., Jacob, A., Zeisel, S.H. (2005) Dietary intake of choline and plasma choline concentrations in pregnant women in Jamaica. *West Indian Medical Journal* 54: 6:355-359.
23. Baric, I., Cuk, M., Fumic, K., Vugrek, O., Allen, R., Glenn, B., Maradin, M., Pazanin, L., Pogribny, I., Rados, M., Sarnavka, V., Schulze, A., Stabler, S., Wagner, C., **Zeisel, S.H.**, Mudd, S. (2005) S-Adenosylhomocysteine hydrolase deficiency: a second patient, the younger brother of the index patient, and outcomes during therapy. *Journal of Inherited Metabolic Diseases* 28:885-902.
24. Niculescu, M., Craciunescu, C., **Zeisel, S.H.** (2006) Dietary choline deficiency alters global and gene-specific DNA methylation in the developing hippocampus of mouse fetal brains. *FASEB Journal* 20:43-49.

25. Lindell, K., Adams, K., Kohlmeier, M., **Zeisel, S.H.** (2006) The evolution of Nutrition in Medicine, a computer-assisted nutrition curriculum. *American Journal of Clinical Nutrition* 83(supplement): 956S-962S.
26. Cho, E., **Zeisel, S.H.**, Jacques, P., Selhub, J., Dougherty, L., Colditz, G., Willett, W. (2006) Dietary choline and betaine assessed by food-frequency questionnaire in relation to plasma homocysteine concentration in the Framingham Offspring Study. *American Journal of Clinical Nutrition* 83: 905-911.
27. Adams, K., Lindell, K., Kohlmeier, M., **Zeisel, S.H.** (2006) Status of nutrition education in medical schools. *American Journal of Clinical Nutrition* 83(supplement) 941S-944S.
28. da Costa, K. A., Kozyrez, O., Song, J., Galanko, J., Fischer, L., **Zeisel, S. H.** (2006) Common genetic polymorphisms affect the human requirement for the nutrient choline. *FASEB* 20: 1336-1344.
29. Buist, N.R.M., Glenn, B., Vugrek, O., Wagner, C., Stabler, S., Allen, R.H., Pogribny, I., Schulze, A., **Zeisel, S.H.**, Baric, I., Mudd, S.H. (2006) S-Adenosylhomocysteine hydrolase deficiency in a 26-year-old-man. *Journal of Inherited Metabolic Disease* 29: 538-545.
30. da Costa, K. A., Niculescu, M., Craciunescu, C., Fisher, L., **Zeisel, S.H.** (2006) Choline deficiency increases lymphocyte apoptosis and DNA damage in humans. *American Journal of Clinical Nutrition* 84:88-94.
31. Craciunescu, C., Wu, R., **Zeisel, S.H.** (2006) Diethanolamine alters neurogenesis and induces apoptosis in fetal mouse hippocampus. *FASEB* 20:1635-1640.
32. **Zeisel, S.H.** (2007) Response to: DEA in consumer products is safe. Letter to the Editor in *FASEB Journal*. 21(1): 296-297.
33. Niculescu, M., Wu, R., Guo, Z., da Costa, K., **Zeisel, S.H.** (2007) Diethanolamine alters proliferation and choline metabolism in mouse neural precursor cells. *Toxicological Sciences* Niculescu, M., Wu, R., Guo, Z., da Costa, K., **Zeisel, S.H.** (2007) Diethanolamine alters proliferation and choline metabolism in mouse neural precursor cells. *Toxicological Sciences* DOI:10.1093/toxsci/kfl200.
34. Niculescu, M., Pop, E., Fischer, L., **Zeisel, S.H.** (2006) Dietary isoflavones differentially induce gene expression changes in lymphocytes from postmenopausal women who form equol as compared to those who do not. *Journal of Nutritional Biochemistry* (In Press).
35. Likes, R., Madl, R., **Zeisel, S.H.**, Craig, S. (2006) The betaine and choline content of a whole wheat flour compared to other mill streams. *Journal of Cereal Science* (In Press).
36. Fischer, L., da Costa, K., Kwock, L., Stewart, P., Lu, T., Stabler, S., Allen, R., **Zeisel, S.H.** (2007) Gender and menopausal status influence human dietary requirements for the nutrient choline. *American Journal of Clinical Nutrition* (In Press).
37. Steck, S., Gammon, M., Hebert, J., Wall, D., **Zeisel, S.H.** (2007) GSTM1, GSTT1, GSTP1, GSTA1 polymorphisms and urinary isothiocyanate metabolites following broccoli consumption in humans. *Journal of Nutrition* (In Press).

### **C. RESEARCH SUPPORT:**

#### **Ongoing Research Support**

P01 AG09525 (J. Blusztajn, Principal Investigator)

04/01/05-03/31/10

National Institute of Aging

Parent program – Brain aging: Effects of Perinatal Nutrition

Daughter project - Biochemistry of Supplemental Choline in Neonatal Rats

The major goals of this project are to determine the metabolism of supplemental choline in the rat during the perinatal period and to determine the extent to which physiologic changes occur in the availability of choline to perinatal brain.

Role: PI of Daughter project

2005-35200-15247 (S. Zeisel, Principal Investigator)

12/1/04-11/30/06

USDA

Dietary Choline and Folic Acid And Optimal Brain Development

The major objective of this project is to identify a mechanistic link between choline and folic acid availability in the diet and changes in cell proliferation, apoptosis and differentiation in fetal brain that have lifelong effects on brain function.

Role: PI

R21 ES012997 (S. Zeisel, Principal Investigator) 4/01/04-03/31/07  
NIEHS  
Diethanolamine Alters Brain Development  
The major goal of this project is to examine how diethanolamine effects the development of the hippocampus in the fetal mouse.  
Role: PI

P30 DK56350 (S. Zeisel, Principal Investigator) 9/30/99-3/31/11  
NIDDK  
UNC-Clinical Nutrition Research Unit  
This major goal of this center is to provide expertise and core services that increase and enhance conduct of human nutrition research.  
Role: PI

P30 DK56530-00005S2 (S. Zeisel, Principal Investigator) 9/30/05-3/31/11  
NIDDK  
Obesity in Asians-Supplement to the Clinical Nutrition Research Unit  
(This is a supplement to the CNRU, of which Steven Zeisel is the PI, for obesity research conducted by June Stevens.) The major goal of this research is to examine Asians living in China and Whites and Blacks living in the United States  
Role: PI of CNRU

T32 DK07686 (S. Zeisel, Principal Investigator) 9/30/92-9/29/07  
NIDDK  
Nutrition Training Grant  
The major goal of this project is to train predoctoral and postdoctoral researchers in human clinical nutrition.  
Role: PI

R25 CA65474 (S. Zeisel, Principal Investigator) 2/24/95-3/31/08  
NCI  
Nutrition in Medicine  
The major aim of this continued funding is to: 1) complete the series of eight modules of a national core curriculum in nutrition for medical students; 2) provide Wide World Web support for the use of these modules in teaching medical students; 3) sustain a national center for the support of the computer-based curriculum; and 4) evaluate the computer programs to determine user preference, user acquisition and retention of learned materials.  
Role: PI

T32 CA72319 (S. Zeisel, Principal Investigator) 9/30/97-6/30/07  
NCI  
Nutritional Biochemistry and the Epidemiology Carcinogenesis  
The major goal of this project is to cross-train predoctoral and postdoctoral researchers in nutrition and cancer.  
Role: PI

R01 CA109753-01A2 (J. Chen, Principal Investigator; M. Gammon, PI of UNC subcontract) 6/26/06-4/30/11  
NCI  
Dietary Methyl Content, Epigenetics, and Etiology of Breast Cancer  
The major goal of this project is to investigate whether the methyl content of the diet and methyl metabolism influence pathogenesis of breast cancer through epigenetic mechanisms.  
Role: Investigator

N/A (S. Zeisel, Principal Investigator) 6/01/04-5/31/07  
Gerber Foundation

Supplemental choline and neurodevelopment in humans.

The major goal of this award is to focus on how the nutrient choline is needed for normal development of the brain.

Role: PI

P30 ES10126 (J. Swenberg, Principal Investigator)  
NIEHS

04/01/01-03/31/10

UNC-CH Center for Environmental Health and Susceptibility

The major goal of this award is to bring population science, medical and biomedical researchers together to examine major issues in environmental health resulting from gene-environment interactions that affect an individual's susceptibility to disease.

Role: Core Director

### **Pending Research Support**

R01 DK55865 (S. Zeisel, Principal Investigator)  
NIDDK

9/1/00-11/30/11

Human Requirements for the Nutrient Choline

The major aim is to better understand the how genetic polymorphisms influence the dietary requirements for choline. Experiments are proposed that will determine whether postmenopausal women treated with estrogen have a lower choline requirement, identify functionally important SNPs, determine prevalence of these in the population and examine dietary choline requirements in humans with these SNPs.

Role: PI

### **Completed Research Support**

58-1235-5-126 (S. Zeisel, Principal Investigator)  
USDA

9/25/00-8/15/06

Choline Content of Commonly Eaten Foods

Supported the analysis of choline content in the USDA food database.

Role: PI

N/A (S. Zeisel, Principal Investigator)  
Mead Johnson Nutritional Group

9/1/04-12/1/05

Endogenous Synthesis of choline during pregnancy

The major goal of this project was to determine whether PEMT, the enzyme that synthesizes choline endogenously, was upregulated or had increased activity during pregnancy.

Role: PI

N/A (S. Zeisel, Principal Investigator)  
American Egg Board

10/1/01-9/30/05

Choline, Pregnancy and Brain Development

The major goal of this project was to determine if a high dietary choline consumption during pregnancy (in eggs or as phosphatidylcholine in diet: a) increases maternal choline concentration in plasma b) increases breast milk choline concentration c) enhances memory performance in the children born of supplemented mothers.

Role: PI

N01 CN75035 (S. Zeisel, Principal Investigator)  
NIH

6/01/98-7/31/05

Phase I Single and Multiple Dose Safety, Pharmacokinetic, and Efficacy Clinical Study in Women of Two Formulations of Isoflavone Mixtures

The major objective of this study was to provide the parameters and characteristics of genistein's toxicity in humans, pharmacokinetic data, the safely delivered dose, and a recommended phase II/III dose.

Role: PI