CURRICULUM VITAE

Bernard W. Futscher

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EDUCATION

B.S. 1983	Biology & Chemistry Valparaiso University
Ph.D. 1990	Pharmacology Loyola University of Chicago Adviser: Leonard C. Erickson, Ph.D.
Postdoctoral Fellow 1990–1994	Multidrug Resistance Arizona Cancer Center Adviser: William S. Dalton, M.D., Ph.D.

ACADEMIC APPOINTMENTS

2010–Present	Margaret E. & Fenton L. Maynard Chair in Breast Cancer Epigenomics, Arizona Cancer Center
2005–Present	Professor Department of Pharmacology & Toxicology College of Pharmacy University of Arizona
2000–2005	Associate Professor Department of Pharmacology & Toxicology College of Pharmacy University of Arizona
1997–Present	Scientific Director, Genomics Shared Service Arizona Cancer Center
1994–2000	Assistant Professor Department of Pharmacology College of Medicine University of Arizona

MAJOR RESEARCH INTERESTS

Cancer Epigenetics: 5-methylcytosine & histone modification in genome structure & function
Genomics Technology: Tools for the molecular analysis of cancer
Cancer Therapeutics: New agents that target transcriptional reprogramming

BOOK CHAPTERS & REVIEWS

1. **Futscher, BW**, & Dalton, WS. MDR1-mediated Multidrug Resistance. *In*: Teicher, B. (ed), Mechanisms of Drug Resistance in Oncology. New York: Marcel Dekker, Inc., 1992.

2. Domann, FE & **Futscher, BW**. Genetic and epigenetic regulation of *maspin* gene expression in normal and tumor tissue. *In*: Hendrix MJC (ed), Maspin. New York: Landes Biosciences Inc., 2002.

3. Domann, FE & **Futscher BW**. Maspin as a Molecular Target for Cancer Therapy. The Journal of Urology, 169(3):1162-4, 2003.

4. Domann, FE & **Futscher BW**. Flipping the Epigenetic Switch. American Journal of Pathology, 164(6):1883-86, 2004.

5. **Futscher BW** & Domann FE. Epigenetic Dysregulation of Maspin (Serpinb5) in Cancer Invasion and Metastasis. *In:* Manel Esteller, (ed), DNA Methylation, Epigenetics and Metastasis, Springer Life Sciences, vol 7: 133-56, 2005.

6. **Futscher BW** & Domann FE. Maspin, Cancer, and an Epigenetic Switch *In*: Anne Cress & Ray Nagle (eds), Cell Adhesion and Cytoskeletal Molecules in Metastasis. Springer Life Sciences, vol 9: 123-40, 2006.

7. **Futscher, BW**: 5-aza-2' Deoxycytidine. *In*: Mandred Schwab (ed), Encyclopedia of Cancer. Springer, 2nd ed., 2009.

8. Severson, P, & **Futscher, BW**: Epigenomic Actions of Environmental Arsenicals. *In*: Saura Sahu (ed), Toxicology and Epigenetics. Wiley, 2012. NIHMSID: 529492

9. **Futscher, BW**: Epigenetic Changes during Cell Transformation. *In*: Adam Karpf (ed), Epigenetic Alterations Oncogenesis. Springer, New York. 2013. doi: 10.1007/978-1-4419-9967-2 NIHMSID: 440223

JOURNAL ARTICLES

1. **Futscher, B.W.**, Micetich, K.C., Barnes, D.M., Fisher, R.I. & Erickson, L.C.: Inhibition of DNA Repair Results in Enhanced Nitrosourea Cytotoxicity in Resistant Human Tumor Cells. Cancer Communications 1(1): 65-73, 1989. PMID: 2534817

2. Pieper, R.O., **Futscher, B.W.**, & Erickson, L.C.: Transcription-terminating Lesions Induced by Bifunctional Alkylating Agents *In Vitro*. Carcinogenesis 10(7): 1307-1314,

1989. PMID: 2736721

3. **Futscher, B.W.** & Erickson, L.C.: Changes in c-myc & c-fos Expression in a Human Tumor Cell Line Following Exposure to Bifunctional Alkylating Agents. Cancer Research 50(1): 62-66, 1990. PMID: 2104539

4. Vlahos, N.S., **Futscher, B.W.**, Hora, N.K., Trent, J.M. & Erickson, L.C.: Gene Amplification Affecting O^6-alkylguanine-DNA alkyltransferase Activity is not Detected in Nitrosourea Resistant or Sensitive Human Cell Lines. Carcinogenesis 11(3): 479-483, 1990. PMID: 2311191

5. Pieper, R.O., **Futscher, B.W.**, Dong, Q., Ellis, T.M., & Erickson, L.C.: Comparison of O^6-methylguanine DNA Methyltransferase (MGMT) mRNA Levels in Mer^+ and Mer^- Human Tumor Cell Lines Containing the MGMT Gene by the Polymerase Chain Reaction Technique. Cancer Communications 2(1): 13-20, 1990. PMID: 2369549

6. Kanabrocki, E.L., Kanabrocki, J.A., Sothern, R.B., **Futscher, B.W.**, Lampo, S., Cournoyer, C., Rubnitz, M. E., Zieher, S. J., Greco, J., Bushnell, D.L., Tsai, T.H., Scheving, L.E., & Olwin, J.H.: Circadian Distribution of Proteins in Urine From Healthy Young Men. Chronobiology International 7(6): 433-443, 1990. PMID: 2097077

7. Pieper, R.O., **Futscher, B.W.**, Dong, Q., & Erickson, L.C.: Effects of Streptozotocin/ BCNU Combination Therapy on 0^6-Methylguanine DNA Methyltransferase Activity and mRNA Levels in HT-29 Cells *In Vitro*. Cancer Research 51: 1581-1585, 1991. PMID: 1825618

8. Pieper, R.O., Costello, J.F., Kroes, R., **Futscher, B.W.**, Marahathi, U., & Erickson, L.C.: Direct Correlation between Methylation Status and Expression of the Human MGMT Gene. Cancer Communications 3(8): 241-253, 1991. PMID: 1716139

9. Micetich, K.C., **Futscher, B.W.,** Koch, D., Fisher, R.I., & Erickson, L.C.: Phase I study of Streptozocin- and Carmustine-Sequenced Administration in Patients with Advanced Cancer. J National Cancer Inst 84: 256-260, 1992. PMID: 1531148

10. **Futscher, B.W.**, Pieper, R.O., Dalton, W.S., & Erickson, L.C.: Gene-specific DNA Interstrand Cross-links Produced by Nitrogen Mustard in the Human Tumor Cell Line COLO320HSR. Cell Growth and Differentiation 3(4): 217-223, 1992. PMID: 1515367

11. **Futscher, B.W.**, Pieper, R.O., Hanin, I., & Erickson, L.C.: DNA damaging and Transcription-Terminating Lesions Induced by AF64 *in vitro*. J Neurochemistry 58(4): 1504-1509, 1992. PMID: 1548483

12. Grabowski, D.T., Pieper, R.O., **Futscher, B.W.**, Deutsch, W.A., Erickson, L.C., & Kelley, M.R.: Expression of Ribosomal Phosphoprotein PO Is Induced by Antitumor Agents and Increased in Mer^- Human Tumor Cell Lines. Carcinogenesis 13(2): 259-263, 1992. PMID: 1740017

13. Nelson, M.A., **Futscher, B.W.**, Kinsella T., Wymer J., & Bowden, G.T.: Detection of Mutant Harvey ras Genes in Chemically Initiated Mouse Skin Prior to the Development of Neoplasia. Proc Natl Acad Sci USA 89: 6398-6402, 1992. PMID: 1352887

14. **Futscher, B.W.**, Campbell, K., & Dalton, W.S.: Collateral Sensitivity to Nitrosoureas in Multidrug Resistant Cells Selected With Verapamil. Cancer Research 52: 5013-5017, 1992. PMID: 1387586

15. Nelson, M.A., **Futscher, B.W.**, Loew, M.R., & Bowden, G.T.: Analysis of the Harvey ras gene in Cisplatin-initiated Mouse Skin Tumors by Polymerase Chain Reaction and Direct DNA Sequencing. Cancer Lett 65: 27-33, 1992. PMID: 1511406

16. Danks, M.K., Warmoth, M.R., Friche, E., Granzen, B., Bugg, B.Y., Harker, W.G., Zwelling, L.A., **Futscher, B.W.**, Suttler, D.P., & Beck, W.T.: Single Strand Conformational Polymorphism (SSCP) Analysis of the 170 kDa Isozyme of DNA Topoisomerase II. Cancer Research 53:1373-1380, 1993. PMID: 8383009

17. **Futscher, B.W.**, Blake, L.L., Gerlach, J.H., Grogan, T.M., & Dalton, W.S.: Quantitative PCR Analysis of mdr1 Expression in Multiple Myeloma. Anal. Biochem 213: 414-421, 1993. PMID: 8238918

18. List, A.F., Spier, C., Greer, J., Wolff, S., Hutter, J., Dorr, R., Salmon, S., **Futscher, B.W.**, Baier, M., Dalton, W.S.: Phase I/II trial of cyclosporine as a chemotherapy-resistance modifier in acute leukemia. Journal of Clinical Oncology 11(9):1652-1660, 1993. PMID: 8102639

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20. **Futscher, B.W.**, Abbaszadegan, M.R., & Dalton, W.S.: Analysis of MRP mRNA in Mitoxantrone-selected Mulitdrug Resistant Human Tumor Cells. Biochem. Pharm. 47: 1601-1604, 1994. PMID: 8185674

21. Klimecki, W., **Futscher, B.W.**, & Dalton, W.S.: Effect of Ethanol and Paraformaldehyde on RNA Yield and Quality. Biotechniques 16: 1021-1024, 1994. PMID: 7521184

22. Costello, J.F., **Futscher, B.W.**, Graunke, D., & Pieper, R.O.: Graded Methylation in the Promoter and Body of the O^6-Methylguanine DNA Methyltransferase (MGMT) Gene Correlates with MGMT Expression in Human Glioma Cells. J. Biol. Chem. 269: 17228-17237, 1994. PMID: 8006031

23. Costello, J.F., **Futscher, B.W.**, Kroes, R. A., and Pieper, R.O.: Methylation-Related Chromatin Structure Blocks Transcription Factor Access to and Expression of the O^6-Methylguanine DNA Methyltransferase Gene in Human Glioma Cells. Mol. Cell. Biol. 14: 6515-6521, 1994. PMID: 7523853; PMCID: PMC359181

24. Abbaszadegan, M.R., **Futscher, B.W.**, List, A.F., & Dalton, W.S.: Analysis of Multi-Drug Resistance-associated Protein (MRP) mRNA in Normal and Malignant Hematopoietic Cells. Cancer Research 54: 4676-4679, 1994. PMID: 8062263

25. Watts, G.S. & **Futscher, B.W.**: Detecting Differences in 5-methylcytosine using Restriction Enzyme Isoschizomers: an Endogenous Control for Complete Digestion. Nucleic Acids Research 23(22): 4740-4741, 1995. PMID: 8524671

26. **Futscher, B.W.,** Gleason-Guzman, M., Foley, N.E., Meltzer, P.S., D.M. Sullivan, & Dalton, W.S.: Verapamil Suppresses the Emergence of P-Glycoprotein-mediated Multidrug Resistance. Int. J. Cancer 66: 520-525, 1996. PMID: 8635868

27. Pieper, R.O., Patel, S., Ting, S., **Futscher, B.W.**, & Costello J.F.: Methylation of CpG Island Binding Sites is Unnecessary for Aberrant Silencing of the Human MGMT Gene. J. Biol. Chem. 271: 13916-13921, 1996. PMID: 8662860

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29. Watts, G.S., Pieper, R.O., Costello, J.F., Peng, Y-M., Dalton, W.S. & **Futscher B.W.**: Methylation of Discrete Regions of the MGMT CpG Island is Associated with Heterochromatinization of the MGMT Transcription Start Site and Silencing of the MGMT Gene. Mol. Cell. Biol. 17: 5612-5619, 1997. PMID: 9271436; PMCID: PMC232409

30. Wang, Jiang, Z., Wong, Y.W., Dalton, W.S., **Futscher, B.W.**, & Chan V.T.: Decreased CP-1 (NF-Y) Activity Results in Transcriptional Down-Regulation of Topoisomerase II-alpha in Doxorubicin-resistant Variant of Human Multiple Myeloma RPMI 8226. Biochem. Biophys. Res. Comm. 237: 217-224, 1997. PMID: 9268689

31. Rice, J.C., Massey-Brown K.S. & **Futscher, B.W.**: Aberrant Methylation of the BRCA1 CpG Island Promoter is Associated with Decreased BRCA1 mRNA in Sporadic Breast Cancer. Oncogene 17: 1807-1812, 1998. PMID: 9778046

32. Dodge, J.E., List, A., & **Futscher, B.W.**: Selective Variegated Methylation of the p15 CpG island in Acute Myeloid Leukemia. International Journal of Cancer 78: 561-567, 1998. PMID: 9808523

33. Mitchell, M.K., **Futscher, B.W.** & McQueen C.A.: Developmental Expression of N-Acetyltransferses in C57Bl/6 mice. Drug Metabolism and Disposition, 27(2): 261-264, 1999. PMID: 9929513

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36. Rice, J.C. & **Futscher B.W.**: Transcriptional repression of BRCA1 by aberrant cytosine methylation, histone hypoacetylation and chromatin condensation of the BRCA1 promoter. Nucleic Acids Research 28(17): 3233-3239, 2000. PMID: 10954590; PMCID: PMC110706

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Guzman, M, Isett, R., Fitchmun, M., Bowden, G.T., Cress, A.E., **Futscher, B.W.**, & Nagle, R.B.: Laminin-5-mediated Gene Expression in Human Prostate Carcinoma Cells. Molecular Carcinogenesis 30: 119-129, 2001. PMID: 11241759

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41. Crowley, C., Payne, C.M., Gleason-Guzman, M., Watts, G.S., **Futscher, B.W.**, Bernstein, C., Garewal, H., & Bernstein, H.: Development and Molecular Characterization of HCT-116 Cell Lines Resistant to the Tumor Promoter and Multiple Stress-inducer, Deoxycholate. Carcinogenesis 23: 2063-2080, 2002. PMID: 12507930

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43. Oshiro, M.M., Watts, G.S., Wozniak, R.J., Junk, D.J., Munoz-Rodriguez, J., Domann, F.E., & **Futscher, B.W.**: Mutant p53 and aberrant cytosine methylation cooperate to silence gene expression. Oncogene 22: 3624-3634, 2003. PMID: 12789271

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Technology in Biomedicine 11(4): 398-405, 2007. PMID: 17674622

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62. Eblin, K.E., Hau, A.M., Jensen, T.J., **Futscher, B.W.**, Gandolfi, A.J.: The role of reactive oxygen species in arsenite and monomethylarsonous acid-induced signal transduction in human bladder cells: Acute studies. Toxicology 250(1): 47-54, 2008. PMID: 18588940; PMCID: PMC2567114

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64. Novak, P., Jensen, T., Oshiro, M.M., Watts, G., Kim, C.J., **Futscher, B.W.**: Agglomerative Epigenetic Aberrations are a Common Event in Human Breast Cancer. Cancer Research 68(20): 8616-8625, 2008. PMID: 18922938; NIHMSID: 66851

65. Vrba, L., Junk, D.J., Novak, P., **Futscher, B.W.**: p53 induces distinct epigenetic states at its direct target promoters. BMC Genomics 2008, doi:10.1186/1471-2164-9-486. PMID: 18922938; PMCID: PMC2585595

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EDITORIAL BOARD

Journal of Pharmacology & Experimental Therapeutics (2000–2010)
Cancer Epidemiology, Biomarkers and Prevention (2000–2008)
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Journal of Cancer Research & Clinical Oncology
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Molecular & Cellular Biology
Molecular Carcinogenesis
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Pharmacologic Reviews
Plos Medicine

GRANT REVIEWER

NIH NCI Cancer Center Site Visit Review: Winship Cancer Institute Emory University 2011
Superfund Basic Research Program (P42), RTP 2011
National Health & Medical Research Council Fellowship, Australian Government 2011
Ohio Cancer Research Associates, Seed Grant review 2011
NIH Study Section: Cancer Genetics 2012
NIH Study Section: Basic Mechanisms of Cancer Therapeutics 2010
NCI Vanderbilt Cancer Center Support Grant (Nashville, TN) 2010
NCI USC Cancer Center Support Grant (LA, CA) 2010
NIH Chair, SBIR 2010
NIH Transformative R01 2010
NIH RC4 grants 2010
NIH Chair, SEP on Cancer Signatures 2009
MRC International Grant Review 2009
NIH 8 Challenge Grants in Health and Science Research 2009
NIEHS Grant Opportunity on Bisphenol A 2009
NIH Study Section: Basic Mechanisms of Cancer Therapeutics (member) 2006-2008
Los Alamos National Laboratory Research & Development Funds 2006
NIH Special Emphasis Panel (SEP): Chair R01 2005-2006
NIH SEP: Innovative Technologies for the Molecular Analysis of Cancer 2002-2004
NIH Study Section: Experimental Therapeutics-1 (ad hoc) 2001-2002
Multiple Myeloma Research Foundation 2001
Flinn Foundation 2000

AWARDS & SOCIETIES

Member, Society of Toxicology
Member, The Epithelial-Mesenchymal Transition International Association (TEMTIA)

Continued

American Association for Cancer Research Program Committee 2005
Session Chair: Gordon Research Conference on Toxicogenomics 2005
Susan Komen Postdoctoral Fellowship
Member, American Association for the Advancement of Science
Member, Epigenetics Society
Member, American Association for Cancer Research
Arthur J. Schmitt Predoctoral Fellowship 1988
G.D. Searle Predoctoral Fellowship 1984-1987
Dean's List, Valparaiso University, 1981-1982
Presidential Scholarship, Valparaiso University, 1979-1982
Eagle Scout, Boy Scouts of America

CURRENT EXTRAMURAL SUPPORT

Epigenetic Remodeling by Environmental Arsenicals
Role: Principal Investigator
Agency: NIEHS
Type: 2P42 ES004940-21 Period: 04/01/10 - 04/31/15
The long-term goal of this research project is to determine if environmental arsenic exposure is linked to disease-relevant epigenetic changes.

Epigenetic Features of Pregnancy-Associated Breast Cancer in Hispanic Women
Role: Co-Principal Investigator with Maria Elena Martinez, PhD
Agency: NIH/NCI
Type: 1U01CA153086-01 Period: 7/1/10–6/30/15
The immediate objective of this research project is to compare the epidemiological and epigenetic profiles of breast cancer tumors diagnosed in the transient postpartum period of increased risk against those that are diagnosed outside this period.

Cancer Center Support Grant (Genomics Shared Service; Co-Leader, Cancer Biology and Genetics Research Program)
Role: Collaborator with Dave Alberts, MD (PI)
Agency: NIH
Type: P30 CA23074 Period: 7/1/2003–6/30/2014
The goal of this grant is to provide microarray technology to AZCC investigators.

Southwest Environmental Health Sciences Center Support Grant (Genomics Facility Core)
Role: Scientific Director, Genomics Shared Service
Agency: NIEHS
Type: P30 CA23074 Period: 4/1/2006–3/31/2017
The goal of this grant is to provide microarray technology to SWEHSC investigators.

Continued

COMPLETED EXTRAMURAL SUPPORT

Genomic Methylation: A Mechanism to Alter Tumor Phenotype
Role: Principal Investigator
Agency: NIH
Type: R01 CA 65662 Period: 11/1/05–10/30/10
The goal of this grant is to exploit aberrant methylation in cancer as a therapeutic target.

Epigenetic Remodeling by Environmental Arsenicals
Role: Principal Investigator
Agency: NIEHS
Type: R01 CA 127989 Period: 9/27/06–7/30/10
The long-term goal of the proposed study is designed to identify mechanisms of toxicity that are a result of environmental exposures to arsenicals.

Microarray Technology to Profile CpG Island Methylation in Cancer
Role: Principal Investigator
Agency: NIH
Type: R21/R33 CA091351 Period: 8/1/02–7/31/06
The goal of this grant is to develop new technology for the genome-wide analysis of DNA methylation patterns.

Genomic Methylation: A Mechanism to Alter Tumor Phenotype
Role: Principal Investigator
Agency: NIH
Type: R29 CA 65662 Period: 6/1/96–5/31/01
The goal of this grant was to exploit aberrant methylation in cancer as a therapeutic target.

Transcriptional Repression as a Mechanism of Maspin Gene Inactivation in Cancer
Role: Principal Investigator
Agency: ADCRC
Type: ADCRC6003 Period: 7/1/01–6/30/03
The goal of this grant is to determine the frequency of aberrant methylation of the maspin promoter in human breast cancer specimens.

Transcriptional Repression as a Mechanism of BRCA-1 Gene Inactivation
Role: Principal Investigator
Agency: Department of Army
Type: DAMD17-98-1-8279 Period: 8/1/98–7/1/00
The goal of this project was to determine if BRCA1 is silenced in sporadic breast cancer by aberrant methylation of the BRCA1 promoter.

DNA Microarray Instrumentation
Role: Collaborator with Syd Salmon (PI)
Agency: NIH (Supplement to Cancer Center Support Grant)
Type: P30 CA23074 Period: 1999
The goal of this supplement was to obtain instrumentation for microarray technology to the Arizona Cancer Center.

The Timing of p15 Gene Inactivation during Human Leukemogenesis
Role: Principal Investigator Period: 9/97–9/99
Agency: Southwest Environmental Health Sciences Center
The goal of this project was to determine when p15 was inactivated during human leukemogenesis.

The Regulation of MDR1 Gene Expression in Human Tumor Cells
Role: Principal Investigator Period: 1995–1996
Agency: American Cancer Society Institutional Research Grant
The goal of this project was to determine the cellular factors responsible for the up-regulation of MDR1 in drug resistant tumors.

Inhibition of MDR1 Gene Expression to Reverse Multidrug Resistance
Role: Principal Investigator Period: 1995–1996
Agency: Friends of the Arizona Cancer Center Award
The goal of this project was to identify new strategies to inhibit MDR1 in human tumors.