

WOLOSCHAK, GAYLE

12 October 2007

To whom it may concern:

I am interested in training medical students in my laboratory because I find them to be curious, insightful and interested. I find that they stimulate the laboratory environment and work well with graduate students and residents alike. On the other hand, I believe we can offer them a pleasant atmosphere to learn about research and to gain experience in asking questions using a scientific approach that will be useful to them in their future career interests.

If you require additional information from me, please feel free to contact me.

Sincerely,

Gayle E. Woloschak, Ph. D., Professor
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Professor Gayle E Woloschak

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Quick CV Education

Ph.D., Medical College of Ohio, OH (1980)
B.S., Youngstown State University, OH (1976)

Selected Publications

Paunesku, T., Rajh, T., Wiederrecht, G., Maser, J., Vogt, S., Stojicevic, N., Protic, M., Lai, B., Oryhon, J., Thurnauer, M. C., and Woloschak, G. E. "Biology of TiO₂-oligonucleotide nanocomposites." *Nature Materials*, 2003, **2**:343-346.

Larson AC, Rhee TK, Deng J, Wang D, Sato KT, Salem R, Paunesku T, Woloschak G, Mulcahy MF, Li D, Omary RA. "Comparison between intravenous and intraarterial contrast injections for dynamic 3D MRI of liver tumors in the VX2 rabbit model." *J Magn Reson Imaging*. 2006, **24**(1):242-247.

Paunesku T, Vogt S, Maser J, Lai B, Woloschak G. "X-ray fluorescence microprobe imaging in biology and medicine." *J Cell Biochem*. 2006, **99**(6):1489-502.

Paunesku, T., Vogt, S., Lai, B., Maser, J., Stojicevic, N., Thurn, K. T., Osipo, C., Liu, H., Legnini, D., Wang, Z., Lee, C., Woloschak, G. E. "Intracellular distribution of TiO₂-DNA oligonucleotide nanocomposites directed to nucleolus and mitochondria." *Nano Letters*, 2007, **7**(3):596-601.

Mishra, M., T. Paunesku, G. E. Woloschak, T. Lukas, T. Siddique, L Zhu, E. H. Bigio. "Gene Expression Analysis of Frontotemporal Lobar Degeneration of the Motor Neuron Disease Type with Ubiquitinated inclusions" *Acta Neuropathologica* in press 2007



Research Summary

Woloschak laboratory is involved in two main areas of research: 1) development of bio-nanoconjugates for imaging and treatment of cancer; 2) investigation of effects of radiation and radiation responses in healthy and radiosensitive animal models.

We have developed nanoconjugates with combined functional properties of the bio- and organic molecules (DNA, PNA, peptides, fluorescent dyes), and the inorganic nanoparticle compounds. Composition of the nanoparticle allows for imaging (magnetic resonance) or photocatalytic function of the nanoconjugates, while attached molecules provide cell type or intracellular targeting/retention specificity or imaging capacity (optical fluorescence). For example when the DNA complementary to nucleolar or mitochondrial DNA is covalently bound to the TiO₂ nanoparticle, these nanoconjugates have the ability to hybridize to complementary DNA and be retained specifically in nucleolus or mitochondria. Moreover, these nanoconjugates can carry out light- or radiation-induced charge separation resulting in DNA cleavage. Within the second area of interest belong studies of radiation-induced mutations, cancers and normal tissue toxicity founded on samples and information from an animal tissue archive, with tissues from 49,000 mice and 7,000 dogs exposed to varying doses, dose-rates and qualities of ionizing radiation. In addition, we are examining the effects of several radioprotectors on radiation-induced genomic instability. Within the same general area of study falls work with a mouse model for radiosensitivity, immunodeficiency and neurologic abnormality—wasted. The purpose of this project is to understand the molecular basis for the combined abnormalities from a molecular-cellular perspective, with much of the work focusing on PCNA and its role in connection to the radiation sensitivity.

BIOGRAPHICAL SKETCH

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|---------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|----------------|------------------------------------------|
| NAME | | POSITION TITLE | |
| Gayle E. Woloschak | | Professor | |
| EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i> | | | |
| INSTITUTION AND LOCATION | DEGREE <i>(if applicable)</i> | YEAR(s) | FIELD OF STUDY |
| Youngstown State University, Youngstown, OH | B.S. | 1976 | Biological Sciences (summa cum laude) |
| Medical College of Ohio, Toledo, OH | Ph.D. | 1980 | Medical Sciences (microbiology) |

A. Positions and Honors

- 1980-1983 Postdoctoral Research Fellow, Immunology, Molecular Biology, Mayo Clinic, Rochester, MN
- 1983-1984 Associate Consultant, Department of Cell Biology, Mayo Clinic, Rochester, MN
- 1984-1987 Associate Consultant, Assistant Professor, Department of Immunology/Department of Biochemistry and Molecular Biology, Mayo Clinic/Mayo Graduate School of Medicine, Rochester, MN
- 1987-1992 Assistant Molecular Biologist, Center for Mechanistic Biology and Biotechnology, Argonne National Laboratory, Argonne, IL
- 1992-2001 Molecular Biologist, Group Leader, Biosciences Division, Argonne National Laboratory, Argonne, IL
- 2001-2002 Senior Molecular Biologist, Bioscience Division, Argonne National Laboratory, Argonne, IL
- 2001-2002 Senior Fellow, Nanosciences Consortium, Argonne National Laboratory-University of Chicago
- *1994-1998/ 2005-2009
Member Radiation Study Section
- 2002-2006 Chairman, NASA Radiation Study Section
- 2002-present Director, Collaborative Student Exchange between Tohoku University (Sendai, Japan) and Northwestern University (initiated in 1997 with Argonne National Laboratory and transferred to Northwestern University in 2002)
- 2002-present Professor, Department of Radiation Oncology, Radiology, and Cell and Molecular Biology, The Feinberg School of Medicine, Chicago Campus, Northwestern University; Member, Cancer Center; Member, Center for Genetic Medicine; Co-Director, Radiation Oncology Residency Program
- 2002-present Member, Editorial Boards of Journal of Radiation Research (Japan), International Journal of Radiation Biology; editor of Special issue, Journal of Structural Biology
- 2003-2009 Member, National Council on Radiation Protection and Measurements
- 2006-present Associate Director Microbeam Science, BioCAT Beamline, Advanced Photon Source, Argonne National Laboratory
- 2006-present Visiting Senior Scientist, Bundeswehr Institute of Radiobiology, Munich, Germany

B. Selected Peer-Reviewed Publications

1. **Woloschak, G. E.**, Paunesku, T. and Chang-Liu, C-M. Effects of high-LET vs. low-LET radiations in gene expression. (Short Report) Radiation Research, 141:111-112, 1995.
2. **Woloschak, G. E.**, Felcher, P., and Chang-Liu, C-M. Combined effects of radiation and cycloheximide on gene expression. Molecular Carcinogenesis, 13:44-49, 1995.
3. **Woloschak G. E.**, Panozzo, J., Schreck, S., and Libertin, C. R. Salicylic acid inhibits UV- and cis-Pt-induced human immunodeficiency virus expression. Cancer Research, 55:1696-1700, 1995.

4. **Woloschak, G. E.**, Felcher, P. and Chang-Liu, C-M. Expression of cytoskeletal and matrix genes following exposure to ionizing radiation: dose-rate and protein synthesis requirements. Cancer Letters, 92:135-141, 1995.
- . **Woloschak, G. E.**, Paunesku, T., Chang-Liu, C.-M., and Grdina, D. J. Changes in gene expression associated with radiation exposure. Radiation Research 1895-1995: Congress Proceedings, Congress Lectures (Ed. by H. Hagen, H. Jung, and C. Streffer), 2:545-547, 1995.
6. **Woloschak, Gayle E.**, Paunesku, Tatjana, Chang-Liu, Chin-Mei, and Grdina, David J. Expression of Thymidine Kinase mRNA is Modulated by Radioprotector WR1065. Cancer Research, 55:4788-4792, 1995.
7. **Woloschak, G. E.** and Chang-Liu, C-M. Modulation of genes encoding nuclear proteins following exposure to JANUS neutrons or (-rays. Cancer Letters, 97:169-175, 1995.
8. Panozzo, J., Panozzo, J., Akan, E., Libertin, C. R., and **Woloschak, G. E.** The effects of cisplatin and methotrexate on the expression of human immunodeficiency Virus Type I long terminal repeat. Leukemia Research, 20:309-317, 1996..
9. **Woloschak, G. E.**, Chang-Liu, C-M., Chung, J., and Libertin, C. R. Expression of enhanced spontaneous and (-ray-induced apoptosis by lymphocytes of the wasted mouse. International Journal of Radiation Biology, 69:47-55, 1996.
10. Panozzo, John, Akan, Ender, Griffiths, T. Daniel, and **Woloschak, Gayle E.** The effects of 5-flourouracil and doxorubicin on expression of human immunodeficiency virus type 1 long terminal repeat. Cancer Letters, 105:217-223, 1996.
11. Zhang, Yueru, and **Woloschak, Gayle, E.** Multigene deletions in lung adenocarcinomas from irradiated and control mice. Argonne National Laboratory Second Technical Women's Symposium, pp. 6367, April 29-30, 1996.
12. **Woloschak, G. E.**, and Paunesku, T. Mechanisms of radiation-induced gene responses. Radiation Injury and the Chernobyl Catastrophe. Stem Cells, 15(suppl 2): 15-25, 1997.
13. Akan, Ender, Chang-Liu, Chin-Mei, Watanabe, Jobu, Ishizawa, Kota, and **Woloschak, Gayle, E.** The effects of vinblastine on the expression of human immunodeficiency virus type 1 long terminal repeat. Leukemia Research, 21(5):459-464, 1997.
4. Chang-Liu, C-M. and **Woloschak, G. E.** The effect of passage number on cellular response to DNA-damaging agents: Cell survival and gene expression. Cancer Letters, 113:77-86, 1997.
15. **Woloschak, G. E.** Different pathways for radiation-induced apoptosis. Editorial. International Journal of Radiat. Oncology, Biology, and Physiology, 39(5):951-952, 1997.
16. Liu, S.-C., Murley, J. S., **Woloschak, G. E.**, and Grdina, D. J. Repression of *c-myc* gene expression by the thiol and disulfide forms of the radioprotector amifostine. Carcinogenesis, 18:2457-2459, 1997.
17. **Woloschak, G. E.**, Paunesku, T., Oryhon, J., Milton, J., Shearin-Jones, P., Salbego, D., and Milosavljevic, A. Radiation induced genes: identification and mechanisms. Radiation Research, 148:520-522, 1997.
18. Zhang, Y., and **Woloschak, G. E.** Detection of codon 12 point mutations of *K-ras* gene from mouse lung adenocarcinomas by "enriched PCR". International Journal of Radiation Biology 74:43-51, 1998.
19. Paunesku, T., Chang-Liu, C.-M., Shearin-Jones, P., Watson, C., Milton, J., Oryhon, J., Salbego, D., Milosavljevic, A., and **Woloschak, G.E.** Identification of genes regulated by UV/salicylic acid. International Journal of Radiation Biology 76(2):189-198, 2000.
20. Paunesku, Tatjana, Zhang, Yueru, Gemmell, M. Anne, and **Woloschak, Gayle E.** p53 gene deletions in radiation-induced tumors. Leukemia Research, (2000) 24: 511-517.
21. Paunesku, T., Rajh, T., Wiederrecht, G., Maser, J., Vogt, S., Stojicevic, N., Protic, M., Lai, B., Oryhon, J., Thurnauer, M. C., and **Woloschak, G. E.** Biology of TiO₂-oligonucleotide nanocomposites. Nature Materials (2003) 2(5):343-346.
22. Textbook: Radiation Toxicity ed by William Small and **Gayle E. Woloschak**, Kluwer Academic Press, 2006.
23. Paunesku, T., Vogt, S., Lai, B., Maser, J., Stojicevic, N., Thurn, K. T., Osipo, C., Liu, H., Legnini, D., Wang, Z., Lee, C., and **Woloschak, G. E.** Intracellular distribution of TiO₂-DNA oligonucleotide nanocomposites directed to nucleolus and mitochondria. Nano Letters, in press, 2007.
24. Szolc-Kowalska, B., Paunesku, T., Flores, L., Jacubczak, D., Mishra, M., Templeton, I., Haley, B., Cruz, C. Pearlman, A., Biggio, E., Hlatky, L., and **Woloschak, G. E.** Decreased PCNA expression in the immune tissues of wasted mice accompanies an inversed G1 checkpoint 24 hours following gamma-irradiation. Submitted, 2007.

C. Research Support**Active Research Support**

NIH (NCI) Application of TiO₂-DNA nanocomposites to Cancer Cells 03/01/04-02/28/07
 Role: PI

NIH (NCI) Minority supplement for Application of TiO₂-DNA nanocomposites to Cancer Cells
 Role: PI 03/01/04-02/28-07

DOE Dog/Mouse Tissues from ANL Long-term Radiation Studies 10/01/05-open
 Role: PI

DOE Adaptive response mechanisms after chronic whole-body
 Role: PI Exposure to low LET radiation 07/01/05-06/3008

NIH (NIBIB) Applications of TiO₂-DNA Nanocomposites 04/01/05-03/31/09
 Role: PI

NCI (U54) Project 5 on CCNE project (PI: Mirkin) 11/01/05-10/31/10
 PI of Project 5

DOE Studies of the effects of radioprotectors on Microsatellite
 Role: PI repeats 10/01/06-09/30/09

Completed Research Support

2 P01 NS21442-18 Roos (PI) 5/1/98-5/31/03
 NIH (NINDS)
 Pathogenesis of Motor Neuron Disease
 (Project 3: The pathogenesis of motor neuron disease in the wasted mouse)
 The study will examine molecular aspects of the cause of motor neuron degeneration in the wasted mouse.
 Role: PI of Project 3

5 R01 CA81375-03S1 Woloschak (PI) 6/1/01-11/30/03
 NIH (NCI)
 Minority Supplement for PCNA Promoter Deletion in Radiosensitive Mice
 The study will supplement studies on the radiation sensitivity of thymocytes derived from the wasted mouse,
 predominantly examining gene expression.
 Role: PI

DOE/ANL LDRD Makowski (PI) 1/1/01-10/01/02
 Lab Director Research Directed grant (ANL)
 Comprehensive Functional Characterization of Genomes Subtask 3. DNA- and Metal-binding Proteins
 The study examined use of metals for imaging metal-containing proteins and metal-bound DNA in cells.
 Role: PI of Subtask 3

DOE/ANL LDRD Gibson (PI) 10/1/01-10/1/02
 DOE/LDRD
 Nano-Biocomposite Structures; Consortium for Nanoscience Research theme project
 The study used Ti-containing nanocomposites with DNA to image subcellular organelles in cells
 Role: PI of Subtask 4

R01 CA81375 Woloschak (PI)
 NIH (NCI) PCNA Promoter Deletion in Radiosensitive Mice 12/01/99- 11/30/04
 Role: PI

Principal Investigator (Last, first, middle): _____ Woloschak, Gayle