

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
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NAME: Wanda Elaine Hardman

eRA COMMONS USER NAME (credential, e.g., agency login): hardman

POSITION TITLE: Professor, Department of Biochemistry and Microbiology

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Auburn Univ. at Montgomery, AL	B.S.	6/1978	Biology
Auburn Univ. at Montgomery, AL	Internship	12/1978	Med. Technology
Univ. Texas Health Science Center at S.A., TX	Ph.D.	12/1992	Cell Biology

NOTE: The Biographical Sketch may not exceed five pages.

A. Personal Statement

I have almost 25 years of experience in studies on dietary interventions against cancer. About 20 years ago, my research evolved into studies of the effects of dietary fat, especially omega 3 fats on cancer growth and response to chemotherapy using xenograft models. My research remains focused on omega 3 fats and cancer using various models (including xenograft, carcinogen treated and transgenic models) and experimental designs to answer different experimental questions. I have completed a small clinical trial to assess the effects of omega 3 fatty acids on NFkB activation in the lymphocytes of patients with chronic lymphocytic leukemia. This study clearly demonstrated the ability of omega 3 supplementation to significantly reduce NFkB activation and to induce histone modification in the cancerous cells. I have 2 other pilot clinical trials in progress. I have served on Grant Study Sections for the NIH (NCI, Subcommittees G and J for 6 years and currently CDP, *ad hoc*), the Susan Komen Breast Cancer Foundation and the American Institute for Cancer Research, giving me an understanding of the expectations of granting agencies and the requirement for prompt publication of results. My record of continuous research funding since I was a graduate student indicates that I have the skills needed to obtain significant grant support. I have mentored post-doc, graduate and undergraduate students several of whom have established successful research careers. I am the senior faculty mentor for three junior faculty members who are making good progress towards establishing independence. I supervise an active research laboratory, currently completing a clinical trial. I have the established clinical connections and basic science experience at Marshall to help insure the completion of this project and to develop clinically relevant future directions. The West Virginia Cancer Genomics Network (WVCGN) has been collecting cancer and paired normal tissues since its inception in 2012 and could be a valuable resource for future research. As a PI of the West Virginia Cancer Genomics network, I have connections with colleagues within the state to encourage collaborative interactions and the future research of the project investigators.

B. Positions and Honors

List in chronological order previous positions, concluding with the present position. List any honors. Include present membership on any Federal Government public advisory committee.

Medical Technologist, Hematology, Cancer Therapy and Research Center, San Antonio, TX 1982-1988
Sr. Research Assistant, Cellular and Structural Biology, The University of Texas Health
Science Center at San Antonio, TX 1988-1990

Teaching Assistant, Cellular and Structural Biology, The University of Texas Health
Science Center at San Antonio, TX 1990-1993
Instructor, Cellular and Structural Biology, The University of Texas Health Science
Center at San Antonio, TX 1993-1997
Research Assistant Professor, Cellular and Structural Biology, The University of Texas Health
Science Center at San Antonio, TX 1997 - 2001
Assistant Professor, Pennington Biomedical Research Center, Louisiana State University,
Baton Rouge, LA 2001 to 2005
Associate Professor, Marshall University School of Medicine, Dept of Biochemistry and Microbiology
Huntington, WV 2005 to 2011
Professor, Marshall University School of Medicine, Dept of Biochemistry and Microbiology
Huntington, WV July, 2011 to present

National Institutes of Health reviewer pool for RAID grant proposals, 1998 to 2000.
National Cancer Institute Scientific Review Group, Subcommittee G, Education, 2003, 2004, 2005
National Cancer Institute Scientific Review Group, Subcommittee J, grant reviewer, 2005-2009
National Cancer Institute Scientific Review Group, CDP, *ad-hoc* grant reviewer, 2009, 2012, 2014
Susan G. Komen Breast Cancer Foundation, grant reviewer, 1999, 2000, 2001, 2002, 2003, 2005
American Institute for Cancer Research, grant reviewer, 2003 - 2012
Advisory Board for San Antonio Affiliate of Susan Komen Breast Cancer Foundation, 1999-2001

Selected Junior Faculty, 'Methods in Clinical Cancer Research, A Workshop', American Society of Clinical
Oncology, American Association for Cancer Research, National Cancer Institute, July, 1997
Consultant Scientist, InCell Corporation, 1997 to present
National Institutes of Health Training Fellowship, October 1, 1991 to September 30, 1992,
Barbara H. Bowman Postgraduate Scholarship, First annual award, 1995
Selected participant - American Association for Cancer Research, Histopathobiology of Neoplasia Workshop,
June 1993
Treasurer, International Federation for Cell Biology, 2002-2010
Scientific Advisory Board, California Walnut Council, 2004 to present
2001 to present Editorial Advisor; *Cancer Cell International*
1997 to present Reviewer, *British Journal of Cancer*, *International Journal of Cancer*, *Cancer
Epidemiology, Biomarkers and Prevention*, *Histochemical Journal*, *Cancer, Nutrition and Cancer*, *Clinical
Cancer Research*, *American Journal Clinical Nutrition*, *Life Sciences*,
2003 to present Reviewer, *Clinical & Experimental Metastasis*, *Nutrition, Lipids, Oncogene*
2005 to present Reviewer, *BMC Pharmacology*

C. Contribution to Science

Briefly describe up to five of your most significant contributions to science.

My early research assessed the ability of dietary fiber or non-steroidal anti-inflammatory drugs to retard colon cancer progression. These were some of the early studies to show that cancer could be a preventable disease. Heitman, DW, Hardman, WE and Cameron, IL. Dietary supplementation with pectin and guar gum on 1,2-dimethylhydrazine-induced colon carcinogenesis in rats. *Carcinogenesis* 13: 815-818, 1992.
Barnes, C., Hardman, WE, Cameron, IL, Lee, M. Cell proliferation parameters in rat colonic crypts: influence of aspirin, age, and proximity to lymphoid nodules. *Cell Prolif.* 28: 59-71, 1995.
Hardman, WE and Cameron, IL. Site specific reduction in colon cancer incidence without a concomitant reduction in cryptal cell proliferation in 1,2-dimethylhydrazine treated rats by diets containing 10% pectin and either 5% or 20% corn oil. *Carcinogenesis* 16: 1425-1431, 1995.
Barnes, CJ, Lee, M, Hardman, WE, and Cameron, IL. NSAID modulation of colonic epithelial cell proliferation and apoptosis as intermediate biomarkers of induced rat colon cancer. *Br. J. Cancer*, 77:573-580, 1997

My research is currently focused on studies of the effects of dietary fat, especially omega 3 fats on cancer growth and response to chemotherapy using various models (including xenograft, carcinogen treated and transgenic models) and experimental designs to answer different experimental questions. I have demonstrated that consumption of fish oil can sensitize cancers to various chemotherapies or to radiation.

Hardman, WE, Moyer, MP and Cameron, IL Dietary fish oil sensitizes A549 lung xenografts to doxorubicin chemotherapy. *Cancer Letters*, 151: 145-151, 2000

Hardman, WE and Cameron, IL. Fish oil supplementation enhances CPT-11 (irinotecan) efficacy against MCF7 breast carcinoma xenografts and ameliorates intestinal side effects. *Br. J. Cancer*, 81: 440-448, 1999.

Hardman, WE, Avula, CPR, Fernandes, G. and Cameron, IL. Three percent dietary fish oil concentrate increased efficacy of doxorubicin against MDA-MB 231 breast cancer xenografts. *Clin. Cancer Res.* 7: 2041-2049, 2001.

Hardman, WE, Sun, L.Z., Short, N. and Cameron, IL. Dietary omega-3 fatty acids and ionizing irradiation on human breast cancer xenograft growth and angiogenesis. *Cancer Cell Int.* 2005 Apr 28;5(1):12.

A limitation for the use of fish oil by people may be that would usually be taken as a supplement. The expense could limit regular use by many people as well as the limitation of fish stocks. Canola oil is readily available, can be used in cooking, baking or salads and usually costs the same as corn or soybean oil. I have demonstrated that canola oil also has beneficial effects against cancer.

Hardman, WE. Dietary canola oil suppressed growth of implanted MDA-MB 231 human breast tumors in nude mice. *Nutr and Cancer*, 2007, 57(2), 177-183.

Ion, G., Akinsete, J.A. and Hardman, W.E. Maternal consumption of canola oil suppressed mammary gland tumorigenesis in C3(1) TAg mice. *BMC Cancer*. 2010 Mar 6;10(1):81. [Epub ahead of print].

Ion, G, Fazio, K, Akinsete, JA and Hardman, WE Effects of canola and corn oil mimetic on Jurkat cells. *Lipids in Health and Disease*, 2011 Jun 1;10:90.

Epidemiology studies have shown that regular consumption of nuts and seeds may reduce the risk for multiple cancers, including colon cancer. Work with walnuts incorporated into the diet of mice shows that these nuts can indeed reduce development and growth of colon, prostate and breast cancers.

Hardman WE and Ion, G. Walnut consumption for growth suppression of human MDA-MB 231 xenografts. *Nutr and Cancer*. 2008, 60(5), 666-674.

Hardman, WE, Ion, G, Akinsete, JA, Witte, TR. Dietary walnut suppressed mammary gland tumorigenesis in the C(3)1 TAg mouse. *Nutrition and Cancer*, online: 20 Jul 2011

Reiter RJ, Tan DX, Manchester LC, Korkmaz A, Fuentes-Broto L, Hardman WE, Rosales-Corral SA, Qi W. A Walnut-Enriched Diet Reduces the Growth of LNCaP Human Prostate Cancer Xenografts in Nude Mice. *Cancer Invest.* 2013 Jun 11. [Epub ahead of print] PMID: 23758186.

Tsoukas MA^{1,2}, Ko B-J¹, Witte TR³, Dincer F¹, Hardman WE³, Mantzoros CS¹. Dietary Walnut Suppression of Colorectal Cancer in mice: mediation by miRNA patterns and fatty acid incorporation. *Journal of Nutritional Biochemistry* 2015 Jul;26(7):776-83 PMID: 25882694.

We have completed and published the results of a clinical trial that demonstrates that omega 3 fatty acids can show the same benefit in patients that they do in the pre-clinical studies.

Varney, ME, Hardman, WE and Sollars, VE. Omega 3 fatty acids reduce myeloid progenitor cell frequency in the bone marrow of mice and promote progenitor cell differentiation. *Lipids in Health and Disease*. 2009, 8:9.

Fahrman, JF and Hardman, WE. Omega 3 fatty acids increase the chemo-sensitivity of B-CLL-derived cell lines EHEB and MEC-2 and of B-PLL-derived cell line JVM-2 to anti-cancer drugs doxorubicin, vincristine and fludarabine. *Lipids Health Dis.* 2013 Mar 16;12:36. doi: 10.1186/1476-511X-12-36.

Witte, TR, Salazar, AJ, Ballester, OF and Hardman, WE. RBC and WBC fatty acid composition following consumption of an omega 3 supplement: Lessons for future clinical trials. [Lipids Health Dis.](#) 2010 Mar 22;9:31.

Fahrman, JF, Ballester, OM, Ballester, G, Witte, TR, Salazar, AJ, Ion, G, Primerano, DA, Boskovic, G, Denvir, J, Hardman, WE. Inhibition of Nuclear Factor Kappa B activation in early stage chronic lymphocytic leukemia by omega 3 fatty acids. *Cancer Invest.* 2013 Jan 31(1) 24-38.

My full list of publications may be found at: <http://www.ncbi.nlm.nih.gov/sites/myncbi/1NUta7os-qn5c/bibliography/48879093/public/?sort=date&direction=ascending>

D. Research Support

List both selected ongoing and completed research projects for the past three years (Federal or non-Federally-supported). *Begin with the projects that are most relevant to the research proposed in the application.* Briefly indicate the overall goals of the projects and responsibilities of the key person identified on the Biographical Sketch

Principal Investigator: W. Elaine Hardman Title: Omega-3 fat to reduce risk for breast cancer
1R01CA114018-01A2
Dates: Sept. 14, 2007 to Aug. 31, 2012 Total Budget: \$266,000/year, \$1,064,000 total,
Agency: National Cancer Institute Status: Funded, Complete
No scientific or budgetary overlap.

Principal Investigator: W. Elaine Hardman
Title: Administrative supplement to Omega-3 fat to reduce risk for breast cancer
1R01CA114018-01A2
Dates: Sept. 14, 2007 to Aug. 31, 2012 Total Budget: \$40,886/year, \$122,658 total,
Agency: National Cancer Institute Status: Funded, Complete
No scientific or budgetary overlap.

Principal Investigator(s): Gary O. Rankin
Project Title: West Virginia IDeA Network of Biomedical Research Excellence (WV-INBRE)
3P20RR016477-09S4
Dates: 09/25/2009 – 09/24/2012 Total Budget: \$651,385
Role on project: collaborator, 1.2 calendar months Status: Funded, Complete
No scientific or budgetary overlap.

Principal Investigator: W. Elaine Hardman
Title: Maternal consumption of omega 3 fatty acids to reduce breast cancer risk in offspring
Dates: Sept 1, 2010 to August 30, 2013 Total Budget: \$781,000
Agency: Dept of Defense, Breast Cancer Research Program Status: Funded, Complete
No scientific or budgetary overlap.

Principal Investigator: Johannes Fahrman/ W. Elaine Hardman, mentor
Title: Pre-doctoral award for Johannes Fahrman
Dates: Aug. 2011 – July 2012
Total Budget: \$12,000
Agency: WV-NASA
Status: Funded, Complete

Principal Investigator: Johannes Fahrman/ W. Elaine Hardman, mentor
Title: Pre-doctoral award for Johannes Fahrman
Dates: Aug. 2012 – July 2013
Total Budget: \$12,000
Agency: WV-NASA
Status: Funded, Complete

Principal Investigator: W. Elaine Hardman
Title: Omega 3 induced epigenetic change in CLL (clinical trial)
Dates: Oct. 1, 2012 – Sept. 30, 2013
Total Budget: \$10,000
Agency: WV-INBRE
Status: Funded, Complete

Principal Investigator: W. Elaine Hardman
Title: Dietary Walnut to reduce risk factors for breast cancer (clinical trial)
Dates: Jan. 1, 2013 – Jan 1, 2016
Total Budget: \$99,022
Agency: Calif. Walnut Commission/AICR
Status: Funded, in progress

Principal Investigator: W. Elaine Hardman

Title: Pilot Trial: Feasibility and Safety of Nutritional Supplementation with Omega-3 Fatty Acids to Reduce Prostate Specific Antigen Rise in Men with Biochemical Failure after Prostatectomy or External-Beam Radiotherapy (clinical trial)

Dates: Jan. 15, 2013 to Jan 14, 2015

Total Budget: \$25,000

Agency: Marshall Health Translational Pilot grant

Status: Funded, complete

Principal Investigator: W. Elaine Hardman, Donald A. Primerano

Title: WEST VIRGINIA CANCER GENOMICS NETWORK

Dates: 6/2012 – 6/2017

Total Budget: \$473,000

Agency: WV Higher Education Policy Commission

Status: Funded, in progress

Principal Investigator: co-PIs: W. Elaine Hardman (Marshall Univ) and Patrick Ma (WVU)

Title: Adaptive metabolic rewiring in precision therapy lung cancer drug resistance

Dates: Feb. 1, 2016-Jan 31, 1017

Total Budget: \$50,000

Agency: WVU-Marshall Collaborative grants

Status: Funded