

## Professor Emeritus Garth L. Nicolson

**Birth Date:** 10/1/43      **Current Date:** 4/1/13  
**Birth Place:** Los Angeles, California  
**E-mail:** gnicolson@immed.org      gnicolson@cox.net  
**Tel:** (949) 715-5978 **Fax:** (714) 596-3791

### Education:

1970, Ph.D., Biochemistry/Cell Biology,  
University of California, San Diego  
1965, B.S., Chemistry, University of California, Los Angeles

### Professional Experience:

#### Primary Appointment:

1996-Present, President, Chief Scientific Officer and Emeritus Professor of Molecular Pathology, The Institute for Molecular Medicine, 31677 Virginia Way, PO Box 9355, S. Laguna Beach, CA 92652

#### Secondary Appointments:

2003-Present, Conjoint Professor, Faculty of Science and Technology, University of Newcastle, Newcastle, Australia

#### Previous Appointments:

1989-99, Professor, Department of Internal Medicine, The University of Texas Medical School, Houston, TX  
1981-98, Adjunct Professor, Department of Pathology, School of Veterinary Medicine, Texas A & M University, College Station, TX  
1982-98, Professor, Department of Pathology and Laboratory Medicine, The University of Texas Medical School, Houston, TX  
1980-96, David Bruton Jr. Chair in Cancer Research, Professor and Chairman, Tumor Biology, The University of Texas M. D. Anderson Cancer Center, Houston, TX  
1980-96, Professor, The Graduate School of Biomedical Sciences, The University of Texas Health Science Center, Houston, TX  
1980-87, Florence M. Thomas Professor of Cancer Research, The University of Texas M. D. Anderson Cancer Center, Houston, TX  
1978-80, Professor, Department of Physiology and Biophysics, College of Medicine, University of California, Irvine, CA  
1977-80, Associate Director, Oncology Program, University of California, Irvine, CA  
1975-80, Professor, Department of Developmental and Cell Biology, University of California, Irvine  
1974-76, Chairman, Department of Cancer Biology, The Salk Institute, La Jolla, CA  
1972-74, Head, Cancer Council Laboratory, Director, Electron Microscopy Laboratory, The Salk Institute, La Jolla, CA  
1970-71, Senior Research Associate, Cancer Council Laboratory, The Salk Institute, La Jolla, CA  
1967-70, USPHS Predoctoral Fellow University of California, San Diego, CA

### Editorships and Editorial Boards:

#### Editor:

Clinical & Experimental Metastasis (Founding & Emeritus Editor), 1981-2002

Journal of Cellular Biochemistry (Field Editor)  
Journal of Functional Foods in Health and Disease (Editor)  
Cancer & Metastasis Reviews (Founding & Emeritus Editor), 1981-1989  
Cell Surface Reviews (Founding Editor), 1976-1983  
Experimental Cell Research (Emeritus Field Editor), 1978-1984

**Associate Editor:**

Advances in Molecular Medicine  
Biochimica et Biophysica Acta, 1973-1979  
Cancer Biology Reviews, 1978-1984  
Cancer Communications, 1988-1992  
Cancer & Metastasis Reviews, 1987-2004  
Cancer Molecular Biology, 1994-1999  
Cancer Research, 1981-84, 1985-1989, 1990-1995  
Cancer Reviews, 1984-1990  
Current Cancer Therapy Reviews  
Experimental Cell Biology, 1985-1991  
Experimental Cell Research, 1978-1994  
Gamete Research, 1978-1984  
International Journal of Cancer, 1984-1993  
Invasion & Metastasis, 1974-1999  
ISRN Biochemistry  
Journal of the American Nutraceutical Association, 2003-2010  
Journal of Chronic Fatigue Syndrome, 2000-2005  
Journal of Experimental Therapeutics and Oncology  
Medical Veritas  
Molecular Biology of Cancer  
Molecular & Cellular Biochemistry, 2001-2012  
Natural Immunity & Cell Growth Regulation, 1985-1989  
Oncology Research, 1990-2004  
Open Cancer Journal  
Open Tropical Medicine Journal  
Open Tropical Medicine Reviews  
Pathobiology, 1991-1999  
Receptors & Recognition, 1974-1979  
Yearbook of Cancer, 1982-1987

**National & Intern. Committee Memberships:**

Member, Board of Scientific Advisors, CFIDS Association of America, 2008-  
Member, Board of Advisors, Lay Foundation, 2008-  
Member, Board of Advisors, Lyme in Autism Foundation, 2007-  
Member, Board of Advisors, The Healthy Foundation, 2001-  
Member, Board of Advisors, Road Back Foundation, 2000-  
Member, Susan Koman Foundation for Breast Cancer Research Review Committee, 1995-1998  
Chairman, Medical-Scientific Panel, Persian Gulf War Veterans Conference, 1995  
Chairman, American Cancer Society Review Committee, Personnel B Review Committee, 1990-1994  
Chairman, USAMRDC Review Committee on Breast Cancer, Endocrinology-2 Committee, 1994  
Member, Extramural Scientific Advisory Committee, Moffitt Cancer Center, The University of South Florida, 1995-1998

Member, Extramural Scientific Advisory Committee, The University of Arizona Health Sciences Center, 1991-1999  
Member, Extramural Scientific Advisory Committee, Roswell Park Memorial Institute, Buffalo, NY, 1988-1993  
Member, Extramural Scientific Advisory Committee, The University of Nebraska Health Sciences Center, 1994-1996  
Reviewer, National Cancer Institute Cancer Centers Program, 1974-1993  
Member, National Cancer Institute Large Bowel Cancer Project, 1984-1988  
Member, National Cancer Institute Organ Systems Program, 1984-1988  
Member, National Cancer Institute Construction Review Committee, 1982-1986  
Member, National Cancer Institute Breast Cancer Task Force, 1983-1986  
Chairman, American Cancer Society Review Committee, Cell and Developmental Biology, 1979-1983  
Member (Ad Hoc), NIH Pathology B Study Section, 1976-1981  
Member, U.S.-Japan Cooperative Cancer Research Program, 1976-1980  
Member, Advisory Committee, Division of Cancer Cause and Prevention, National Cancer Institute, 1974-1979  
Member, National Cancer Institute Virus-Cancer Program Review Committee, 1974-1979  
Member, World Health Organization Task Force on Human Fertility, 1973-1976

#### **Consultantships and Visiting Professorships:**

Conjoint Professor, University of Newcastle (Aust.), 1999-  
Distinguished Visiting Professor, Kuwait University, 1998  
Visiting Professor, Ain Shams University, Faculty of Medicine, Cairo, Egypt, 1998  
Burroughs Wellcome Distinguished Visiting Professor, Royal Society of Medicine, London, 1991  
Roswell Park Memorial Distinguished Professor Lectureship, Buffalo, New York, 1991  
Diana J. Benz Memorial Lectureship in Breast Cancer Research, The University of Iowa, 1991  
Arnold D. Welch Visiting Professorship, Yale University, 1988  
University of Arizona Health Sciences Center, 1990-1998  
Creighton University School of Medicine, 1993-1995  
University of Nebraska Health Sciences Center, 1993-1995  
University of Pittsburgh Cancer Research Institute, 1989-1994  
Glycomed Inc., 1994-1996  
Ventures Medical, 1989-1996  
California State University, Northridge Center for Cancer and Developmental Biology, 1985-1989  
Cetus Corporation, 1985-1989  
Grace Cancer Drug Center, Roswell Park Memorial Institute 1983-1989  
Triton Biosciences, 1985-1989  
Smith-Kline Beckman Corp, 1979-1987  
NCI-Frederick Cancer Research Center, 1974-1980  
Alza Research, 1974-80  
University of Hawaii School of Medicine, 1973-1979  
Immuno-Diagnostics Systems, 1973-1976

#### **Honors and Awards:**

John Drulle Memorial Lectureship, International Lyme and Associated Diseases Society (ILADS), 2008  
Annual Award of the Common Cause Medical Research Foundation (Canada), 2006  
Innovative Medicine Award (Canada), 2002

Stephen Paget Award, Metastasis Research Society, 1998  
Albert Schweitzer Award (Portugal), 1998  
First Norman N. Durham Lectureship, Environmental Institute, OSU, 1996  
Indo-American Society for Health & Laboratory Professionals Award, 1996  
Distinguished Presentation Award, Third International Cancer Molecular Biology Symposium, 1996  
COLONEL (Honorary), U. S. Army Special Forces, 1995  
SEAL (Honorary), U.S. Navy Special Forces, 1995  
Haskel Visiting Professorship, University of Pennsylvania, 1995  
Burroughs Wellcome Medal, Royal Society of Medicine Foundation, London, 1991  
Outstanding Faculty Award, The University of Texas Health Science Center at Houston, 1991  
U.S. National Cancer Institute U.S.S.R. Scientist Exchange Award for Collaborative Research on  
Molecular and Genetic Aspects of Tumor Metastasis, 1991  
Evan and Marion Helfaer Distinguished Lectureship, The Cancer Center of the Medical College of  
Wisconsin, 1990  
Dean's Teaching Excellence List, The University of Texas Health Science Center at Houston Graduate  
School of Biomedical Sciences, 1985-1994  
Teaching Excellence Award for Best Course, The University of Texas Medical School at Houston,  
1990  
NCI/NIH Outstanding Investigator Award, 1987  
Annual Award of the Japan Histochemical Society, 1976  
Eli Nadel Memorial Lecture in Biochemistry, 1983  
Rita Ferdinand Memorial Lectureship, 1982  
Guy Lipscomb Memorial Lecture in Chemistry, 1980  
Upjohn Biology Education Award, 1976  
Presidential Award, Electron Microscopy Society of America, 1971

#### **Society Memberships with Offices Held:**

American Association for Cancer Research  
Member, Board of Directors, 1985-1988  
Chairman, Rhoades Award Committee, 1987-1988  
Chairman, Nomination Committee, 1985-1988  
Member, Program Committee, 1984-1988  
Member, Local Arrangements Committee, 1991  
Metastasis Research Society  
President, 1988-1990  
Secretary-Treasurer, 1990-1998  
Vice President, 1986-1988  
American Academy of Environmental Medicine  
American College for the Advancement of Medicine  
American Society of Biological Chemists, 1975-1985  
American Society for Cell Biology, 1970-1980  
Biophysical Society, 1972-1980  
Electron Microscopy Society of America, 1970-1978

#### **Chairmanship of National and International Conferences:**

Co-Chairman, 11<sup>th</sup> International Functional Food Components in Health and Disease, Univ. Texas  
Southwestern Medical School, Dallas, 2012

Co-Chairman, 10<sup>th</sup> International Functional Food Components in Health and Disease, UC Santa Barbara, 2012

Co-Chairman, 9<sup>th</sup> International Functional Food Components in Health and Disease, U. San Diego, 2011

Co-Chairman, 2<sup>nd</sup> International Conference on Integrative Medicine and Women's Health, Los Angeles, 2002

Co-Chairman, IIACR Conference on Invasion and Metastasis, Athens, Greece 2001.

Co-Chairman, Conference on Integrative Medicine and Chronic Illnesses, Anaheim, CA, 2000

Co-Director, NATO Advanced Study Institute, Intermolecular Cross-talk in Tumor Metastasis, Athens, Greece, 1998

Co-Chairman, Keystone Symposium on Molecular and Cellular Biology, Cancer Cell Motility and Invasion, Tammaron, Colorado, 1995

Co-Chairman, Fifth International Congress of the Metastasis Research Society, Bethesda, Maryland, 1994

Co-Chairman, Pezcoller Foundation Symposium on Cell Adhesion Molecules, Roverto, Italy, 1992

Co-Chairman, 43rd MDACC Annual Symposium on Fundamental Cancer Research, Growth Factors and Their Receptors in Cancer: Basic Mechanisms and Therapy, Houston, 1991

Chairman, Third International Congress of the Metastasis Research Society, Bethesda, Maryland, 1990.

Co-Chairman, NCI Workshop on Cancer Cell Biology, Bethesda, Maryland, 1990

Co-Chairman, AACR/BACR/EORTC Conference on The Cell Membrane and Cell Signals as Targets in Cancer Chemotherapy, Cambridge, England, 1989

Co-Chairman, U.S.-Japan Conference on Cancer Cells, Honolulu, Hawaii, 1988

Chairman, UCLA Symposium on Molecular and Cellular Biology, Tumor Progression and Metastasis, Keystone, Colorado, 1987

Co-Chairman, Second International Research Symposium on Cellular Oncology, Occult Nodal Metastasis in Solid Carcinomata, Palm Springs, California, 1985

Co-Chairman, MDACC Annual Symposium on Fundamental Cancer Research, Cancer Invasion and Metastasis: Biologic and Therapeutic Aspects, Houston, 1983

Co-Chairman, V.A. Medical Center Symposium on New Approaches in Biology, Diagnosis, and Treatment of Cancer, Long Beach, California, 1983

Chairman, UCLA Symposium on Molecular and Cellular Biology, Molecular Biology of Tumors and Potential Clinical Applications, Keystone, Colorado, 1976

Co-Chairman, UCLA Symposium on Molecular and Cellular Biology, Cell Membranes. Squaw Valley, California, 1974

### **U.S. Congressional Committee and Presidential Commission Testimony**

Testimony of Dr. Garth L. Nicolson, House Committee on Government Reform, Subcommittee on National Security, Veterans' Affairs and International Relations, United States House of Representatives, January 24, 2002.

Testimony of Dr. Garth L. Nicolson, House Committee on Veterans' Affairs, Subcommittee on Health, United States House of Representatives, January 24, 2002.

Testimony Of Dr. Garth L. Nicolson, Special Oversight Board For Department Of Defense Investigations Of Gulf War Chemical And Biological Incidents, U. S. Senate Hart Office Building SH-216, November 19, 1998.

Testimony Of Dr. Garth L. Nicolson, House Committee on Veterans' Affairs, Subcommittee on Benefits, United States House of Representatives, July 16, 1998.

Testimony Of Dr. Garth L. Nicolson and Dr. Nancy L. Nicolson, House Committee On Government Reform and Oversight, Subcommittee on Human Resource and Intergovernmental Relations,

United States House of Representatives, June 26, 1997.

Testimony of Dr. Garth L. Nicolson and Dr. Nancy L. Nicolson, House Committee On Government Reform And Oversight, Subcommittee on Human Resource and Intergovernmental Relations, United States House of Representatives, April 2, 1996.

Testimony of Garth Nicolson and Nancy L. Nicolson, Mycoplasma Infections in Gulf War Illnesses, President's Advisory Panel on Gulf War Veterans' Illnesses, Washington D.C., August 14-16, 1995.

### **Symposia Presentations at National or International Conferences (1987-2012):**

December 13-15, 2012. Las Vegas, NV. 20<sup>th</sup> World Congress on Anti-Aging and Regenerative Medicine. Invited Symposium Speaker: Lipid Replacement Therapy: an anti-aging membrane glycopospholipid formulation with NADH and CoQ10, significantly reduces fatigue in long-term intractable chronic fatiguing illnesses and chronic Lyme disease.

October 6, 2012. London, England, UK. Royal Society of Medicine Conference. Invited Keynote Speaker: Mitochondrial repair—Resolution of fatigue.

August 21-23, 2012. San Diego, CA. 11<sup>th</sup> International Functional Foods and Chronic Inflammation Conference. Session Chair and Invited Speaker: Blood homocysteine levels are significantly reduced with a glycopospholipid formulation plus vitamin B-complex: a retrospective study in older subjects.

May 22-25, 2012. Kelowna, British Columbia, Canada. 9<sup>th</sup> Natural Health Products Research Conference. Invited Keynote Speaker: Lipid replacement therapy: a functional food approach for reducing cancer-associated fatigue and the adverse effects of cancer therapy. Also, an invited presentation was presented: Lipid Replacement Therapy, a glycopospholipid formulation with NTFactor, NADH and CoQ10 reduces fatigue in long-term intractable chronic fatiguing illnesses and chronic Lyme Disease.

March 13-15, 2012. Santa Barbara, CA. 10<sup>th</sup> International Functional Foods and Bioactive Compounds Conference. Invited Speaker: Lipid Replacement Therapy using a glycopospholipid formulation with NTFactor, NADH and CoQ10 reduces fatigue in long-term intractable chronic fatiguing illnesses and chronic Lyme Disease.

March 7, 2012. Honolulu, Hawaii. University of Hawaii John A. Burns School of Medicine. Yanagimachi Distinguished Lecture: Reducing cancer-associated fatigue and the adverse effects of cancer therapy using Lipid Replacement Therapy.

October 28-30, 2011. Toronto, Ontario, Canada. 2011 Annual Conference of the International Lyme and Associated Diseases Society. Invited Special Speaker: Recent clinical trials using Lipid Replacement Therapy to improve mitochondrial function and reduce fatigue for Lyme Disease and other chronic illnesses.

August 16, 2011. San Diego, CA. 9<sup>th</sup> International Functional Food Components in Health and Disease Conference. Invited Speaker: Lipid Replacement Therapy functional food formulation with NTFactor for reducing weight, girth, body mass, appetite, cravings for sweets and fatigue while improving cardiovascular blood lipid profiles.

April 29, 2011. Bellevue, WA. 18<sup>th</sup> International Symposium on Functional Medicine: Emerging infections in the 21<sup>st</sup> Century-Terrain, Tolerance and Susceptibility. Invited Speaker: Mycoplasma and other chronic infections in neurodegenerative, neurobehavioral and fatiguing illnesses.

April 17, 2011. Bologna, Italy. 6<sup>th</sup> International Academy on Nutrition and Aging. Invited Speaker: Lipid Replacement Therapy: a nutraceutical approach for reducing cancer-associated fatigue and the adverse effects of cancer therapy.

April 8, 2011. Minneapolis, MN. iMosaic Combined AAEM, ACAM, AHMA, ICIM Conference. Invited Speaker: Lipid Replacement Therapy with a glycopospholipid-antioxidant-vitamin formulation reduces fatigue within one week in chronic fatigued patients: implications for

neurodegenerative, neurobehavioral and fatiguing illnesses.

March 17, 2011. Las Vegas, NV. International Functional Foods in Health and Chronic Diseases Conference. Keynote Speaker: Lipid Replacement Therapy: a functional food approach for reducing cancer-associated fatigue and the adverse effects of cancer therapy.

October 15, 2010. New Jersey City, NJ. International Lyme and Associated Diseases Society Conference. Invited Special Lecturer: Lyme-associated infections in neurodegenerative and neurobehavioral disorders, oxidative stress and the loss of mitochondrial function: using nutraceuticals to reverse mitochondrial damage and increase cellular energy.

October 10, 2010. Los Angeles, CA. 9<sup>th</sup> California Naturopathic Doctors Association Conference. Invited Special Lecture: Restoring mitochondrial function—The key to improving energy output.

October 3, 2010. Montreal, Quebec, Canada. 2<sup>nd</sup> International Cancer Fatigue Symposium. Invited Speaker: Lipid Replacement Therapy: a nutraceutical approach for reducing cancer-associated fatigue and the adverse effects of cancer therapy.

September 24, 2010. Buffalo, NY. 53<sup>rd</sup> Conference of the International College of Integrated Medicine. Invited Special Speaker: Chronic bacterial and viral infections in neurodegenerative and neurobehavioral diseases: Why physicians are not up to speed on chronic infections.

July 26, 2010. Santa Ana, NM. 5<sup>th</sup> Congress of the International Academy of Nutrition and Aging. Invited Speaker: Lipid replacement therapy with a phospholipids-antioxidant-vitamin formulation significantly reduces fatigue within one week in chronic fatigued patients.

July 19, 2010. Bethesda, MD. National Institutes of Health Conference on Pediatric Autoimmune Neuropsychiatric Disorders Associated with Streptococcal Infections. Invited Speaker: The role of Mycoplasmal Infections in neurodegenerative and neurobehavioral disorders.

October 9-11, 2009. Seattle, WA. Lyme and Associated Diseases Conference. Invited Speaker: Lyme Disease Co-Infections, Neurodegenerative and Neurobehavioral Diseases, Oxidative Damage and Lipid Replacement of Damaged Cellular Membranes.

May 28-29, 2009. London, England, UK. International ME/CFS Conference. Keynote Speaker: Similar infections found in ME/CFS and neurodegenerative and neurobehavioral diseases.

October 18-19, 2008. San Francisco, CA. International Lyme and Associated Diseases Annual Conference. John Drulle Memorial Lecture: Lyme co-infections in neurodegenerative and neurobehavioral diseases.

September 28-30, 2008. Cazadero, CA. Ratna Ling CFIDS Symposium. Invited Speaker: CFS and ASD: comparisons and treatments.

August 29-31, 2008. Sudbury, Ontario, Canada. Common Cause Medical Research Foundation Conference. Keynote Speaker: Chronic infections in neurodegenerative diseases: their origins.

July 23-25, 2008. Indian Wells, CA. Lyme-Induced Autism Foundation Physician Meeting. Invited Speaker: Chronic infections in Autism Spectrum Disorders.

January 27-28, 2008. San Diego, CA. Lyme-Induced Autism Foundation Workshop. Invited Speaker: Bacterial and viral infections in Autism Spectrum Disorders.

October 28-29, 2007. Santa Cruz, CA. Conference sponsored by Dr. Stan Montieth. Invited Keynote Speaker: Chronic infections in neurodegenerative and autoimmune diseases.

October 20-21, 2007. Houston, TX. 2007 Health Expo. Invited Symposium Speaker: Role of chronic infections in neurodegenerative diseases and fatiguing illnesses.

October 10-11, 2007. Irvine, CA. DAN Conference. Invited Speaker: Lyme Disease, other infections and autism.

August 8-12, 2007. Cazadero, CA. Ratna Ling CFIDS Symposium. Invited Speaker: Transmission of CFS to immediate family members and role of Lyme Disease.

July 3-6, 2007. Montecatini, Tuscany, Italy. 19<sup>th</sup> American Biologics Integrative Medicine Symposium. Invited Speaker: Evidence for chronic co-infections in the blood of Autism Spectrum Disorders.

June 23-24, 2007. Irvine, CA. Lyme Disease in Autism Conference. Invited Speaker: Chronic co-infections in Lyme Disease and Autistic Spectrum Disorders.

April 19-20, 2007. Ferrara, Italy. International Conference on Chronic Chlamydia and Mycoplasma Human Infections. Invited Speaker: Chronic co-infections (Mycoplasma, Chlamydia, Borrelia, Brucella) in various human illnesses.

March 24-25, 2007. Dallas, TX. Lay Institute Symposium. Invited Speaker: Biological Warfare and the ethics of development and testing biowarfare agents.

January 27-28, 2007. San Diego, CA. Lyme-Induced Autism Workshop. Invited Speaker: Co-infections in Lyme Disease and Autism Spectrum Disorders.

January 10-12, 2007. Ft. Lauderdale, FL. Eighth International Association of Chronic Fatigue Syndrome Conference. Invited Speaker: (1) Chronic bacterial co-infections in Chronic Fatigue Syndrome and Chronic Fatigue Syndrome patients subsequently diagnosed with Lyme Disease. (2) Lipid Replacement Therapy for restoring mitochondrial function in fatiguing illnesses and Chronic Fatigue Syndrome.

November 17-19, 2006. Sudbury, Ontario, Canada. Common Cause Medical Research Foundation. (1) Invited Keynote Speaker: Degenerative diseases and the role of chronic bacterial and viral infections. (2) Invited Speaker: Autistic Spectrum Disorders: role of chronic bacterial and viral infections.

October 26-29, 2006. Hilton Head, SC. American Academy of Environmental Medicine Annual Conference. Invited Speaker: Chronic co-infections in Autistic Spectrum Disorders: diagnosis and treatment.

July 1-5, 2006. Corfu, Greece. 18<sup>th</sup> American Biologics International Symposium. Invited Speaker: Role of multiple co-infections in Lyme Diseases: diagnosis and treatment.

June 8-11, 2006. Dallas, TX. 24<sup>th</sup> Symposium on Man and his Environment. Invited Speaker: Lipid replacement and antioxidant therapy for restoring mitochondrial function in Chronic Fatigue Syndrome and other fatiguing illnesses.

May 4-6, 2006. Richardson, TX. American College for Advancement in Medicine. Invited Speaker: Diagnosis and treatment of multiple co-infections in Lyme Disease.

October 29-31, 2005. Philadelphia, PA. International Lyme and Associated Diseases Conference. Invited Symposium Speaker: Role of mycoplasmal co-infections in Lyme Disease.

September 6-9, 2005. Dubrovnik, Croatia. 4th European-American Forensic Medicine Conference. Invited Symposium Speaker: Chronic infections in Gulf War veterans and immediate family members: relationship to Gulf War Syndrome.

September 3-4, 2005. Houston, TX. Center for Autistic Spectrum Disorders Symposium. Invited Speaker: Treating multiple chronic bacterial and viral infections in Autistic Spectrum Disorder patients.

July 10, 2005. Philadelphia, PA. Center for Autistic Spectrum Disorders Physicians Workshop. Invited Speaker: Role of chronic infections in Autistic Spectrum Disorders.

May 21-24, 2005. Budapest, Hungary. Hungarian Academy of Sciences Meeting on Membranes. (1) Invited Symposium Speaker: Breast cancer progression and metastasis-associated genes. (2) Invited Speaker: Lipid replacement therapy and mitochondrial function.

May 7-8, 2005. Unionville, CT. Lyme Disease Support Conference. Invited Speaker: Role of intracellular co-infections in Lyme Disease.

May 6, 2005. Hamilton, NJ. Medical Diagnostics Laboratories. Invited Speaker: Role of chronic bacterial and viral infections in fatiguing and autoimmune illnesses.

April 16-19, 2005. Istanbul, Turkey. Congress of Molecular Medicine. Invited Symposium Speaker: Cancer metastasis-associated human *MTA1* gene and its role in dacylation and signal transduction in epithelial cancer cells.



October 10-13, 2004. Phoenix, AZ. American Academy of Environmental Medicine. (1) Invited Speaker: Chronic co-infections in Chronic Fatigue Syndrome and other fatiguing illnesses. (2) Lipid Replacement Therapy, fatigue and mitochondrial function.

April 15-17, 2004. Kansas City, KS. American Academy of Environmental Medicine. Invited Speaker: Chronic bacterial and viral co-infections in Chronic Fatigue and Fibromyalgia Syndromes and Gulf War Illnesses.

March 3-4, 2004. Baton Rouge, LA. Chancellors Distinguished Lecture: Cancer progression and metastasis: role of genetics, growth factors and infections.

February 12-15, 2004. Munster, Germany. Neurobiology of the Skin. Invited Symposium Speaker: Role of neurotrophins in regulating metastasis of melanoma to brain.

October 30-November 2, 2003. Phoenix, AZ. American Academy of Environmental Medicine Annual Meeting. Invited Symposium Speaker: (1) Diagnosis and treatment of multiple, chronic bacterial and viral infections in Chronic Fatigue Syndrome, Fibromyalgia Syndrome and Gulf War Illnesses; (2) Nutritional support restores mitochondrial function and reduces moderately severe fatigue in aged subjects.

August 22-23, 2003. Vancouver, BC, Canada. Common Cause Foundation Annual Meeting. Invited Speaker: Mycoplasmal, Chlamydial and Herpes Virus infections in chronic illnesses.

July 24-26, 2003. Kansas City, MO. American Academy of Craniofacial Pain Annual Meeting. Invited Symposium Speaker: Chronic infections in fatiguing and autoimmune illnesses.

March 18, 2003. San Diego, CA. San Diego VA Medical Center. Invited seminar speaker: Gulf War Illnesses: role of chronic infections and multiple chemical exposures.

December 6-8, 2002. Belview, WA. Neurological Disease Conference. Invited Speaker: Co-Infections in Borrelia-Lyme Disease.

October 24, 2002. San Diego, CA. Defeat Autism Now Workshop. Invited Speaker: Chronic infections in Autism and ADHD patients.

September 18-20, 2002. Niagara Falls, Ont., Canada. Institute for Integrative Medicine Meeting. Invited Symposia Speaker: Mitochondrial function in fatiguing illnesses: Diagnosis and treatment.

September 20-22, 2002. Chicago, IL. Metastasis Research Society Congress. Session presentation: The role of the *MTA1* gene in metastasis.

June 27-July 6, 2002. Rhodes, Greece. 13<sup>th</sup> Annual American Biologics International Conference on Integrative Medicine. Invited Symposia Speaker: Biological Warfare agents: their identification and treatment.

May 3-5, 2002. Orlando, FL. National Fibromyalgia Conference. Invited Speaker: Role of chronic bacterial and viral infections in Fibromyalgia Syndrome.

April 3-10, 2002. Sydney, Australia. Mind of a Child Conference. Invited Symposia Speaker: Chronic infections in Autism patients: Identification and treatment.

March 8-10, 2002. Carmel, CA. Annual Meeting of the Academy of Biological Dentistry. Invited Speaker: Chronic bacterial and viral infections in chronic illnesses.

January 28, 2002. Arlington, VA. Joint Intelligence Operatives, Fort Myer. Gulf War Illnesses and related syndromes caused by chronic infections.

January 24, 2002. Washington DC. House of Representatives, U.S. Congress. Invited testimony on Gulf War veterans' illnesses.

December 6, 2001. Munich, Germany. International Conference on Staging of Cancer. Keynote Speaker: History of Cancer Research on Membranes, Invasion and Metastasis.

December 1, 2001. Sydney, Australia. 3<sup>rd</sup> International Conference on Chronic Fatigue Syndrome. Keynote Speaker: Multiple Co-Infections in Chronic Fatigue Syndrome: Diagnosis and Treatment.

November 15, 2001. Long Beach, CA. Biannual Meeting of the American Academy for Advancement in Medicine. Invited Workshop Speaker: Diagnosing and Treating Chronic Infections in Chronic

## Illnesses.

- June 30, 2001. Malta. 12<sup>th</sup> Annual American Biologics Conference on Integrative Medicine. Invited Speaker: Chronic Infections in Autoimmune Diseases.
- June 14-17, Athens, Greece. International Institute for Anticancer Research Conference. Conference Chairman and Speaker: MTA1 Gene and Breast Cancer Progression.
- May 18, 2001. Ottawa, Quebec. Environmental Illness Soc. of Canada Conference. Invited Speaker: Role of Chronic Intracellular Infections in Chronic Illnesses.
- May 15, 2001. Aylmer, Quebec. Canadian Dept. of National Defense Symposium on Chemical Sensitivity. Invited Speaker: Diagnosis and Treatment of Mycoplasmal and Chlamydial Infections.
- November 11, 2000. Anaheim, CA. First Annual Conference on Integrative Medicine, Invited Speaker and Conference Chairman: Integrative Medicine Approaches to Chronic Illnesses.
- October 28, 2000. Salt Lake City, UT. American Academy for Advancement in Medicine, Semi-Annual Meeting. Invited Symposium Speaker: Intracellular Bacterial Infections: Diagnosis and Treatment.
- August 18, 2000. Rochester, New York. Common Cause Foundation Meeting. Keynote Speaker: Chronic Infections in Fatiguing and Autoimmune Illnesses.
- September 16, 2000. Herdon, VA. National Gulf War Conference. Invited Speaker: Gulf War Illnesses and the Role of Chronic Infections.
- June 9, 2000. Dallas, Texas. American Academy of Environmental Medicine. Invited Symposium Lecture: Chronic Infections in Environmental Health.
- May 23-26, 2<sup>nd</sup> Congress of Oncologists of the CIS. Kiev, Ukraine. Plenary Lecture: Genetics of Breast Cancer Invasion and Metastasis. Session Chairman, Invited Lecture: Chronic Infections in Cancer, Fatiguing Illnesses and Autoimmune Diseases.
- April 6, 2000. Kuwait City, Kuwait. Ministry of Health of Kuwait. Invited Symposium Lecture: Gulf War Illnesses and the Role of Chronic Infections in Fatiguing and Autoimmune Illnesses.
- March 3-5, 2000. Carmel, CA. American Academy of Biological Dentistry Annual Meeting. Invited Symposia Speaker. Role of Chronic Infections in Oral and Systemic Diseases.
- September 20, 1999. Las Vegas, Nevada. National Gulf War Resource Center Conference. Invited symposia speaker: Chronic infections in Gulf War Illnesses.
- September 10, 1999. Brussels, Belgium. Second International Congress on Chronic Fatigue Syndrome. Invited symposia speaker: Chronic infections in Chronic Fatigue Illnesses and their Treatment.
- August 21, 1999. Gananoque, Ontario, Canada. Common Cause Foundation International Symposia. Invited symposia speaker: Chronic infections in CFS, FMS and Gulf War Illness.
- July 26, 1999. Ottawa, Ontario, Canada. Second International Symposia on Breast Cancer. Invited symposia speaker: Breast cancer-associated genes and their gene products.
- July 2, 1999. Vienna, Austria. American Biologics 11<sup>th</sup> International Symposium on Integrative Medicine. Invited symposia speaker: Chronic infections and Their Treatment
- May 29, 1999. Washington DC. Memorial Day Veterans Health Conference. Invited symposia speaker: Chronic infections and Their Treatment in Gulf War Illnesses.
- February 26, 1999. Sydney, Australia. Alison Hunter Memorial Foundation International Meeting on Chronic Illnesses. Invited symposia speaker: Chronic infections in CFS, FMS and Gulf War Illness.
- October 8, 1998. San Diego, CA. International Congress of the Metastasis Research Society. Stephen Paget Award Lecture: Cancer metastasis-associated genes and cancer progression.
- October 6, 1998. New Orleans, LA. September 10, 1998. American College of Occupational and Preventive Medicine. Invited symposia speaker: Chronic infections in CFS and Fibromyalgia Syndrome.
- September 11, 1998. Oxford, England. Royal Society of General Practitioners. Invited symposia speaker: Mycoplasmas, Gulf War Syndrome and CFS/ME.

July 24, 1998. Athens, Greece. NATO Conference on Intermolecular Cross-talk in Tumor Metastasis. Conference Co-organizer and speaker: Metastasis-associated genes and breast cancer metastasis and Organ microvessel endothelial cells: secretion of organ-specific motility and growth factors.

June 27, 1998. Istanbul, Turkey. American Biologics International Conference. Invited symposia speaker. Role of chronic infections in Gulf War Illness, Chronic Fatigue and Fibromyalgia Syndromes.

April 18-19, 1998. Riverside, CA. The Arthritis Institute Conference on Antibiotic Treatment for Rheumatic Diseases. Invited symposia speaker: Mycoplasmal infections in chronic diseases.

February 27-March 1, 1998. San Francisco, CA. Fourth Annual Symposium on Orthomolecular Medicine. Invited symposia speaker: Gulf War vaccines and disease.

February 10-12, 1998. Sydney, Australia. Chronic Fatigue Syndrome 98 International Conference. Invited symposia speaker: Mycoplasmas, Gulf War Syndrome and CFS.

January 16-18, 1998. Pasadena, CA. National Health Federation. Invited symposia speaker: Chronic infections in CFS and Fibromyalgia Syndrome.

November 16, 1997. Santa Ynez Valley CFIDS Association. Invited symposium speaker: Chronic infections in Fibromyalgia/Chronic Fatigue Syndrome.

October 16, 1997. Los Angeles, CA. Granada Forum. Invited symposium speaker: Fibromyalgia/Chronic Fatigue Syndrome.

September 29-30, 1997. Indianapolis, IN. Advances in Enzyme Control in Normal and Neoplastic Tissues. Invited symposium speaker: Role of heparanase in cancer invasion and metastasis.

September 20-21, 1997. Sudbury, Ont., Canada. Invited symposium speaker: Chronic infections in GWI/ Fibromyalgia/Chronic Fatigue Syndrome.

August 30-31, 1997. Los Angeles, CA. Cancer Control Convention. Invited symposium speaker: Chronic infections in Fibromyalgia/Chronic Fatigue Syndrome.

June 25-28, 1997. Lago Maggiore, Italy. International Integrative Medicine Congress. Invited symposium speaker: Chronic infections in Gulf War Illness/Fibromyalgia/Chronic Fatigue Syndrome.

June 16-17, San Francisco, CA. Neurocognitive Disorders and Molecular Genetics. Invited symposium speaker: Chronic infections in Fibromyalgia/Chronic Fatigue Syndrome.

April 17, 1997. Oceanside, CA. San Diego County CFIDS Association. Invited symposium speaker: Chronic infections in Fibromyalgia/Chronic Fatigue Syndrome.

April 24-26, 1997. Tampa, FL. American College for Advancement in Medicine. Invited symposium speaker: Role of chronic infections in Gulf War Illness/Chronic Fatigue Syndrome.

April 12-16, 1996. San Diego, CA. American Society for Cancer Research Meeting. Invited symposium speaker: Cancer metastasis-associated genes.

February 7-9, 1997. Seattle, WA. Fibromyalgia International Conference. Invited symposium speaker: Chronic infections in Fibromyalgia/Chronic Fatigue Syndrome.

January 30, 1997. Santa Barbara, CA. Santa Barbara Medical Society, Invited symposium speaker: Gulf War Illness/Chronic Fatigue Syndrome: role of chronic infections.

December 14, 1996. Le Puente, CA. Indo-American Society for Health and Laboratory Professionals. Invited speaker: Chronic infections associated with Chronic Fatigue Syndrome and Gulf War Illness.

November 14-16, 1996. Cairo, Egypt. 4th International Cancer Molecular Biology Symposium. Invited symposium speaker: Cancer metastasis-associated genes.

October 26-28, 1996. Nice, France. 3rd International Symposium on Predictive Oncology and Therapy. Invited speaker and session chairman.

September 7-11, 1996. Metastasis Research Society Congress. Invited Keynote Speaker: Breast cancer progression and the role of quantitative genomic changes and quantitative changes in gene

expression.

- July 20-24, 1996. Snowmass, CO. 45th Symposium on the Biology of the Skin. Invited symposium speaker: Neurotrophins and malignant melanoma invasion and metastasis.
- June 5, 1996. Dallas, TX. Institute for Environmental Medicine. Invited symposium speaker: Mycoplasmal infections in Gulf War Illness-CFIDS.
- April 28-May 2, 1996. Houston, TX. 9th International Congress on Breast Disease. Invited symposium speaker: Breast cancer metastasis genes and oncogenes and their role in tumor progression, cellular communication and metastasis.
- March 24-27, 1996. San Francisco, CA. American Cancer Society Annual Science Writers Symposium. Invited speaker: Role of cancer metastasis metastasis-associated genes in the progression of cancer to the metastatic state.
- March 7-8, 1996. New Orleans, LA. 19th Annual Interdisciplinary Cancer Research Workshop. Keynote speaker: Breast cancer-associated genes and regulation of tumor progression.
- March 1-2, 1996. Houston, TX. Endocrine and Breast Diseases International Congress. Invited speaker: Breast cancer metastasis and gene expression.
- February 27, 1996. San Antonio, TX. Presidential Advisory Commission on Gulf War Veterans' Illnesses. Invited speaker: Mycoplasmal infections in Gulf War Illnesses.
- February 15, 1996. Oklahoma City, OK. 1st Norman Durham Lecturer, Environmental Institute, Oklahoma State University.
- January 15-17, 1996. Bethesda, MD. U.S.-Japan Cooperative Research Program on the Role of Cytokines in Cancer. Invited speaker: Mechanism of interferon- $\alpha$  inhibition of CML.
- January 12, 1996. Kansas City, MO. Presidential Advisory Commission on Gulf War Veterans' Illnesses. Invited speaker: Mycoplasmal infections in Gulf War Illnesses.
- November 23-26, 1995. London, England. Annual Meeting of the British Society of General Practitioners. Invited symposium speaker: Persian Gulf War Illness: role of mycoplasmal infections.
- November 10-16, 1995. Alexandria, Egypt. Third International Cancer Molecular Biology Symposium. Invited symposium speaker: Cancer metastasis-associated genes.
- November 1-5, 1995. Schwarzwald Titisee, Germany. International Titisee Conference on Tumor Angiogenesis. Invited speaker: Paracrine growth and motility factors from microvessel endothelial cells stimulate metastasis.
- October 1-5, 1995. Terrigal, New South Wales, Australia. 19th Annual Conference of the Connective Tissue Society. Keynote Speaker: Role of trophic factors in stimulating metastatic cell matrix invasion and degradative enzymes.
- June 25-28, 1995. Kansas City, MO. Sixth Meeting of the Pan American Society for Pigment Cell Research. Keynote Address: Role of neurotrophins and paracrine growth factors in brain metastasis of melanoma.
- March 18-22, 1995. Toronto, Canada. American Association for Cancer Research. Invited symposium speaker. The *mta1* gene and breast cancer metastasis.
- January 15-18, 1995. Durango, Colorado. Keystone Symposium on Cancer Cell Invasion and Motility. Invited symposium speaker: Organ microvessel endothelial cells: role in cancer cell invasion and growth.
- December 7-8, 1995. Dearborn, Michigan. Preuss Foundation Annual Meeting. Invited symposium speaker: Role of neurotrophins in brain invasion and metastasis.
- December 2-5, 1994. Keystone, Colorado. Keystone Symposia on Cancer. Invited symposium speaker: Paracrine motility factors and metastasis.
- October 30-November 5, 1994. New Delhi, India. International Cancer Congress. Invited Symposium Chairman and Speaker: Membranes of metastatic cells.

October 25-26, 1994. Munster, Germany. Symposium on Gene Diagnosis of Cancer. Invited symposium speaker. Genes related to breast cancer metastasis.

October 9-12, 1994. Vienna, Austria. Annual Meeting of German and Austrian Societies of Haematology and Oncology. Invited symposium speaker: Molecular properties of metastatic cells.

June 10-12, 1994. Mexico City, Mexico. 130th Anniversary of the Mexican National Academy of Medicine. Invited symposium speaker: Metastasis of tumors to brain: molecular mechanisms.

March 28-April 1, 1994. Tokyo, Japan. Annual Meeting of the Japanese Pharmaceutical Society. Invited symposium speaker: Brain Metastasis: molecular mechanisms.

February 17-20, 1994. Houston, Texas. Annual Meeting of the Radiation Therapy Oncology Group. Invited symposium speaker: Metastasis: molecular mechanisms of invasion and metastasis.

February 11, 1994. Detroit, Michigan. Distinguish Faculty Lecture of Wayne State University. Invited speaker: Molecular mechanisms of cancer metastasis.

January 31-February 5, 1994. Big Sky, Montana. AACR Special Conference on the Molecular Genetics of Tumor Progression and Metastasis. Invited speaker: Role of neurotrophins and paracrine factors in brain cancer metastasis.

January 14, 1994. Miami, Florida. University of Maimi School of Medicine. Sigma Xi Distinguished Lecture: Tumor microenvironment and metastasis to specific sites-Molecular mechanisms.

December 2-5, 1993. Houston, Texas. Society for Basic Urological Research. Invited speaker: Molecular mechanisms of cancer metastasis.

November 24-26, 1993. Cairo, Egypt. Second International Cancer Molecular Biology Symposium. Invited symposium speaker: Cancer metastasis: Role of specific tumor cell and host properties in metastasis and identification of genes associated with breast cancer metastasis.

November 4-7, 1993. Houston, Texas. Thirty-Seventh Annual Clinical Conference. Invited symposium speaker: Cancer metastasis.

October 19-22, 1993. Potsdam, Germany. Schering Research Foundation Symposium. Invited speaker: Tumor metastasis and host microenvironment.

July 15-16, 1993. Glasgow, Scotland. Cancer Research Campaign Review of Metastasis Research. Invited speaker: Interactions of metastasis with host tissue.

March 6, 1993. San Francisco, California. Twenty-eighth Annual San Francisco Cancer Symposium. Invited symposium speaker: The Mechanisms of Metastasis: Current Concepts--Understanding and Predicting Tumor Spread.

December 9-10, 1992. San Antonio, Texas. Fifteenth Annual San Antonio Breast Cancer Symposium. Invited symposium speaker: Breast Cancer Metastasis: Role of Microenvironmental Signals at Primary and Secondary Sites.

November 20, 1992. Taegu, Korea. Molecular Medicine of Cancer Symposium. Invited symposium speaker: Organ Specificity of Cancer Metastasis: Role of Specific Tumor Cell Properties and Host Paracrine Motility Factors, Paracrine Growth Factors and other Cytokines in Metastasis to Specific Sites.

September 1-4, 1992. Paris, France. Fourth International Congress of the Metastasis Research Society. Invited symposium speaker: Organ Specificity of Cancer Metastasis: Role of Specific Tumor Cell Properties and Host Paracrine Motility Factors, Paracrine Growth Factors and other Cytokines.

June 26, 1992. Rovereto, Italy. Pezcoller Foundation's Fourth International Symposium on Cell Adhesion Molecules. Invited speaker, Session V: Endothelial Cell Adhesion in Invasion and Metastasis.

June 20, 1992. Innsbruck, Austria. University of Innsbruck. Invited speaker: The Role of Adhesion Components and Paracrine Growth Factors in Metastasis to Specific Sites.

June 16, 1992. Milan, Italy. Ares-Serono Symposium on Heterogeneity of Cancer Cells. Invited plenary speaker: Heterogeneity of Metastases.

May 22, 1992. Duarte, California. City of Hope 1992 Distinguished Visiting Lecturer Series: Organ Specificity of Metastasis: Role of Specific Adhesion, Invasion and Paracrine Growth Factors.

May 20, 1992. San Diego, California. Eighty-Third Annual Meeting of the American Association for Cancer Research. Invited symposia speaker, Metastasis and the Microenvironment Session: Purification and Characterization of Migration-stimulating Factor Secreted by Mouse Hepatic Sinusoidal Endothelial Cells.

April 23-24, 1992. Memphis, Tennessee. University of Tennessee. The Baptist Memorial Health Care Foundation Forum on Cancer Research: The Molecular Basis for Cancer Prevention. Invited symposia speaker: Organ specificity of cancer metastasis: Role of specific tumor cell properties and host cytokines.

March 15, 1992. New York, New York. Society of Surgical Oncology 45th Annual Cancer Symposium. Invited symposia speaker: Paracrine growth factors and metastasis.

February 9-13, 1992. Houston, Texas. ASBMB/Biophysical Society Meeting.

January 26-February 2, 1992. Keystone, Colorado. Keystone Symposium. Invited speaker: Paracrine Growth Factors.

January 22-24, 1992. Atlanta, Georgia. American Cancer Society. Invited symposia speaker: Invasion and metastasis.

December 9, 1991. Dallas, Texas. American Academy of Dermatology's 50th Annual Meeting. Invited symposia speaker: Mechanisms of invasion and metastasis of malignant melanoma.

November 7, 1991. Berlin, Germany. Schering AG West Germany. Invited speaker series: Role of Adhesion Components, Motility Factors and Paracrine Growth Factors in Cancer Metastasis.

October 30-November 6, 1991. Moscow, U.S.S.R. All Union Cancer Center, U.S.S.R., Moscow. Visiting professor and lecturer: Tumor Invasion and Metastasis: Role of Endothelial Cell Adhesion and Degradative Enzymes and Organ Preference of Tumor Metastasis: Paracrine and Autocrine Organ Growth and Motility Molecules.

October 28-30, 1991. Bonn, Germany. International Meeting on Metastasis: Basic Research and Clinical Applications. Invited speaker: Integrin and Non-integrin Receptors and Paracrine Growth Factors in Organ Preference of Metastasis.

October 2, 1991. Dallas, Texas. Komen Foundation Symposium on Breast Cancer at the Molecular and Cellular Level. Invited speaker: Role of a Paracrine Growth Factor in Metastatic Breast Cancer.

August 11-16, 1991. Newport, Rhode Island. Gordon Research Conference on Cancer. Invited speaker: "Tissue-specific Growth Factors in Cancer Metastasis.

June 5-7, 1991. Trento, Italy. III Annual Pezcoller Symposium. Invited speaker: Tumor Suppressor Genes.

May 28-29, 1991. Cedar Rapids, Iowa. Fourth Annual Diana J. Benz Memorial Lecture. Distinguished lecture series: Breast Cancer Metastasis.

May 21-22, 1991. Buffalo, New York. Roswell Park Memorial Institute. Distinguished lecturer series: Organ Specificity of Cancer Metastasis: Role of Specific Tumor Cell Properties and Cytokines Expressed at Organ Sites.

May 4, 1991. Maui, Hawaii. Society of Head and Neck Surgery Symposium on Cervical Lymph Node Metastases. Invited speaker: Mechanisms of Lymphatic and Hematogenous Metastases.

April 18-20, 1991. New York City. The Fourth World Congress on Cancers of the Skin. Invited speaker: Biology of Malignant Melanoma Metastasis: Tumor Cell Properties and Cytokines Expressed at Particular Organ Sites Determine Organ Specificity.

April 1-7, 1991. Steamboat Springs, Colorado. UCLA Symposium on Epithelial Cancers and Aerodigestive Tract. Invited speaker: Lung Colonization by Metastatic Tumor Cells is Determined by the Properties of Unique Tumor Cells and Lung-Associated Cytokines.

March 26-27, 1991. Phoenix, Arizona. Thirty-third Science Writers' Seminar. Invited speaker: Breast Cancer Metastasis.

March 13-15, 1991. St. Gallen, Switzerland. International Symposium on Angiogenesis. Invited symposia speaker: Stimulation of Growth and Migration of Liver-metastasizing Lymphoma Cells by Molecules from Murine Liver Endothelial Cells.

February 26, 1991. New York City. New York Academy of Sciences Meeting on Metastasis: Mechanisms to Therapies. Invited speaker: The Role of Cell Adhesion in Tumor Metastasis.

December 4-7, 1990. Houston, Texas. University of Texas M.D. Anderson Cancer Center's 43rd Annual Symposium on Fundamental Cancer Research. Co-chairman and plenary lecturer in Session II (Epithelial Tissue): Paracrine Growth Factors.

October 18-21, 1990. Prouts Neck, Maine. International Conference on Molecular Genetics of Bladder Cancer. Lectured in Session VI (Molecular Markers in Bladder Cancer) on Cytokines Involved in Tumor Invasion and Metastasis.

September 17-19, 1990. Bethesda, Maryland. Third International Congress of the Metastasis Research Society. Chairman of the Congress Program Committee. Delivered the President's address on Integrin and Non-Integrin Receptors and Paracrine Growth Factors in Organ Preference of Metastasis. Co-chaired Symposium II on Cell Adhesion and Extracellular Matrix.

September 13-16, 1990. Washington, D.C. Tenth International Scientific Symposium of the National Foundation for Cancer Research, Georgetown University Conference Center. In the third session (Basic Carcinogenesis) lectured on Human and Mouse Melanoma Heparanases Are Inhibited by the Anticancer Agent Suramin.

August 11-17, 1990. Bethesda, Maryland. Annual meeting of the NCI Laboratory of Tumor Cell Biology on Frontiers in Human Retrovirology and Related Topics. Invited special speaker on Malignancies Associated with Retrovirus Infections.

July 6, 1990. Sapporo, Japan. 10th Sapporo Cancer Seminar. Keynote speaker: Generation of Diversity in Malignant Cell Populations. Plenary lecture on Organ Specificity of Cancer Metastasis Is Determined by Tumor Cell Molecules and Cytokines Expressed at Particular Organ Sites.

July 3-5, 1990. Sapporo, Japan. 49th Annual Meeting of the Japanese Cancer Association. Speaker in the symposium on Progression and Metastasis in Malignancy entitled Cell Surface and Growth Properties of Metastatic Cells.

June 11-13, 1990. Trento, Italy. Fondazione Pezcoller Trento Symposium on the Therapeutic Implications of Molecular Biology of Breast Cancer. Invited participant/discussant.

May 23-26, 1990. Washington, D.C. 81st Annual Meeting of the American Association for Cancer Research. Invited participant in the symposium on Metastasis: Genetic Mechanisms and Cytokine Signal Transduction.

April 26-29, 1990. Washington, D.C. Cancer Cell Biology Workshop on Implications for New Drug Development. Invited discussant and lecturer: Molecular Properties of Metastatic Cancer Cells.

April 23-24, 1990. New York City. Cancer Progress V. Invited symposia presenter: Shaping Future Strategies for the Pharmacological Intervention of Tumor Cell Metastasis.

April 1-5, 1990. Washington, D.C. American Association of Pathologists Program of the FASEB 1990 Annual Meeting. Invited speaker in the Minisymposium, Invasion and Metastasis. Lecture title: Cytokines in Metastasis Growth and Organ Homing.

March 9-12, 1990. Squaw Valley, California. UCLA Symposia on Molecular and Cellular Biology: Biology of Sarcomas. Invited speaker: Interactions between Tumor Cells, Vascular Cells and Extracellular Matrix.

February 7-9, 1990. La Jolla, California. Twelfth Annual Conference on Clinical Laboratory Molecular Analysis sponsored by Scripps Clinic and Research Foundation. Invited speaker and instructor: Molecular Determinants of Metastasis.

February 4-7, 1990. San Francisco, California. Annual Meeting of the Society of Gynecologic Oncologists. Invited symposia speaker: Adhesive, Invasive and Growth Properties of Metastatic Cells.

January 27-February 3, 1990. Park City, Utah. UCLA Symposia on Molecular and Cellular Biology: Molecular Pathways of Cytokine Action. Symposia lecture on "Organ Specificity of Metastasis Is Determined by Adhesive, Invasive and Growth Properties of Unique Tumor Cells and Host Environments.

September 25-27, 1989. Genoa, Italy. Joint NCI-IST Symposium on Biology and Therapy of Breast Cancer. Plenary speaker, Differential Adhesion, Invasion and Growth Properties of Metastatic Mammary Adeno-carcinoma Cells.

September 14-16, 1989. Cambridge, England. AACR BACR EORTC meeting on The Cell Membrane and Cell Signals as Targets in Cancer Chemotherapy. Session chairman (Metastasis and Cell Death) and speaker, The Cell Surface and Metastasis.

May 28, 1989. Honolulu, Hawaii. Joint Meeting of the AACR/JCA on Molecular Aspects of Growth Control. Poster presentation entitled: Oncogene-induced tumor cell diversification and loss of intercellular junctional communication correlates with metastatic potential in EJ c-H-*ras* gene transferred to rat mammary carcinoma cells. Lectures entitled: Membrane Functions and Cell Growth and Tumor Progression and Metastasis.

May 25-27, 1989. San Francisco, California. Presented at the 80th Annual Meeting of the American Association for Cancer Research.

April 13, 1989. Castres, France. International Symposium on New Concepts in Cancer, sponsored by the Centre de Recherche Pierre FABRE (Castres) and the Centre National de la Recherche Scientifique in (Toulouse). Delivered two lectures: Oncogenes and metastasis and Organ specific adhesion: Invasion and Growth in Metastasis.

March 30, 1989. Dana Point, California. Fourth ICN-UCI Symposium. Lecturer on Protein-Nucleic Acid Interactions in Gene Expression.

October 12, 1988. New Orleans, Louisiana. ASTRA Symposium on The Cell Membrane and Therapeutic Strategies for Neoplastic Diseases. Delivered keynote talk on The Role of Membrane Structure in Blood-Borne Metastasis.

September 26-29, 1988. Heidelberg, West Germany. Second International Meeting of the Metastasis Research Society. Chairperson for two symposia; delivered plenary lecture on Organ tropism: Role of Differential Tumor Cell Adhesion.

September 13, 1988. Galveston, Texas. Galveston R. E. 'Bob' Smith International Workshop. Delivered a lecture on Metastasis and chaired a symposium session entitled The Biology of Melanoma

September 8, 1988. La Jolla, California. Participated in the Benson Biomedical Symposium and was a presenter and session Chairman in the area of Cancer and Genetic Disorders.

July 4-12, 1988. Sapporo, Japan. 8th Sapporo Cancer Seminar. Plenary speaker in the symposium on Cancer Progression and Metastasis.

May 24-28, 1988. New Orleans, Louisiana. 79th Annual Meeting of the American Association for Cancer Research. Chairperson of the poster discussant session on Invasion and Metastasis (Biology I). Participate in meetings of the Board of Directors of the AACR.

March 17-19, 1988. Dana Point, California. Third ICN-UCI Symposium on the Molecular Basis of Genetic Disease.

February 14-19, 1988. Honolulu, Hawaii. U.S.-Japan Cancer Program meeting on Cancer Cell Membranes: Aberrant Glycosylation and other Critical Molecular Events. Delivered a plenary lecture on Metastatic Potential of Tumor Cells and Genetic Background.

November 30, 1987 - December 2, 1987. Bethesda, Maryland. National Cancer Institute, Division of



- Cancer Biology and Diagnosis (Tumor Biology Program) Workshop on Experimental Metastasis: Designing New Research Strategies.  
 September 6-11, 1987. Eilat, Israel. Bat-Sheva Seminar on Tumor Malignancy: Pathogenesis and Prevention of Tumor Dissemination. Speaker in the Session on Functional Aspects of Oncogenes: Tumor Diversification and Metastasis.
- August 16-21, 1987. New London, New Hampshire. Gordon Research Conference on Cancer. Speaker in the Session on High Frequency Variation in Normal and Neoplastic Populations: Oncogenes in Tumor Progression and Metastasis."
- July 26-31, 1987. Saxtons River, Vermont. FASEB Summer Research Conference on Biology of Tumor Metastases. Speaker in the Session on Endothelium & Angiogenesis: Role of Endothelium in Tumor Metastases.
- June 4, 1987. Bethesda, Maryland. Meeting of the Breast Cancer Working Group of the NCI Organ Systems Coordinating Program entitled Methods for Quantitating Cell Heterogeneity and Phenotypic Variation in Breast Cancer.
- May 19-22, 1987. Atlanta, Georgia. 78th Annual Meeting of the American Association for Cancer Research. Chaired and spoke in a symposium on Invasion and Metastasis (Biology III).
- May 12-15, 1987. Bologna, Italy. International Congress on Cancer Metastasis: Biological and Biochemical Mechanisms and Clinical aspects. In the session on Biology of Metastatic Cells, chaired a round table discussion on metastatic models. Presented a plenary presentation: Cytoskeletal and Junctional Heterogeneity in Mammary Tumor Cells and their Possible Significance in Tumor Progression.
- April 6-12, 1987. Keystone, Colorado. Co-chaired the UCLA Symposium on Tumor Progression and Metastasis Delivered a lecture in the session on Regulation of the Metastatic Phenotype on Gene Expression and Metastasis.
- March 12, 1987. Bethesda, Maryland. Upper Aerodigestive Cancer Program Workshop on Biology of Tumor Growth and Progression. Chaired and presented in Session II on Invasion and Metastasis.
- February 1-5, 1987. Taormina, Sicily. Erbamont/Farmitalia Carlo Erbe Workshop on Platelets and Angiogenesis in Cardiovascular and Cancer Research. Symposium lecture: The biology and biochemistry of metastasis.

**University Teaching (Outside Univ. of Texas):**

- Cancer Biology Course (Winter and Fall), Invasion and Metastasis I, II & III, Stanford University, 1979-1993
- University of Copenhagen, Center for Medical Biotechnology, Nordic Course on Techniques in Cell Biology, 1991
- Rice University/Baylor College of Medicine/University of Texas Medical School at Houston: Vascular Cell Biology, Functional Differences in Organ Microvascular Endothelial Cells, 1990
- National Taiwan University, College of Medicine, Taipei. Institute of Biochemistry, Tumor and Host Properties in Blood-Borne Metastasis, 1990
- Houston Community College, Downtown Campus, Membrane Biology and Cancer Metastases, 1990
- Rice University/Baylor College of Medicine/University of Texas Medical School at Houston: Vascular Cell Biology, Functional Differences in Organ Microvascular Endothelial Cells and Their Importance in Organ Preference of Tumor Metastasis, 1990
- National Taiwan University, College of Medicine, Taipei. Institute of Biochemistry, Tumor and Host Properties in Blood-Borne Metastasis, 1990
- Houston Community College, Downtown Campus, Membrane Biology and Cancer Metastases, 1990
- The Lineberger Cancer Research Center of the University of North Carolina School of Medicine, Chapel Hill, Biochemistry and Biology of Metastasis, 1985

Stanford, California. Stanford University Program in Cancer Biology, Metastasis I and Metastasis II, 1985

Tucson, Arizona. University of Arizona, Cancer Biology Training Program at the Arizona Health Sciences Center: Models for Breast Cancer Metastasis, 1985

Houston Community College, Northwest Campus, Structure and Function of Cell Surface Membranes and the Fluid Mosaic Model, 1986-1988

American Cancer Society, 9th Annual Florida Division meeting, Breast Cancer Metastasis, 1986

Multidisciplinary Evening Seminar, Biology of Melanoma, sponsored by MDACC and the UT M. D. Anderson Associates, 1985

Shanghai Institute of Materia Medica, Chinese Academy of Sciences, Shanghai, China, Mechanisms of Blood-Borne Metastasis and Tumor Formation, 1984

Shanghai Institute of Materia Medica, Chinese Academy of Sciences, Shanghai, China, Role of Fetal and Virus Components in Large Cell Lymphoma Metastasis, 1984

Beijing Neurosurgical Institute, Beijing, China, Mechanisms of Blood-Borne Metastasis and Tumor Formation, 1984

Beijing Medical Institute, Beijing, China, Role of Fetal and Virus Components in Lymphoma Metastasis, 1984

MDACC Multidisciplinary Management of Early Breast Cancer: Present Status and Future Directions, sponsored by the M. D. Anderson Associates, 1984

Histopathobiology of Cancer Course, Keystone, Colorado (NCI sponsored), 1984

Oregon University Health Sciences Center, Biochemical and Biophysical Properties of Membranes series (BioChem 520), Cytoskeleton Membrane Interactions, 1984

Stanford University Program in Cancer Biology, Molecular and Cellular Aspects of Cancer Biol., Metastasis I & II, 1984

University of California, Los Angeles, Pathology Program in Cancer Biology, Cancer Metastasis, 1984

Yale University School of Medicine, Cancer Center Educational Lecture Series, Mechanisms of Invasion and Metastasis, 1983

University of Missouri School of Medicine, Columbia, Perspectives in Pharmacology and Medicine Series, Cellular Diversity and Instability during the Malignant Progression of Cancer, 1983

University of California, Los Angeles, Major Concepts in Oncology (M293), Blood-Borne Metastasis, 1980

Histopathobiology of Neoplasia, Lake Placid, New York (NCI sponsored), Mechanisms of Metastasis, 1980

American Cancer Society Biology of Cancer series, California State University, Northridge, 1978-1982

American Cancer Society Biology of Cancer series, University of California, Los Angeles, 1978-1980

Histopathobiology of Cancer Course, Keystone, Colorado (NCI sponsored), Mechanisms of Metastasis, 1979

Transformed Cell Course, Cold Spring Harbor Laboratory, New York, Pathobiology of Cancer Progression, 1978

Pathophysiology of Cancer Course, Keystone, Colorado (NCI sponsored), Pathobiology of Cancer Progression, 1978

University of Washington School of Medicine, Visiting Professor of Pathology (Pathology 507), 1977

The Upjohn Company Biology Education Lecture Series, Cell Surfaces and Plasma Membranes, 1976

University of California, Riverside, Visiting Professor of Biochemistry (Biochemistry 230), 1975

California Institute of Technology, Visiting Assistant Professor of Cell Biology, 1971

### **Supervisory Teaching:**

***Ph.D. Thesis Committees--Chairman:***

Amr Moustafa, M.D., Ph.D. 1998, Ain Shams University, Cairo, Egypt. Current: Associate Professor of Biochemistry and Medicine, Ain Shams University Faculty of Medicine, Cairo, Egypt.

Mei Hu, M.D., Ph.D. 1996, University of Texas Graduate School of Biomedical Sciences, Houston, TX. Current: staff physician, Dept. of Rehabilitive Medicine, Baylor College of Medicine, Houston, TX.

Zhong Yun, M.S., Ph.D., 1996, University of Texas Graduate School of Biomedical Sciences, Houston, TX. Current: Assistant Professor, Yale University, New Haven, CT.

John Herrmann, Ph.D., 1995, University of Texas Graduate School of Biomedical Sciences, Houston, TX. Current: Assistant Professor, Baylor College of Medicine, Houston.

Li Jin, M.D., Ph.D. 1994, University of Texas Graduate School of Biomedical Sciences, Houston. Current: Department Head, New Jersey State Pathology Laboratory, Newark, NJ.

John Patton, Ph.D., 1993, Rice University, Dept. of Chemical Engineering. Current: Staff scientist, Glycomed, Alameda, CA.

Alexander Chop, Ph.D. 1992, University of Texas Graduate School of Biomedical Sciences, Houston. Current: Staff Physician, Creighton University School of Medicine, Omaha, NB.

Sridhar Rajagopalan, Ph.D., 1990, Rice University, Dept. of Chemical Engineering. Current: Staff Scientist, Shell Oil Research Division, Houston, TX.

Robert J. Tressler, Ph.D., 1990, The University of Texas Graduate School of Biomedical Sciences, Houston; 6/90-present, Staff Scientist, Glycomed, Palo Alto, CA.

Ronald A. LaBiche, Ph.D., 1990, University of Texas Graduate School of Biomedical Sciences, Houston; 6/90-6/92 Postdoctoral Fellow, 6/95-present, Associate Professor, University of North Carolina, Chappel Hill, NC.

Paula N. Belloni, Ph.D., 1989, The University of Texas Graduate School of Biomedical Sciences, Houston; Postdoctoral Fellow, 11/89-8/90, Instructor, University of Texas M. D. Anderson Cancer Center; 8/90-present, Department Head, Syntex Research, Palo Alto, CA.

Timothy V. Updyke, Ph.D., 1987, University of California, Irvine; 9/87-9/91, Research Associate, MDACC, Houston, 9/91-present, Vice-President for Development, Novex Inc. San Diego, CA.

Danny R. Welch, Ph.D., 1984, University of Texas Graduate School of Biomedical Sciences, Houston; 6/84-6/87, Staff Scientist, Upjohn Co., Kalamazoo, MI; 6/87-6/90, Department Head, Glaxo Pharm., Research Triangle, NCI; 6/90-9/02, Assistant, then Associate Professor of Experimental Pathology, Pennsylvania State University, Hershey, PA. 9/02-present, Endowed Professor, Department of Pathology, University of Alabama, Birmingham, AL.

Jaime Estrada-Aguilar, M.D., M.S., 1983, University of Texas Graduate School of Biomedical Sciences, Houston; 9/83-9/88, Assistant Professor of Pediatrics; 9/88-6/92, Associate Professor of Pediatrics, University of South Florida, Tampa, FL, 6/92-present, Professor of Pediatrics, University of Texas Health Science Center at San Antonio, San Antonio, TX.

Ruth Davis, M.S., 1980, University of California, Irvine. Current: Staff scientist, Allergin Corp., Irvine, CA.

Anthony Neri, Ph.D., 1980, University of California, Irvine; 9/80-4/83, Postdoctoral Fellow, University of Southern California, Los Angeles, CA; 9/83-present, Staff Scientist, Department Head, Hoffmann-LaRoche, Nutley, NJ.

***Thesis Advisory Committees - Member:***

Amr Moustafa, Ph.D., M.D., Ain-Shams University School of Medicine, Cairo, Egypt  
 Thomas Smith, Ph.D., Rice University  
 Dihua Yu, Ph.D., University of Texas at Houston  
 John Patton, Ph.D., Rice University  
 Paul Chiao, Ph.D., University of Texas at Houston  
 Douglas P. Evans, Ph.D., University of Texas at Houston

Raphael Pollock, M.D./Ph.D., University of Texas at Houston  
 Sridhir Rajagopalan, Ph.D., Rice University  
 John P. Volpe, M.A./Ph.D., University of Texas at Houston  
 David Krizman, Ph.D., University of Texas at Houston  
 Paul E. Cizdziel, Ph.D., University of Texas at Houston  
 David Danielpour, Ph.D., University of Texas at Houston  
 Martin A. Schwarz, Ph.D., University of Texas at Houston  
 Cheung Lam King, Ph.D., University of Texas at Houston  
 Michael J. Niedbala, Ph.D., State University of New York, Buffalo, New York  
 Carl Thomas McGary, M.D./Ph.D., The University Graduate School of  
 Biomedical Sciences at Galveston  
 Buddy Weissman, Ph.D., University of California, Irvine.  
 Channing Der, Ph.D., University of California, Irvine.  
 Carl Ware, Ph.D., University of California, Irvine.

***Postdoctoral Trainees:***

Jelena Prljic, Ph.D., 10/00-9/01, Postdoctoral Fellow. The Institute for Molecular Medicine, Huntington Beach; Present: Scientist, Academy of Sciences, Belgrade, Yugoslavia.

Oliver LeChef, D.V.M., 10/99-10/00, Postdoctoral Fellow. The Institute for Molecular Medicine, Huntington Beach; Present: scientist, INSERM, Paris, France

Jorg Haier, M.D., Ph.D., 4/97-2/98 Visiting Scientist, Department of Molecular Pathology, The Institute for Molecular Medicine, Huntington Beach, CA. Present: Professor of Surgery & Medicine, University of Muenster, Muenster, Germany.

Amr Moustafa, M.D., 9/95-2/98 Visiting Scientist, Department of Molecular Pathology, The Institute for Molecular Medicine, Huntington Beach, CA; Present: Assistant Professor of Biochemistry and Medicine, Ein Shams University School of Medicine, Cairo, Egypt.

Marwan Nasralla, Ph.D., 11/95-11/97 Visiting Scientist, Visiting Scientist, Department of Molecular Pathology, The Institute for Molecular Medicine, Huntington Beach; Present: Department Head, LabCorp, San Diego.

Hiroyuki Tsujimoto, M.D., Ph.D., 1/97-12/97 Visiting Scientist, Department of Molecular Pathology, The Institute for Molecular Medicine, Irvine, CA; Present: Associate Professor, Yokohama University, Japan.

Fumiyuki Uematsu, M.D., Ph.D., 9/96-9/97 Visiting Scientist, Department of Molecular Pathology, The Institute for Molecular Medicine, Irvine, CA. Present: Nagoya Medical School, Nagoya, Japan.

Hironao Wakabashi, Ph.D., 4/92-8/96, Project Investigator, Department of Tumor Biology, University of Texas M.D. Anderson Cancer Center, Houston, TX; Present: Assoc. Research Professor, University of Rochester Medical School, Rochester, NY.

Dario Marchetti, Ph.D., 9/91-8/96, Research Associate, Instructor, Department of Tumor Biology, University of Texas M. D. Anderson Cancer Center, Houston, TX; until 9/01: Assistant Professor of Experimental Neurology, The University of Texas Medical School, Houston, TX. Present: Professor, Louisiana State University, Baton Rouge, LA.

Hidetomo Sawada, M.D., Ph.D., 4/94-4/96 Research Associate, Department of Tumor Biology, University of Texas M. D. Anderson Cancer Center, Houston, TX; Present: Associate Professor of Surgery, Nara University Medical School, Nara, Japan.

Akihiro Nawa, M.D., Ph.D., 4/94-4/96, Research Associate, Department of Tumor Biology, University of Texas M. D. Anderson Cancer Center, Houston, TX; Present: Professor of Surgery, Nagoya University Medical School, Japan.

Sei-Hyun Ahn, M.D., Ph.D., 9/94-9/95, Visiting Scientist, Department of Tumor Biology, University of Texas M. D. Anderson Cancer Center, Houston; Present address: Dept. of Surgery, Asan Medical

Center, Seoul, Korea.

Chung Hwan Baek, M.D., 4/92-7/93, Visiting Scientist, Department of Tumor Biology, University of Texas M. D. Anderson Cancer Center, Houston. Present Address: Assoc. Professor, Dept. of Otolaryngology, College of Medicine, Dong-A University, Pusan, Korea.

Yasushi Toh, M.D., Ph.D., 7/92-6/94 Research Associate, Department of Tumor Biology, University of Texas M. D. Anderson Cancer Center, Houston. Present: Assistant Professor of Surgery, Kyushu University, Fukuoka, Japan.

Scot Pencil, M.D., Ph.D., 6/91-6/93, Research Associate, Department of Tumor Biology, University of Texas M. D. Anderson Cancer Center, Houston. Most Recent Address: Professor of Pathology, The University of Texas Medical Branch, Galveston, TX (deceased).

Koichiro Miki, M.D., Ph.D., 3/92-7/94, Postdoctoral Fellow, Department of Tumor Biology, University of Texas M.D. Anderson Cancer Center, Houston. Present: Associate Professor of Internal Medicine, Kyushu University, Fukuoka, Japan.

June-Sik Park, M.D., Ph.D., 8/90-8/91, Visiting Scientist, Department of Tumor Biology, University of Texas M.D. Anderson Cancer Center, Houston; 9/91-present, Professor of Surgery, Department of Otolaryngology, Kyungpook University School of Medicine, Taegu, Korea.

Jun-Ichi Hamada, Ph.D., 4/89-4/92, Project Investigator, Department of Tumor Biology, University of Texas M.D. Anderson Cancer Center, Houston; 5/92-present, Associate Professor of Cell Biology, Hokkaido University Medical School, Sapporo, Japan.

Yuzo Okumura, Ph.D., 3/90-4/92, Postdoctoral Fellow, Department of Tumor Biology, University of Texas M.D. Anderson Cancer Center, Houston; 4/92-present: Associate Professor, Kyushu University, Fukuoka, Japan.

Hiroaki Ohigashi, M.D., 4/89-9/90, Visiting Scientist, Department of Tumor Biology, University of Texas M. D. Anderson Cancer Center, Houston; 6/89-present, Professor of Surgery, Dept. of Gastrointestinal Surgery, Center for Adult Diseases, Osaka, Japan.

Takatoshi Inoue, M.D., 10/87-6/89, Research Associate, Department of Tumor Biology, University of Texas M. D. Anderson Cancer Center, Houston; 6/89-present, Professor of Surgery, Kyushu University, Fukuoka, Japan.

David G. Menter, Ph.D., 11/86-9/89 Postdoctoral fellow; 9/89-9/96, Present: Assistant Professor, Department of Cancer Prevention, University of Texas M. D. Anderson Cancer Center, Houston, TX.

Philip G. Cavanaugh, Ph.D., 1/87-9/91, Project Investigator; 9/91-9/96, Present: Assist. Research Professor, Department of Tumor Biology, University of Texas M. D. Anderson Cancer Center, Houston, TX.

Mitsuzi Yoshida, Ph.D., 7/84-6/86, Project Investigator, Department of Tumor Biology, University of Texas M. D. Anderson Cancer Center, Houston; 6/86-9/88. Present, Associate Professor, Cancer Chemotherapy Center, Tokyo, Japan.

Susan M. North, Ph.D., 10/82-6/85, Project Investigator, 6/85-12/86, Research Instructor, 1/87-9/89, Assistant Professor, University of Texas M. D. Anderson Cancer Center, Houston; 9/89-9/93, School of Veterinary Medicine, Texas A & M University, College Station, TX, Current: Staff Veterinarian, Manhattan Veterinary Clinic, New York, NY.

Motowo Nakajima, Ph.D., 10/81-8/82, Project Investigator; 9/1/82-8/86, Research Instructor; 9/86-7/91, Assistant Professor, Department of Tumor Biology, University of Texas M. D. Anderson Cancer Center, Houston; 8/91-present, Professor (tenured), Cancer Research Institute, University of Tokyo, Tokyo, Current: Department Head, Novartis Japan.

Peter A. Steck, Ph.D., 6/81-6/82, Project Investigator; 7/82-6/84, Postdoctoral Fellow (NIH Fellowship); 7/1/84-8/86, Research Instructor; 9/86-1993, Assistant Professor, 1994-present Associate Professor (tenured), Department of Neuro-Oncology, University of Texas M. D.

Anderson Cancer Center, Houston (deceased).

Tatsuro Irimura, Ph.D., 2/80-6/80, Project Investigator, Department of Developmental and Cell Biology, University of California, Irvine; 6/80-8/87, Assistant Professor; 9/87-8/91, Associate Professor, University of Texas M. D. Anderson Cancer Center; 8/91-6/88, Present: Professor and Chairman, Pharmaceutical Sciences and Cancer Biology, University of Tokyo, Tokyo, Japan.

Randall H. Kramer, Ph.D., 1977-1979, Postdoctoral Fellow, Depart. of Developmental and Cell Biology, University of California, Irvine; 1980-1985, Assistant Professor; 1985-1990, Associate Professor; 1990-present Professor, University of California, San Francisco, CA.

Christopher L. Reading, Ph.D., 1977-1980, Postdoctoral Fellow, Department of Developmental and Cell Biology, University of California, Irvine; 6/80-5/88, Assistant Professor; 6/88-6/94, Associate Professor, Dept. of Hematology, University of Texas M. D. Anderson Cancer Center, Houston, TX.

Gregory J. Giotta, Ph.D., 1976-1977, Project Investigator; 1977-1992, Research Biologist, The Salk Institute for Biological Studies, La Jolla, CA; 1992-present Senior Council, Glycomed Inc., Alameda, CA.

Charles R. Birdwell, Ph.D., 1975-1977, Postdoctoral Fellow, The Salk Institute; 1977-1981, Assistant Professor, Scripps Clinic and Research Foundation, La Jolla, California; 1981-1985 Research Scientist, La Jolla Cancer Research Foundation, La Jolla, California; 1985-present, Director of Research Development, Hybritech, San Diego, CA.

Reuben Lotan, Ph.D., 1975-1976, Research Associate, The Salk Institute for Biological Studies, La Jolla, CA; 1977-1980, Assistant Professor, Dept. of Developmental and Cell Biology, University of California, Irvine; 1980-1982 Senior Scientist; 1982-1984, Associate Professor, The Weizmann Institute of Science; 1984-1995, Professor and Deputy Chairman, Department of Tumor Biology, University of Texas M. D. Anderson Cancer Center, Houston, TX. 1995-present, Professor and Assoc. Vice President for Cancer Prevention, University of Texas M. D. Anderson Cancer Center, Houston, TX.

Kenneth W. Brunson, Ph.D., 1974-1976, Research Associate, Department of Cancer Biology, The Salk Institute for Biological Studies, La Jolla; 1977-1979, Assistant Specialist, Department of Developmental and Cell Biology, University of California, Irvine; 1979-1984, Assistant Professor, Departments of Pathology and Microbiology and Immunology, Indiana University School of Medicine, Gary, IN; 1984-1991, Staff Scientist, Department Head, Pfizer, Inc., Groton, CN, Associate Professor, University of Pittsburgh, PA. Present position: Professor, North Texas State University School of Medicine, Fort Worth, TX.

James C. Robbins, Ph.D., 1974-1976, Postdoctoral Fellow, The Salk Institute for Biological Studies, La Jolla, California; 1976-present, Senior Research Administrator, Biological Chemistry, Merck Institute, Rahway, NJ.

Jeffrey L. Winkelhake, Ph.D., 1974-1976, Postdoctoral Researcher, The Salk Institute for Biological Studies, La Jolla, California; 1976-1984, Assistant Professor, Medical College of Wisconsin, Milwaukee; 6/84-8/91 Staff Scientist, Cetus Corporation, San Francisco, CA; 8/91-present, Vice President, Cytol Corp., San Diego, CA.

### ***Clinical Fellows:***

Jorg Haier, M.D., Ph.D., 4/97-2/98 Visiting Scientist, Department of Molecular Pathology, The Institute for Molecular Medicine, Huntington Beach, CA. Present: Assist. Professor of Surgery & Medicine, University of Muenster, Muenster, Germany.

Paul Lin, M.D., 1994-1996; Dept. of Gynecology, University of Texas M. D. Anderson Cancer Center, Houston, TX, Current: Associate Professor, Department of Gynecology, University of Texas M. D. Anderson Cancer Center, Houston, TX.

Edna Mora, M.D., 1994-1996, Department of Medical Oncology, University of Texas M. D. Anderson Cancer Center, Houston, TX; 1995-present, Assist. Professor of Surgery, University of Puerto Rico

School of Medicine, San Juan, Puerto Rico.

Tim Yeatman, M.D., 1990-1992, Department of General Surgery, University of Texas M. D. Anderson Cancer Center; 7/92-present Associate Professor of Surgery, University of South Florida, Tampa, FL.

George Barnes, M.D., 1991-1992, Department of General Surgery, University of Texas M. D. Anderson Cancer Center, Houston, TX; 1992-present, Associate Professor of Surgery, Howard University, Washington D.C.

Hiroaki Ohigashi, M.D., 1989-90, Dept. of Surgery, Osaka University, 1990-present, Associate Professor of Surgery, Osaka University Medical School, Osaka, Japan.

Mark Roh, M.D., 1/88-1/89, Department of General Surgery, University of Texas M. D. Anderson Cancer Center, Houston; 1989-1996, Associate Professor, Department of Surgical Oncology, University of Texas M. D. Anderson Cancer Center, Houston, TX. Present: Professor of Surgery, University of Pittsburgh School of Medicine.

### **Patents Pending and Granted:**

U.S. Patent Issued: (No. 4,859,581) Endoglycosidase Assay, invented by G.L. Nicolson, M. Nakajima and T. Irimura, 1989.

U.S. Patent Issued: (No. 5,030,559) Methods and Compositions for the Identification of Metastatic Human Tumors, invented by G.L. Nicolson, S.M. North and P.A. Steck, 1991.

U.S. Patent Issued: (No. 5,164,489) Lung Growth Stimulatory and Inhibitory Factors for Carcinoma Tumor Cells, invented by G.L. Nicolson and P.G. Cavanaugh, 1992.

U.S. Patent Issued: (No. 5,262,403) Glycosaminoglycan Derivatives and their use as Inhibitors of Tumor Invasiveness or Metastatic Profusion-II, invented by G.L. Nicolson, T. Irimura and M. Nakajima, 1993.

U.S. Patent Pending: (UTMDACC:115) Metastasis Associated Collagenolytic Metalloproteinase, invented by M. Nakajima and G.L. Nicolson

U.S. Patent Pending: (UTMDACC:193) Immunochemical Localization of Heparanase in Mouse and Human Melanomas, invented by G.L. Nicolson, L. Jin and M. Nakajima

U.S. Patent Issued: (No. 5,332,812) Endoglycosidase Immunoassay, invented by G.L. Nicolson, M. Nakajima and T. Irimura

U.S. Patent Pending: (UTDMACC:270) Liver-Derived Tumor Cell Growth Inhibitor, invented by P.G. Cavanaugh and G.L. Nicolson

U.S. Patent Pending: (UTDMACC:387) Metastasis-Associated Gene, invented by G.L. Nicolson, Y. Toh and S. Pencil.

### **Publications - Garth L. Nicolson**

1. Nicolson, G.L. and Clayton, R.K. The reducing potential of the bacterial photosynthetic reaction center. *Photochem. Photobiol.* 9: 395-399 (1969).
2. Schmidt, G.L., Nicolson, G.L. and Kamen, M.D. Composition of the sulfur particle of *Chromatium vinosum* strain D. *J. Bacteriol.* 105: 1137-1141 (1971).
3. Nicolson, G.L. and Schmidt, G.L. Structure of the *Chromatium* sulfur particle and its protein membrane. *J. Bacteriol.* 105: 1142-1148 (1971).
4. Nicolson, G.L. Structure of the photosynthetic apparatus in protein-embedded chloroplasts. *J. Cell Biol* 50: 258-263 (1971).

5. Nicolson, G.L. and Singer, S.J. Ferritin-conjugated plant agglutinins as specific saccharide stains for electron microscopy: Application to saccharides bound to cell membranes. *Proc. Natl. Acad. Sci. U.S.A.* 68: 942-946 (1971).
  6. Nicolson, G.L., Masouredis, S.P. and Singer, S.J. Quantitative two-dimensional ultrastructural distribution of RHo(D) antigenic sites on human erythrocyte membranes. *Proc. Natl. Acad. Sci. U.S.A.* 68: 1416-1420 (1971).
  7. Nicolson, G.L., Hyman, R.H. and Singer, S.J. The two-dimensional topographic distribution of H-2 histocompatibility alloantigens on mouse red blood cell membranes. *J. Cell Biol.* 50: 905\_910 (1971).
  8. Nicolson, G.L., Marchesi, V.T. and Singer, S.J. The localization of spectrin on the inner surface of human red blood cell membranes with ferritin-conjugated antibodies. *J. Cell Biol.* 51: 265\_272 (1971).
  9. Singer, S.J. and Nicolson, G.L. The structure and chemistry of mammalian cell membranes. *Am. J. Pathol.* 65: 427-437 (1971).
  10. Nicolson, G.L. and Singer, S.J. Ferritin-conjugated plant agglutinins as specific saccharide stains. *In Proc. of the Electron Microscopy Society of America* (C. Arceneaux, ed.), 536-538, Claitors Publishing, Baton Rouge (1971).
  11. Nicolson, G.L. Difference in the topology of normal and tumour cell membranes as shown by different distributions of ferritin-conjugated concanvalin A on their surfaces. *Nature New Biol.* 233: 244-246 (1971).
  - ¶12. Singer, S.J. and Nicolson, G.L. The fluid mosaic model of the structure of cell membranes. *Science* 175: 720-731 (1972).
- ¶ ***Current Contents Citation Classic***
13. Nicolson, G.L. and Singer, S.J. Electron microscopic localization of macromolecules on membrane surfaces. *Ann. N.Y. Acad. Sci* 195: 368-375 (1972).
  14. Nicolson, G.L. and Yanagimachi, R. Terminal saccharides on sperm plasma membranes: Identification by specific agglutinins. *Science* 177: 276-279 (1972).
  15. Nicolson, G.L. and Blaustein, J. Interaction of *Ricinus communis* agglutinin with normal and tumor cell surfaces. *Biochim. Biophys. Acta* 266: 543-547 (1972).
  16. Nicolson, G.L., Lacorbiere, M. and Delmonte, P. The outer membrane terminal saccharides of bovine liver nuclei and mitochondria. *Exp. Cell Res.* 71: 468-473 (1972).
  17. Nicolson, G.L. A rapid method for determining the topological distribution of anionic sites on membrane surfaces. *J. Supramol. Struct.* 1: 159-164 (1972).
  18. Nicolson, G.L. Topological studies on the structure of cell membranes. *In Membrane Research* (C.F. Fox, ed.), 53-70, Academic Press, New York (1972).



19. Nicolson, G.L. Topography of cell membrane concanavalin A-sites modified by proteolysis. *Nature New Biol.* 239: 193-197 (1972).
20. Yanagimachi, R., Noda, D., Fujimoto, M. and Nicolson, G.L. The distribution of negative surface charge on mammalian spermatozoa. *Amer. J. Anat.* 135: 497-520 (1972).
21. Nicolson, G.L., Lacorbiere, M. and Yanagimachi, R. Quantitative determination of plant agglutinin membrane sites on mammalian spermatozoa. *Proc. Soc. Exp. Biol. Med.* 141: 661\_663 (1972).
22. Hirano, H., Parkhouse, G., Nicolson, G.L., Lennox, E.S. and Singer, S.J. Distribution of saccharide residues on membrane fragments from a myeloma-cell homogenate: Its implications for membrane biogenesis. *Proc. Natl. Acad. Sci. U.S.A.* 69: 2945-2949 (1972).
23. Nicolson, G.L. Neuraminidase "unmasking" and the failure of trypsin to "unmask" D-galactose-like sites on erythrocyte, lymphoma and normal and virus-transformed fibroblast cell membranes. *J. Natl. Cancer Inst.* 50: 1443-1451 (1973).
24. Yanagimachi, R., Nicolson, G.L., Noda, Y.D. and Fujimoto, M. Electron microscopic observations of the distribution of acidic anionic residues on hamster spermatozoa and eggs before and during fertilization. *J. Ultrastruct. Res.* 43: 344-353 (1973).
25. Nicolson, G.L. Anionic sites of human erythrocyte membranes. I. Effects of trypsin, phospholipase C and pH on the topography of positively charged colloidal particles. *J. Cell Biol.* 57: 373-387 (1973).
26. Nicolson, G.L. and Painter, R.G. Anionic sites of human erythrocyte membranes. II. Anti-spectrin-induced transmembrane aggregation of the binding sites for positively charged colloidal particles. *J. Cell Biol.* 59: 395-406 (1973).
27. Oikawa, T., Yanagimachi, R. and Nicolson, G.L. Wheat germ agglutinin blocks mammalian fertilization. *Nature* 241: 256-259 (1973).
28. Nicolson, G.L. Cis- and trans-membrane control of cell surface topography. *J. Supramol. Struct.* 1: 410-416 (1973).
29. Nicolson, G.L. Temperature-dependent mobility of concanavalin A sites on tumour cell surfaces. *Nature New Biol.* 243: 218-220 (1973).
30. Nicolson, G.L. and Lacorbiere, M. Cell contact-dependent increase in membrane D- $\beta$ -galactopyranosyl-like residues on normal, but not virus- or spontaneously-transformed murine fibroblasts. *Proc. Natl. Acad. Sci. U.S.A.* 70: 1672-1676 (1973).
31. Nicolson, G.L. The relationship of a fluid membrane structure to cell agglutination and surface topography. *Ser. Haematol.* 6: 275-291 (1973).
32. Nicolson, G.L. Une nouvelle arme contre le cancer. *Preuves* 16: 95-101 (1973).

33. Nicolson, G.L. Cancer cells: How are they different from normal cells and why do they escape immune destruction? *Lab. Management* 7: 38-40 (1973).
34. Nicolson, G.L. and Singer, S.J. The distribution and asymmetry of saccharides on mammalian cell membrane surfaces utilizing ferritin-conjugated plant agglutinins as specific saccharide stains. *J. Cell Biol.* 60: 236-248 (1974).
35. Nicolson, G.L., Blaustein, J. and Etzler, M.E. Characterization of two plant lectins from *Ricinus communis* and their quantitative interaction with a murine lymphoma. *Biochemistry* 13: 196-204 (1974).
36. Oikawa, T., Nicolson, G.L. and Yanagimachi, R. Inhibition of hamster egg fertilization by phytoagglutinins. *Exp. Cell Res.* 83: 239-246 (1974).
37. Nicolson, G.L. Factors influencing the dynamic display of lectin-binding sites on normal and transformed cell surfaces. *In* Control of Proliferation in Animal Cells (B. Clarkson and R. Baserga, eds.), 251-270, Cold Spring Harbor Laboratory, New York (1974).
38. Krach, S.W., Green, A., Nicolson, G.L. and Oppenheimer, S.B. Cell surface changes occurring during sea urchin embryonic development monitored by quantitative agglutination with plant lectins. *Exp. Cell Res.* 84: 191-198 (1974).
39. Nicolson, G.L. and Yanagimachi, R. Mobility and the restriction of mobility of plasma membrane lectin-binding components. *Science* 184: 1294-1296 (1974).
- ¶40. Nicolson, G.L. The interactions of lectins with animal cell surfaces. *Intern. Rev. Cytol.* 39: 89-190 (1974).
- ¶ ***Current Contents Citation Classic***
41. Hyman, R., Lacorbiere, M., Stavarek, S. and Nicolson, G.L. Derivation of lymphoma variants with reduced sensitivity to lectins. *J. Natl. Cancer Inst.* 52: 963-969 (1974).
42. Nicolson, G.L. Cell-contact and transformation-induced changes in the dynamic organization of normal and neoplastic cell plasma membranes and their role in lectin-mediated toxicity toward tumor cells. *In* Biology And Chemistry Of Eucaryotic Cell Surfaces (E.Y.C. Lee and E.E. Smith, eds.), 103-124, Academic Press, New York (1974).
43. Ji, T.H. and Nicolson, G.L. Lectin binding and perturbation of the cell membrane outer surface induces a transmembrane organizational alteration at the inner surface. *Proc. Natl. Acad. Sci. U.S.A.* 71: 2212-2216 (1974).
44. Pinto Da Silva, P. and Nicolson G.L. Freeze-etch localization of concanavalin A receptors to the membrane intercalated particles on human erythrocyte membranes. *Biochim. Biophys. Acta* 363: 311-319 (1974).
45. Penhoet E., Olsen, C., Carlson, S., Lacorbiere, M. and Nicolson, G.L. Quantitative interaction of *Ricinus communis* agglutinin and concanavalin A with influenza and vesicular stomatitis viruses

- and virus-infected normal and polyoma-transformed cells. *Biochemistry* 13: 3561-3566 (1974).
46. Nicolson, G.L. Ultrastructural analysis of toxin binding and entry into mammalian cells. *Nature* 251: 628-630 (1974).
  47. Nicolson, G.L. Cancer clues at the cell's surface. *In Science Year* (A.G. Tressler and M. Reed, eds.), 108-119, Field Enterprises Educational Corporation, Chicago (1974).
  48. Nicolson, G.L. Restrictions on the lateral mobility of cell membrane components. *In Functional Linkage in Biomolecular Systems* (F.O. Schmitt, D.M. Schneider and D.M. Crothers, eds.), 127-147, Raven Press, New York (1975).
  49. Nicolson, G.L. Current views on the molecular organization of biological membranes. *In Mammalian Cells: Probes and Problems* (C.R. Richmond, D.F. Peterson, P.F. Mullaney and E.C. Anderson, eds.), 246-253, USERDA Technical Information Center, Oak Ridge, Tenn. (1975).
  50. Nicolson, G.L. Concanavalin A as a quantitative and ultrastructural probe for normal and neoplastic cells surfaces. *In Concanavalin A*, Vol. 55 of *Adv. Exp. Med. Biol.* (T.K. Chowdhury and A.K. Weiss, eds.), 153-172, Plenum Publishing, New York (1975).
  51. Nicolson, G.L., Lacorbiere, M. and Hunter, T.R. Mechanism of cell entry and toxicity of an affinity purified lectin from *Ricinus communis* and its differential effects on normal and virus-transformed fibroblasts. *Cancer Res.* 35: 144-155 (1975).
  52. Nicolson, G.L., Lacorbiere, M. and Eckhart, W. Qualitative and quantitative interactions of lectins with untreated and neuraminidase-treated normal, wild-type and temperature-sensitive polyoma-transformed fibroblasts. *Biochemistry* 14: 172-179 (1975).
  53. Nicolson, G.L., Yanagimachi, R. and Yanagimachi, H. Ultrastructural localization of lectin-binding sites on the zonae pellucidae and plasma membranes of mammalian eggs. *J. Cell Biol.* 66: 263-274 (1975).
  54. Oikawa, T., Nicolson, G.L. and Yanagimachi, R. Trypsin-mediated modification of the zona pellucida glycopeptide structure of hamster eggs. *J. Reprod. Fertil.* 43: 133-136 (1975).
  55. Oikawa, T., Yanagimachi, R. and Nicolson, G.L. Species differences in the lectin-binding sites on the zona pellucida of rodent eggs. *J. Reprod. Fertil.* 43: 137-149 (1975).
  56. Nicolson, G.L. Dynamic structure of cell membranes and the use of lectins as probes for normal and neoplastic cell surfaces. *Excerpta Medica* 349: 113-118 (1975).
  57. Nicolson, G.L. Dynamic changes on the surfaces of normal and transformed cells and their relationship to the entry of pharmacologically active proteins. *Am. J. Clin. Pathol.* 63: 677-684 (1975).
  58. Nicolson, G.L. and Winkelhake, J.L. Organ specificity of blood-borne tumour metastasis determined by cell adhesion? *Nature* 255: 230-232 (1975).

59. Poste, G., Papahadjopoulos, D. and Nicolson, G.L. Local anesthetics affect transmembrane cytoskeletal control of mobility and distribution of cell surface receptors. *Proc. Natl. Acad. Sci. U.S.A.* 72: 4430-4434 (1975).
60. Robbins, J.C. and Nicolson, G.L. Surfaces of normal and transformed cells. *In Biology Of Tumors: Surfaces, Immunology, And Comparative Pathology; Vol. 4 of Cancer: A Comprehensive Treatise* (F.F. Becker, ed.), 3-54, Plenum Publishing Corp., New York (1975).
61. Nicolson, G.L., Robbins, J.C. and Winkelhake, J.L. Tumor cell surfaces and metastasis: Dynamic changes in neoplastic membrane structure and their relationship to tumor spread. *In Cellular Membranes And Tumor Cell Behavior* (E.F. Walborg, ed.), 81-127, Williams and Wilkins Company, Baltimore (1975).
62. Nicolson, G.L. and Winkelhake, J.L. An experimental approach to studying organ specificity of pulmonary tumor metastasis. *In Cell Surfaces And Malignancy, Fogarty Intern. Center Proc. No. 24* (P.T. Mora, ed.), 271-276, U.S. Government, Washington, D.C. (1976).
63. Nicolson, G.L. Concanavalin A: The tool, the techniques and the problems. *In Concanavalin A As A Tool* (H. Bittiger and H.P. Schnebli, eds.), 3-15, John Wiley and Sons, New York (1976).
64. Nicolson, G.L., Smith, J.R., Poste, G. Effects of local anesthetics on cell morphology and membrane-associated cytoskeletal organization in Balb/3T3 cells. *J. Cell Biol.* 68:395-402 (1976).
65. Poste, G. and Nicolson, G.L. Calcium ionophores A23187 and X537A affect cell agglutination by lectins and capping of lymphocyte surface immunoglobulins. *Biochim. Biophys. Acta* 426: 148-155 (1976).
66. Winkelhake, J.L. and Nicolson, G.L. Determination of adhesive properties of variant metastatic melanoma cells to BALB/3T3 cells and their virus-transformed derivatives by a monolayer attachment assay. *J. Natl. Cancer Inst.* 56: 285-291 (1976).
67. Nicolson, G.L., Robbins, J.C. and Hyman, R.A. Cell surface receptors and their dynamics on toxin-treated malignant cells. *J. Supramol. Struct.* 4: 15-26 (1976).
68. Winkelhake, J.L., and Nicolson, G.L. Aglycosyl-antibody: Effects of exoglycosidase treatment on autochthonous antibody survival times in the circulation. *J. Biol. Chem.* 251: 1074-1080 (1976).
69. Nicolson, G.L., Winkelhake, J.L. and Nussey, A.C. An approach to studying the cellular properties associated with metastasis: Some *in vitro* properties of tumor variants selected *In vivo* for enhanced metastasis. *In Fundamental Aspects Of Metastasis* (L. Weiss, ed.), 291-303, North-Holland, Amsterdam (1976).
- ¶70. Nicolson, G.L. Transmembrane control of the receptors on normal and tumor cells. I. Cytoplasmic influence over cell surface components. *Biochim. Biophys. Acta* 457: 57-108 (1976).

¶ *Current Contents Citation Classic*

71. Nicolson, G.L. Transmembrane control of the receptors on normal and tumor cells. II. Surface changes associated with transformation and malignancy. *Biochim. Biophys. Acta* 458:1-72 (1976).
72. Nicolson, G.L. and Poste G. The cancer cell: Dynamic aspects and modifications in cell-surface organization. Part 1. *New Eng. J. Med.* 295: 197-203 (1976).
73. Nicolson, G.L. and Poste G. The cancer cell: Dynamic aspects and modifications in cell-surface organization. Part 2. *New Eng. J. Med.* 295: 253-258 (1976).
74. Yanagimachi, R., Winkelhake, J.L. and Nicolson, G.L. Immunological block to mammalian fertilization: Survival and organ distribution of immunoglobulin which inhibits fertilization *In vivo*. *Proc. Natl. Acad. Sci. U.S.A.* 73: 2405-2408 (1976).
75. Yanagimachi, R. and Nicolson, G.L. Lectin-binding properties of hamster egg zona pellucida and plasma membrane during maturation and preimplantation development. *Exp. Cell Res.* 100: 249\_257 (1976).
76. Winkelhake, J.L. and Nicolson, G.L. Preparation of protease-free neuraminidase by affinity adsorption on fetuin derivatized cellulose. *Analyt. Biochem.* 71: 281-289 (1976).
77. Fidler, I.J. and Nicolson, G.L. Organ selectivity for implantation, survival and growth of B16 melanoma variant tumor lines. *J. Natl. Cancer Inst.* 57: 1199-1202 (1976).
78. Nicolson, G.L., Birdwell, C.R., Brunson, K.W. and Robbins, J.C. Cellular interactions in the metastatic process. *Prog. Clin. Biol. Res.* 9: 237-244 (1976).
79. Nicolson, G.L. and Poste, G. Cell shape changes and transmembrane receptor uncoupling induced by tertiary amine local anesthetics. *J. Supramol. Struct.* 5: 65-72 (1976).
80. Kelley, P., Cotman, C.W., Gentry, C. and Nicolson, G.L. Distribution and mobility of lectin receptors on synaptic membranes of identified neurons in the central nervous system. *J. Cell Biol.* 71: 487-496 (1976).
81. Robbins, J.C., Hunter, T.R. and Nicolson, G.L. Ricinus communis toxin-mediated inhibition of protein synthesis in cell free extracts of a toxin-resistant variant mouse lymphoma cell line. *J. Supramol. Struct.* 5: 515-520 (1976).
82. Robbins, J.C., Hyman, R. and Nicolson, G.L. Cell surface changes in a *Ricinus communis* toxin (ricin)-resistant variant of a murine lymphoma. *J. Natl. Cancer Inst.* 58: 1027-1033 (1977).
83. Fidler, I.J. and Nicolson, G.L. Fate of recirculating B16 melanoma metastatic variant cells in parabiotic syngeneic recipients. *J. Natl. Cancer Inst.* 58(6): 1867-1872 (1977).
84. Nicolson, G.L. and Brunson, K.W. Organ specificity of malignant B16 melanomas: *In vivo* selection for organ preference of blood-borne metastasis. *Gann Monogr. Cancer Res.* 20: 15-24 (1977).

85. Nicolson, G.L., Poste, G. and Ji, T.H. The dynamics of cell membrane organization. *In Dynamic Aspects of Cell Surface Organization*, Vol. 3 of Cell Surface Reviews (G. Poste and G.L. Nicolson, eds.), 1-73, North-Holland, Amsterdam (1977).
86. Nicolson, G.L., Giotta, G.J., Lotan, R., Neri, A. and Poste, G. Modifications in transformed and malignant tumor cells. *In International Cell Biology 1976-1977* (B.R. Brinkley, and K.R. Porter, eds.), 138-148, The Rockefeller University Press, New York (1977).
87. Nicolson, G.L., Birdwell, C.R., Brunson, K.W., Robbins, J.C., Beattie, G. and Fidler I.J. Cell interactions in the metastatic process: Some cell surface properties associated with successful blood-borne tumor spread. *In Cell and Tissue Interactions* (J. Lash and M.M. Burger, eds.), 225-241, Raven Press, New York (1977).
88. Lotan, R., Beattie, G., Hubbell, W. and Nicolson, G.L. Activities of lectins and their immobilized derivatives in detergent solutions. Implications on the use of lectin affinity chromatography for the purification of membrane glycoproteins. *Biochemistry* 16: 1787-1794 (1977).
89. Nicolson, G.L., Brunson, K.W. and Fidler, I.J. Tumor cell surfaces: Some characteristics of neoplastic cells that determine states of transformation and malignancy. *Acta Histochem. Cytochem.* 10: 114-133 (1977).
90. Nicolson, G.L. Cell surfaces and blood-borne tumor metastasis. *In Cancer Invasion and Metastasis: Biologic Mechanisms and Therapy* (S.B. Day, W.P.L. Myers, P.G. Stansly, S. Garattini and M.G. Lewis, eds.), 163-174, Raven Press, New York (1977).
91. Nicolson, G.L., Usui, N., Yanagimachi, R., Yanagimachi, H. and Smith, J.R. Lectin-binding sites on the plasma membranes of rabbit spermatozoa. Changes in surface receptors during epididymal maturation and following ejaculation. *J. Cell Biol.* 74: 950-962 (1977).
92. Birdwell, C.R., Gospodarowicz, D. and Nicolson, G.L. Factors from 3T3 cells stimulate proliferation of cultured vascular endothelial cells. *Nature* 268: 528-531 (1977).
93. Lotan, R. and Nicolson, G.L. Inhibitory effects of retinoic acid or retinyl acetate on the growth of untransformed, transformed and tumor cells *in vitro*. *J. Natl. Cancer Inst.* 59: 1717-1722 (1977).
94. Nicolson, G.L. The cell surface: Trans-membrane regulations of receptor dynamics. *In Progress in Immunology III* (R.E. Mandel et al., eds.), 5-7, North-Holland, Amsterdam (1977).
95. Fidler, I.J. and Nicolson, G.L. Tumor cell and host properties affecting the implantation and survival of blood-borne metastatic variants of B16 melanoma. *Israel J. Med. Sci.* 14:38-50 (1977).
96. Nicolson, G.L. Ultrastructural localization of lectin receptors. *In Advanced Techniques in Biological Electron Microscopy*, Vol. 2 (J.K. Koehler, ed.), 1-38, Springer-Verlag, New York (1978).
97. Lotan, R., Giotta, G.J., Nork, E.J. and Nicolson, G.L. Characterization of the inhibitory effects of retinoids on the *in vitro* growth of two malignant murine melanomas. *J. Natl. Cancer Inst.* 60:

1035-1041 (1978).

98. Nicolson, G.L. Cell and tissue interactions leading to malignant tumor spread (metastasis). *Amer. Zool.* 18: 77-86 (1978).
99. Giotta, G.J., Smith, J.R. and Nicolson, G.L. Guanosine 5'-triphosphate inhibits growth and stimulates differentiated functions in malignant melanoma cells. *Exp. Cell Res.* 112: 385-393 (1978).
100. Brunson, K.W., Beattie, G. and Nicolson, G.L. Selection and altered tumour cell properties of brain-colonising metastatic melanoma. *Nature* 272: 543-545 (1978).
101. Nicolson, G.L. Experimental tumor metastasis. Characteristics and organ specificity. *Bioscience* 28: 441-447 (1978).
102. Nicolson, G.L. and Poste, G. Mechanism of resistance to ricin toxin in selected mouse lymphoma cell lines. *J. Supramol. Struct.* 8: 235-245 (1978).
103. Lotan, R. and Nicolson, G.L. Membrane glycoproteins: Dynamics and affinity isolation. *In Glycoproteins and Glycolipids in Disease Processes* (E.F. Walborg, Jr., ed.), ACS Symp. Series 80: 256-271 (1978).
104. Nicolson, G.L., Brunson, K.W. and Fidler, I.J. Specificity of arrest, survival and growth of selected metastatic variant cell lines. *Cancer Res.* 38: 4105-4111 (1978).
105. Birdwell, C.R., Gospodarowicz, D. and Nicolson, G.L. Identification, localization and the role of fibronectin in cultured bovine endothelial cells. *Proc. Natl. Acad. Sci. U.S.A.* 75: 3273-3277 (1978).
106. Nicolson, G.L., Smith, J.R. and Hyman, R. Dynamics of toxin and lectin receptors on a lymphoma cell line and its toxin-resistant variant using ferritin-conjugated <sup>125</sup>I-labeled ligand. *J. Cell Biol.* 78: 565-576 (1978).
107. Brunson, K.W. and Nicolson, G.L. Selection and biologic properties of malignant variants of a murine lymphosarcoma. *J. Natl. Cancer Inst.* 61: 1499-1503 (1978).
108. Brunson, K.W. and Nicolson, G.L. Lipopolysaccharide effects on sensitive and resistant variant Chinese hamster cell lines. *J. Supramol. Struct.* 9: 231-242 (1978).
109. Nicolson, G.L. Cell surface proteins and glycoproteins of metastatic murine melanomas and sarcomas. *In Biological Markers in Neoplasia: Basic and Applied Aspects* (R.W. Ruddon, ed.), 227-239, North-Holland, New York (1978).
110. Nicolson, G.L., Brodginiski, A.B., Beattie, G. and Yanagimachi, R. Cell surface changes in the proteins of rabbit spermatozoa during epididymal passage. *Gamete Res.* 2: 153-162 (1979).
111. Nicolson, G.L. and Poste, G. Lectin-mediated agglutination of murine lymphoma cells. Cell surface deformability and reversibility of agglutination by saccharides. *Biochim. Biophys. Acta*

554: 520-531 (1979).

112. Nicolson, G.L. Topographic display of cell surface components and their role in transmembrane signaling. *Curr. Top. Devel. Biol.* 13: 305-338 (1979).
113. Nicolson, G.L. Cancer metastasis. *Scientific American* 240(3): 66-76 (1979).
114. Lotan, R. and Nicolson, G.L. Heterogeneity in growth inhibition by b-trans-retinoic acid of metastatic B16 melanoma clones and *in vivo*-selected cell variant lines. *Cancer Res.* 39: 4767-4771 (1979).
115. Yanagimachi, R., Lopata, A., Odom, C.B., Bronson, R.A., Mahi, C.A. and Nicolson, G.L. Retention of biologic characteristics of zona pellucida in highly concentrated salt solution: The use of salt-stored eggs for assessing the fertilizing capacity of spermatozoa. *Fertil. Steril.* 31: 563-574 (1979).
116. Nicolson, G.L. and Yanagimachi, R. Cell surface changes associated with the epididymal maturation of mammalian spermatozoa. *In The Spermatozoon: Maturation, Motility, Surface Properties and Comparative Aspects* (D. Fawcett and J. Bedford, eds.), 187-194, Urban Schwarzenberg, Baltimore (1979).
117. Kramer, R.H. and Nicolson, G.L. Interactions of tumor cells with vascular endothelial cell monolayers: A model for metastatic invasion. *Proc. Natl. Acad. Sci U.S.A.* 76: 5704-5708 (1979).
118. Brunson, K.W. and Nicolson, G.L. Selection of malignant melanoma variant cell lines for ovary colonization. *J. Supramol Struct.* 11: 517-528 (1979).
119. Lotan, R. and Nicolson, G.L. Purification of cell membrane glycoproteins by lectin affinity chromatography. *Biochim. Biophys. Acta* 559: 329-376 (1979).
120. Brunson, K.W. and Nicolson, G.L. Experimental brain metastasis. *In Brain Metastasis* (L. Weiss, H. Gilbert and J.B. Posner, eds.), 50-65, G.K. Hall and Company, Boston, MA (1980).
121. Nicolson, G.L. Lectin interactions with normal and tumor cells and the affinity purification of tumor cell glycoproteins. *In Cancer Markers: Developmental and Diagnostic Significance* (S. Sell, ed.), pp. 403-443, Humana Press, Clifton, New Jersey (1980).
122. Poste, G. and Nicolson, G.L. Arrest and metastasis of blood-borne tumor cells are modified by fusion of plasma membrane vesicles from highly metastatic cells. *Proc. Natl. Acad. Sci. U.S.A.* 77: 399-403 (1980).
123. Reading, C.L., Belloni, P.N. and Nicolson, G.L. Selection and *in vivo* properties of lectin-attachment variants of malignant murine lymphosarcoma cell lines. *J. Natl. Cancer Inst.* 64: 1241-1249 (1980).
124. Reading, C.L., Brunson, K.W., Torrianni, M. and Nicolson, G.L. Malignancies of metastatic murine lymphosarcoma cell lines and clones correlate with decreased cell surface display of RNA



tumor virus envelope glycoprotein gp70. Proc. Natl. Acad. Sci. U.S.A. 77: 5943-5947 (1980).

125. Nicolson, G.L., Reading, C.L. and Brunson, K.W. Blood-borne tumor metastasis: Some properties of selected tumor cell variants of differing malignancies. *In* Tumor Progression (R.G. Crispin, ed.), 31-48, Elsevier North-Holland, Amsterdam (1980).
126. Kramer, R.H., Gonzalez, R. and Nicolson, G.L. Metastatic tumor cells adhere preferentially to the extracellular matrix of vascular endothelial cells. *Intern. J. Cancer* 26: 639-645 (1980).
127. Lotan, R., Kramer, R.H., Neumann, G., Lotan, D. and Nicolson, G.L. Retinoic acid-induced modifications in the growth and cell surface components of a human carcinoma (HeLa) cell line. *Exp. Cell Res.* 130: 401-414 (1980).
128. Nicolson, G.L., Neri, A., Reading, C.L. and Miner, K.M. *In vivo* and *in vitro* selection of experimental metastatic variants of rodent melanoma, mammary carcinoma and lymphosarcoma. *In* Metastasis: Clinical and Experimental Aspects Vol. 4 of Developments in Oncology (K. Hellmann, P. Hilgard and S. Eccles, eds.), 163-168, Martinus Nijhoff, The Hague, The Netherlands (1980).
129. Lotan, R. and Nicolson, G.L. Effects of b-all *trans* retinoic acid on the growth and implantation properties of metastatic B16 melanoma cell lines. *In* Molecular Actions and Targets for Cancer Chemotherapeutic Agents (A.C. Sartorelli, J.S. Lazo and J.R. Bertino, eds.), Bristol Myers Cancer Symposia, Vol. 2, 527-539, Academic Press, New York (1981).
130. Nicolson, G.L. Properties of metastatic tumor cells. *In* Cancer Achievements, Challenges, Prospects for the 1980's (J.H. Burchenal and H.F. Oettgen, eds.), Vol. 1, 477-490, Grune and Stratton, Inc., New York (1981).
131. Lotan, R. and Nicolson, G.L. Plasma membranes of eukaryotes. *In* Advanced Cell Biology (L.M. Schwartz and M.M. Azar, eds.), 129-154, Van Nostrand Reinhold, New York (1981).
132. Fidler, I.J. and Nicolson, G.L. Immunobiology of experimental metastatic melanoma. *Cancer Biol. Rev.* 2: 171-234 (1981).
133. Nicolson, G.L., Miner, K.M. and Reading, C.L. Tumor cell heterogeneity and blood-borne metastasis. *In* Fundamental Mechanisms in Human Cancer Immunology (J. Saunders, J.C. Daniels, B. Serrou, C. Rosenfeld and C.B. Denney, eds.), 31-39, Elsevier North Holland, New York (1981).
134. Kramer, R.H. and Nicolson, G.L. Invasion of vascular endothelial cell monolayers and underlying matrix by metastatic human cancer cells. *In* International Cell Biology 1980-1981 (H.G. Schweiger, ed.), 794-799, Springer-Verlag, Berlin and Heidelberg (1981).
135. Nicolson, G.L. The use of animal tumor models to study the metastatic process. *In* Gastrointestinal Cancer (J.R. Stroehlein and M.M. Romsdahl, eds.), 427-441, Raven Press, New York (1981).
136. Irimura, T., Gonzalez, R. and Nicolson, G.L. Effects of tunicamycin on B16 metastatic

- melanoma cell surface glycoproteins and blood-borne arrest and survival properties. *Cancer Res.* 41: 3411-3418 (1981).
137. Nicolson, G.L. Insulin receptor transmembrane signaling and the structure of cell membranes. *In New Approaches to Nerve Disorders: Basic and Applied Contributions*, (A.D. Kidman, J.K. Tomkins and R.A. Westerman, eds.), Excerpta Medica 546: 3-16 (1981).
  138. Nicolson, G.L. Transmembrane signaling and the dynamics of cell membranes. *Cancer Bull.* 33: 205-210 (1981).
  139. Nicolson, G.L., Irimura, T., Gonzalez, R. and Ruoslahti, E. The role of fibronectin in adhesion of metastatic melanoma cells to endothelial cells and their basal lamina. *Exp. Cell Res.* 135: 461-465 (1981).
  140. Lotan, R. Kramer R.H. and Nicolson, G.L. Changes in HeLa cell proliferation rate and cell surface proteins. *Ann. N. Y. Acad. Sci.* 359: 407-409 (1981).
  141. Miner, K.M., Walter, H. and Nicolson, G.L. Subfractionation of malignant variants of metastatic murine lymphosarcoma cells by countercurrent distribution in two-polymer aqueous phases. *Biochemistry* 20: 6244-6250 (1981).
  142. Miner, K.M., Lotan, R. and Nicolson, G.L. Metastatic and melanogenic properties of *In vivo*-selected B16 melanoma sublines and their clonal derivatives. *In Phenotypic Expression in Pigment Cells* (M. Seiji, ed.), 529-532, University of Tokyo Press, Tokyo (1981).
  143. Neri, A., Ruoslahti, E. and Nicolson, G.L. Distribution of fibronectin on clonal cell lines of a mammary adeno-carcinoma growing *in vitro* and *in vivo* at primary and metastatic sites. *Cancer Res.* 41: 5082-5095 (1981).
  144. Neri, A. and Nicolson, G.L. Phenotypic drift of metastatic and cell surface properties of mammary adenocarcinoma cell clones during growth *in vitro*. *Intern. J. Cancer* 28: 731-738 (1981).
  145. Irimura, T. and Nicolson, G.L. The role of glycoconjugates in metastatic melanoma blood-borne arrest and cell surface properties. *J. Supramol. Struct. Cell. Biochem.* 17: 325-336 (1981).
  146. Miner, K.M., Reading, C.L. and Nicolson, G.L. *In vivo* and *in vitro* production and detection of monoclonal antibodies to surface components on metastatic variants of murine tumor cells. *Invasion Metastasis* 1: 158-174 (1981).
  147. Nicolson, G.L., Lotan, R. and Rios, A. Heterogeneous *in vitro* sensitivities of metastatic B16 melanoma sublines and clones to retinoic acid or BCNU. *Cancer Treat. Rep.* 65: 71-74 (1981).
  148. Nicolson, G.L. and Custead, S.E. Tumor metastasis is not due to adaptation of cells to a new organ environment. *Science* 215: 176-178 (1982).
  149. Neri, A., Welch, D., Kawaguchi, T. and Nicolson, G.L. Development and biologic properties of malignant cell sublines and clones of a spontaneously metastasizing rat mammary

- adenocarcinoma. *J. Natl. Cancer Inst.* 68: 507-517 (1982).
150. Nicolson, G.L. Transmembrane-mediated communication and its relevance to hormone action. *In* *Hormone Action*, Vol. 3A of *Biological Regulation and Development* (R.F. Goldberger and K.R. Yamamoto, eds.), 221-251, Plenum Press, New York (1982).
  151. Nicolson, G.L. Structure, dynamics and signaling across cell membranes. *In* *Membranes and Transport*, Vol. 2 (A. Martonosi, ed.), 481-488, Plenum Press, New York (1982).
  152. Nicolson, G.L. Cell surface properties of metastatic tumor cells. *In* *Tumor Invasion and Metastasis* (L. Liotta and I.R. Hart, eds.), 57-79, Martinus Nijhoff, The Hague, The Netherlands (1982).
  153. Nicolson, G.L. Metastatic tumor cell attachment and invasion assay utilizing vascular endothelial cell monolayers. *J. Histochem. Cytochem.* 30: 214-220 (1982).
  154. Kramer, R.H., Vogel, K.G. and Nicolson, G.L. Solubilization and degradation of subendothelial matrix glycoproteins and proteoglycans by metastatic tumor cells. *J. Biol. Chem.* 257: 2678-2686 (1982).
  155. Tomasovic, S.P., Thames, H.D., Jr. and Nicolson, G.L. Heterogeneity in hyperthermic sensitivities of rat 13762NF mammary adenocarcinoma cell clones of differing metastatic potentials. *Radiat. Res.* 91: 555-563 (1982).
  156. Kramer, R.H., Vogel, K.G. and Nicolson, G.L. Tumor cell interactions with vascular endothelial cells and their extracellular matrix. *In* *Interactions of Platelets and Tumor Cells* (G.A. Jamieson, ed.), 333-351, Alan R. Liss, New York (1982).
  157. Nicolson, G.L. Cell surfaces and cancer metastasis. *Hospital Practice* 17(8): 75-86 (1982).
  158. Nicolson, G.L. Mammalian sperm plasma membrane. *In* *Prospects for Sexing Mammalian Sperm* (R.P. Amann and G.E. Seidel, Jr., eds.), 5-16, Colorado Associated University Press, Boulder, CO (1982).
  159. Nicolson, G.L. Cell surface antigen heterogeneity and blood-borne tumor metastasis. *In* *Tumor Cell Heterogeneity: Origins and Implications* (A.H. Owens, Jr., D.S. Coffey, and S.B. Baylin, eds.), 83-97, Academic Press, New York (1982).
  160. Irimura, T. and Nicolson, G.L. Cell membrane molecules and tumor metastasis. *Oncologia* (Tokyo) 1: 30-46 (1982).
  161. Miner, K.M., Kawaguchi, T., Uba, G.W. and Nicolson, G.L. Clonal drift of cell surface, melanogenic and experimental metastatic properties of *in vivo*-selected, brain meninges-colonizing murine B16 melanoma. *Cancer Res.* 42: 4631-4638 (1982).
  162. Lotan, R., Irimura, T. and Nicolson, G.L. Inhibition of experimental pulmonary metastasis by suppression or enhancement of the glycosylation of melanoma cell membrane glycoproteins. *In* *Membranes in Tumor Growth* (Galeotti, T., Cittadini, A., Neri, G. and Papa, S., eds.), 193-204,

Elsevier/North Holland, Amsterdam (1982).

163. Nicolson, G.L. Cancer metastasis: Organ colonization and the cell surface properties of malignant cells. *Biochim. Biophys. Acta* 695: 113-176 (1982).
164. Nicolson, G.L., Wang, T-Y., Irimura, T. and Nakajima, M. Metastatic tumor cell attachment to and invasion of organ tissue and artificial vascular endothelium *in vitro*. In *The Extracellular Matrix* (S.P. Hawkes and J.L. Wang, eds.), 363-377, Academic Press, New York (1982).
165. Nicolson, G.L., Mascali, J.J. and McGuire, E.J. Metastatic RAW117 lymphosarcoma as a model for malignant-normal cell interactions. Possible roles for cell surface antigens in determining the quantity and location of secondary tumors. *Oncodevelop. Biol. Med.* 4: 149-159 (1982).
166. Nicolson, G.L. and Poste, G. Tumor cell diversity and host responses in cancer metastasis. I. Properties of metastatic cells. *Curr. Prob. Cancer* 7(6): 1-83 (1982).
167. Nicolson, G.L. and Poste, G. Tumor cell diversity and host responses in cancer metastasis. II. Host immune responses and therapy of metastases. *Curr. Prob. Cancer* 7(7): 1-43 (1983).
168. Welch, D.R., Milas, L., Tomasovic, S.P. and Nicolson, G.L. Heterogeneous response and clonal drift of sensitivities of metastatic 13762NF mammary adenocarcinoma clones to gamma radiation *in vitro*. *Cancer Res.* 43: 6-10 (1983).
169. Nakajima, M., Irimura, T. and Nicolson, G.L. Mucopolysaccharides and tumor metastasis. *Membrane (Tokyo)* 8: 2-14 (1983).
170. Reading, C.L., Kraemer, P.M., Miner, K.M. and Nicolson, G.L. *In vivo* and *in vitro* properties of malignant variants of RAW117 metastatic lympho-sarcoma. *Clin. Expl. Metastasis* 1: 135-151 (1983).
171. Poste, G. and Nicolson, G. L. Experimental systems for analysis of the surface properties of metastatic tumor cells. In *Biomembranes* (A. Nowotny, ed.), Vol. 11 of *Pathological Membranes*, 341-364, Plenum Press, New York (1983).
172. Nakajima, M., Irimura, T., Di Ferrante, D.T., Di Ferrante, N. and Nicolson, G.L. Heparan sulfate degradation correlates with tumor invasive and metastatic properties of B16 melanoma sublines. *Science* 220: 611-613 (1983).
173. Miner, K.M., Klostergaard, J., Granger, G.A. and Nicolson, G.L. Differences in the cytotoxic effects of activated peritoneal macrophages and J774 monocytic cells on metastatic variants of B16 melanoma. *J. Natl. Cancer Inst.* 70: 717-724 (1983).
174. Irimura, T. and Nicolson, G.L. Carbohydrate chain analysis by lectin binding to mixtures of glycoproteins, separated by polyacrylamide slab-gel electrophoresis, with *in situ* chemical modifications. *Carbohydr. Res.* 115: 209-220 (1983).
175. Miner, K.M. and Nicolson, G.L. Differences in the sensitivities of murine metastatic lymphoma-lymphosarcoma variants to macrophage-mediated cytotoxicity and/or cytostasis. *Cancer Res.* 43:

2063-2067 (1983).

176. Yanagimachi, R., Huang, T.T.F., Fleming, A.D., Kosower, N.S. and Nicolson, G.L. Dithiothreitol, a disulfide-reducing agent, inhibits capacitation, acrosome reaction, and interaction with eggs by guinea pig spermatozoa. *Gamete Res.* 4: 145-154 (1983).
177. Irimura, T., Nakajima, M., Di Ferrante, N. and Nicolson, G.L. High-speed gel permeation chromatography of glycosaminoglycans: Its application to the analysis of heparan sulfate of embryonic carcinoma and its degradation products by tumor cell- derived heparanase. *Analyt. Biochem.* 130: 461-468 (1983).
178. Welch, D.R., Neri, A. and Nicolson, G.L. Comparison of 'spontaneous' and 'experimental' metastasis using rat 13762 mammary adenocarcinoma metastatic cell clones. *Invasion Metastasis* 3: 65-80 (1983).
179. Kawaguchi, T., Kawaguchi, M., Miner, K.M., Lembo, T.M. and Nicolson, G.L. Brain meninges tumor formation by *in vivo*-selected metastatic B16 melanoma variants in mice. *Clin. Expl. Metastasis* 1: 247-259 (1983).
180. Irimura, T. and Nicolson, G.L. The interaction of pokeweed mitogen with poly-N-acetyllactosamine-type carbohydrate chains. *Carbohydr. Res.* 120: 187-195 (1983).
181. Steck, P.A. and Nicolson, G.L. Cell surface glycoproteins of 13762NF mammary adenocarcinoma clones of differing metastatic potentials. *Exp. Cell Res.* 147: 255-267 (1983).
182. Nicolson, G.L. and Poste, G. Tumor implantation and invasion at metastatic sites. *Intern. Rev. Exp. Pathol.* 25: 77-181 (1983).
183. Irimura, T., Nakajima, M. and Nicolson, G.L. Metastatic tumor cell attachment to vascular endothelial cells and destruction of their basal lamina-like matrix. *Gann Monogr. Cancer Res.* 29: 35-46 (1983).
184. Nicolson, G.L. Stability and phenotypic heterogeneity of metastatic tumor cells. *In Cellular Oncology. New Approaches in Biology, Diagnosis and Treatment* (P.J. Moley and G.L. Nicolson, eds.), 3-27, Praeger, New York (1983).
185. Klostergaard, J., Miner, K.M., Granger, G.A. and Nicolson, G.L. The cancer cell and its environment: Macrophage mediated killing of metastatic tumor cells. *In Cellular Oncology. New Approaches in Biology, Diagnosis and Treatment* (P.J. Moley and G.L. Nicolson, eds.), 63-83, Praeger, New York (1983).
186. Welch, D.R. and Nicolson, G.L. Phenotypic drift and heterogeneity in response of metastatic mammary adenocarcinoma cell clones to Adriamycin, 5-fluoro-2'-deoxyuridine and methotrexate treatment *in vitro*. *Clin. Expl. Metastasis* 1: 317-325 (1983).
187. Wang, T-Y. and Nicolson, G.L. Metastatic tumor cell invasion of brain organ tissue cultured on cellulose polyacetate strips. *Clin. Expl. Metastasis* 1: 327-339 (1983).

188. Nicolson, G.L., Steck, P.A., Welch, D.R. and Lembo, T. Heterogeneity and instability of phenotypic and metastatic properties of local tumor- and metastasis-derived clones of a mammary adenocarcinoma. *In Understanding Breast Cancer: Clinical and Laboratory Concepts* (M.A. Rich, J.C. Hager and P. Furmanski, eds.), 145-166, Marcel Dekker, New York (1983).
189. Poste, G. and Nicolson, G.L. *In vitro* systems for studying the interaction of metastatic tumour cells with endothelial cells and subendothelial basement membranes. *In The Biology of Endothelial Cells Vol. 27 of Development in Cardiovascular Medicine* (E.A. Jaffe, ed.), 438-449, Martinus Nijhoff, The Hague (1984).
190. Nicolson, G.L. Cell surface molecules and tumor metastasis. Regulation of metastatic diversity. *Exp. Cell Res.* 150: 3-22 (1984).
191. Nicolson, G.L. An introduction to cancer invasion and metastasis formation. *In Cancer Invasion and Metastasis: Biologic and Therapeutic Aspects* (G.L. Nicolson and L. Milas, eds.), 1-4, Raven Press, New York (1984).
192. Nicolson, G.L., Irimura, T., Nakajima, M. and Estrada, J. Metastatic cell attachment to and invasion of vascular endothelium and its underlying basal lamina using endothelial cell monolayers. *In Cancer Invasion and Metastasis: Biologic and Therapeutic Aspects* (G.L. Nicolson and L. Milas, eds.), 145-167, Raven Press, New York (1984).
193. Irimura, T. and Nicolson, G.L. Carbohydrate chain analysis by lectin binding to electrophoretically separated glycoproteins from murine B16 melanoma sublines of various metastatic properties. *Cancer Res.* 44: 791-798 (1984).
194. Nakajima, M., Irimura, T., Di Ferrante, N. and Nicolson, G.L. Metastatic melanoma cell heparanase. Characterization of heparan sulfate degradation fragments produced by B16 melanoma endo- $\beta$ -glucuronidase. *J. Biol. Chem.* 259: 2283-2290 (1984).
195. Nicolson, G.L. Generation of phenotypic diversity and progression in metastatic tumors. *Cancer Metastasis Rev.* 3: 25-42 (1984).
196. Miner, K.M. and Nicolson, G.L. Separation of malignant lymphoid cells by countercurrent distribution. *In Cell Separation: Methods and Selected Applications, Vol. 3* (T.G. Pretlow and T.P. Pretlow, eds.), 1-12, Academic Press, New York (1984).
197. Nicolson, G.L. Tumor progression, oncogenes and the evolution of metastatic phenotypic diversity. *Clin. Exp. Metastasis* 2: 85-105 (1984).
198. Steck, P.A. and Nicolson, G.L. Cell surface properties of spontaneously metastasizing rat mammary adenocarcinoma cell clones. *Transplant. Proc.* 16: 355-360 (1984).
199. Nicolson, G.L., Irimura, T., Nakajima, M., Updyke, T.V. and Poste, G. The cellular interactions of metastatic tumor cells with special reference to endothelial cells and their basal lamina-like matrix. *In Hemostatic Mechanisms and Metastasis* (K.V. Honn and B.F. Sloane, eds.), 295-318, Martinus Nijhoff, Boston, MA (1984).

200. Estrada, J. and Nicolson, G.L. Tumor-cell-platelet aggregation does not correlate with metastatic potential of rat 13762NF mammary adenocarcinoma tumor cell clones. *Intern. J. Cancer* 34: 101-105 (1984).
201. Updyke, T.V. and Nicolson, G.L. Immunoaffinity isolation of membrane antigens with biotinylated monoclonal antibodies and immobilized streptavidin matrices. *J. Immunol. Methods* 73: 83-95 (1984).
202. Nicolson, G.L. The role of cell surface determinants in large cell lymphoma metastasis to liver. *In Liver Metastasis - Basic Aspects, Detection and Management* (C.J.H. van de Velde and P.H. Sugarbaker, eds.), 20-35, Martinus Nijhoff, The Hague (1984).
203. Rotter, V., Wolf, D. and Nicolson, G.L. The expression of transformation-related protein p53 and p53-containing mRNA in murine RAW117 large cell lymphoma cells of differing metastatic potential. *Clin. Expl. Metastasis* 2: 199-204 (1984).
204. McGuire, E.J., Mascali, J.J., Grady, S.R. and Nicolson, G.L. Involvement of cell-cell adhesion molecules in liver colonization by metastatic murine lymphoma /lymphosarcoma variants. *Clin. Expl. Metastasis* 2: 213-222 (1984).
205. Nicolson, G.L. and Irimura, T. Estimating glycoprotein carbohydrate chain structures by lectin reactivities in polyacrylamide gels. *Biol. Cell* 51: 157-164 (1984).
206. Pearce, V., Pathak, S., Mellard, D., Welch, D.R. and Nicolson, G.L. Chromosome and DNA analysis of rat 13762NF mammary adenocarcinoma cell lines and clones of different metastatic potentials. *Clin. Expl. Metastasis* 2: 271-286 (1984).
207. Welch, D.R., Krizman, D. and Nicolson, G.L. Multiple phenotypic divergence of mammary adenocarcinoma cell clones. I. *In vitro* and *in vivo* properties. *Clin. Expl. Metastasis* 2: 333-355 (1984).
208. Welch, D.R., Evans, D.P., Tomasovic, S.P., Milas, L. and Nicolson, G.L. Multiple phenotypic divergence of mammary adenocarcinoma cell clones. II. Sensitivity to radiation, hyperthermia and FUDR. *Clin. Expl. Metastasis* 2: 357-371 (1984).
209. Steck, P.A. and Nicolson, G.L. Isolation and analysis of a cell surface metastasis-associated sialogalactoprotein from rat and human mammary adenocarcinoma. *In Treatment of Metastasis: Problems and Prospects* (K. Hellmann, and S.A. Eccles, eds.), 101-111, Taylor and Francis, London (1984).
210. Welch, D.R., Evans, D., Tomasovic, S.P., Krizman, D. Milas, L. and Nicolson, G.L. Multiple phenotype divergence of mammary adenocarcinoma cell clones. *In Treatment of Metastasis: Problems and Prospects* (K. Hellmann, and S.A. Eccles, eds.), 239-242, Taylor and Francis, London (1984).
211. Nicolson, G.L. and Custead, S.E. Effects of chemotherapeutic drugs on platelet and metastatic tumor cell-endothelial cell interactions as a model for assessing vascular endothelial integrity. *Cancer Res.* 45: 331-336 (1985).

212. Nicolson, G.L. Tumour metastasis. *In Medical and Biological Perspectives in Cancer Research* (A.J.S. Davies and P. Rudland, eds.), 161-175, Ellis Horwood, Chichester, England, (1985).
213. North, S.M. and Nicolson, G.L. Heterogeneity in the sensitivities of 13762NF mammary adenocarcinoma cell clones to cytolysis mediated by extra- and intratumoral macrophages. *Cancer Res.* 45: 1453-1458 (1985).
214. Kawaguchi, T., Kawaguchi, M., Dulski, K. and Nicolson, G.L. Cellular behavior of metastatic B16 melanoma in experimental blood-borne implantation and cerebral invasion: An electron microscopic study. *Invasion Metastasis* 5: 16-30 (1985).
215. Nicolson, G.L., Dulski, K., Basson, C. and Welch, D.R. Preferential organ attachment and invasion *in vitro* by B16 melanoma cells selected for differing metastatic colonization and invasive properties. *Invasion Metastasis* 5: 144-158 (1985).
216. Updyke, T.V. and Nicolson, G.L. Membrane antigen isolation using biotinylated monoclonal antibodies and streptavidin-agarose. *Focus* 7(3): 1-3 (1985).
217. Nicolson, G.L., Reading, C.L. and Klostergaard, J. Immunobiology of RAW117 large cell lymphoma. *In Immunity to Cancer* (A.E. Reif and M.S. Mitchell, eds.), 55-68 Academic Press, New York (1985).
218. Nicolson, G.L. The evolution of phenotypic diversity in metastatic tumor cells. *In Biological Responses in Cancer: Progress Toward Potential Applications*, Vol. 3 (E. Mihich, ed.), 71-89, Plenum, New York (1985).
219. Rotter, V., Wolf, D., Blick, M. and Nicolson, G.L. Expression of *abl* and other oncogenes is independent of metastatic potential in Abelson virus-transformed malignant murine large-cell lymphoma. *Clin. Exp. Metastasis* 3: 77-86 (1985).
220. Nicolson, G.L. Cancer metastasis. *In Cancer Biology* (E. C. Freidberg, ed.), 138-148, W. H. Freeman, New York (1985).
221. North, S.M. and Nicolson, G.L. Effect of host immune status on the spontaneous metastasis of cloned cell lines of the 13762NF rat mammary adenocarcinoma. *Br. J. Cancer* 52: 747-755 (1985).
222. Nicolson, G.L., Van Pelt, C., Irimura, T. and Kawaguchi, T. Stabilities and characteristics of brain meninges-colonizing murine melanoma cells. *Prog. Exp. Tumor Res.* 29: 17-35 (1985).
223. Miller, W., Ota, D., Giacco, G., Guinee, V., Irimura, T., Nicolson, G.L. and Cleary, K. Absence of a relationship of size of primary colon carcinoma with metastasis and survival. *Clin. Expl. Metastasis* 3: 189-196 (1985).
224. Nicolson, G.L., Nakajima, M. and Irimura, T. Invasion of vascular endothelium and organ tissue *in vitro* by B16 melanoma variants. *In Mechanisms of Metastasis: Potential Therapeutic Implications* (K. V. Honn and B. Sloane, eds.), 275-297, Martinus Nijhoff, Boston, MA (1985).



225. Irimura, T., Nakajima, M. and Nicolson, G.L. Blood vessel wall and tumor metastasis. *Vas Sanguina* 8: 77-84 (1985).
226. Wang, Z.-W., Irimura, T., Nakajima, M., Belloni, P.N. and Nicolson, G.L. Characterization of the extracellular matrix-associated glycosaminoglycans produced by untransformed and transformed bovine corneal endothelial cells in culture. *Eur. J. Biochem.* 153: 125-130 (1985).
227. Nicolson, G.L., Rotter, V., Wolf, D., Irimura, T., Reading, C.L., La Biche, R. and Frazier, M. Biochemistry and Molecular Biology of RAW117 Large Cell Lymphoma. *In Biochemistry and Molecular Genetics of Cancer Metastasis*, (F.K. Lapis, L.A. Liotta, and A.S. Rabson, eds.), 115-127, Martinus Nijhoff, Hingham, MA (1986).
228. Irimura, T., Ota, D.M., Cleary, K.R. and Nicolson, G.L. The use of lectins in biochemical studies on colorectal carcinoma metastasis. *In The Biology and Treatment of Colorectal Cancer Metastasis* (A. Mastromarino, ed.), 57-72, Martinus Nijhoff, Hingham, MA (1986).
229. Nicolson, G.L. and Galvilondo Cowley, F.J.V. Mecanismos de la progresion tumoral y la evolucion de la diversidad fetontipica de las neoplasias malignas. *Interferon Biotechnol.* 3: 1-19 (1986).
230. Nicolson, G. L., Fidler, I. J. and Poste, G. The effects of tertiary amine local anesthetics on the blood-borne implantation and cell surface properties of metastatic mouse melanoma cells. *J. Natl. Cancer Inst.* 76: 511-519 (1986).
231. Nicolson, G.L. Organ preference of metastasis. *In Cancer Metastasis: Experimental and Clinical Strategies* (D. Welch, B.K. Bhuyon and L.A. Liotta, eds.), 25-44, Alan R. Liss, New York (1986).
232. Nakajima, M., Welch, D.R., Irimura, T. and Nicolson, G.L. Basement membrane degradative enzymes as possible markers of tumor metastasis. *In Cancer Metastasis: Experimental and Clinical Strategies* (D. Welch, B.K. Bhuyon and L.A. Liotta, eds.), 113-122, Alan R. Liss, New York (1986).
233. Nicolson, G.L. Metastatic phenotypic diversity and brain metastasis. *Cancer Bull.* 38: 32\_38 (1986).
234. Updyke, T.V. and Nicolson, G.L. Immunoaffinity isolation of membrane antigens with biotinylated monoclonal antibodies and streptavidin-agarose. *Meth. Enzymol.* 121: 717-725 (1986).
235. Dabbous, M. K., Woolley, D.E., Haney, L., Carter, L.M. and Nicolson, G.L. Host-mediated effectors of tumor invasion: Role of mast cells in matrix degradation. *Clin. Expl. Metastasis* 4: 141-152 (1986).
236. Nakajima, M., Irimura, T. and Nicolson, G.L. Tumor metastasis-associated heparanase (heparan sulfate  $\beta$ -endoglycosidase) in human melanoma cells. *Cancer Lett.* 31: 277-283 (1986).

237. Nicolson, G.L. and Dulski, K.M. Organ specificity of metastatic tumor colonization is related to organ-selective growth properties of malignant cells. *Intern. J. Cancer* 38: 289-294 (1986).
238. Irimura, T., Tressler, R.J. and Nicolson, G.L. Sialoglycoproteins of murine RAW117 large cell lymphoma/lymphosarcoma sublines of various metastatic colonization properties. *Exp. Cell Res.* 165: 403-416 (1986).
239. Nicolson, G.L. Oncogenes, genetic instability and the evolution of the metastatic phenotype. *Adv. Viral Oncol.* 6: 143-167 (1986).
240. Nakajima, M., Irimura, T. and Nicolson, G.L. A solid-phase substrate of heparan sulfate degrading endoglycosidase: Its application to assay of human melanoma for heparan sulfate degradative activity. *Analyt. Biochem.* 157: 162-171 (1986).
241. Nicolson, G.L., LaBiche, R.A., Frazier, M.L., Blick, M., Tressler, R.J., Irimura, T. and Rotter, V. Differential expression of metastasis-associated cell surface glycoproteins and mRNA in a murine large-cell lymphoma. *J. Cell. Biochem.* 31: 305-312 (1986).
242. Irimura, T., Nakajima, M. and Nicolson, G.L. Chemically modified heparins as inhibitors of heparan sulfate specific endo- $\beta$ -glucuronidase (heparanase) of metastatic melanoma cells. *Biochemistry* 25: 5322-5328 (1986).
243. Nicolson, G.L. Krebsmetastagen. *In Krebs-Tumoren Zellen Gene*, 148-159, Spektrum der Wissenschaft, Heidelberg (1986).
244. Nicolson, G.L. Tumor oncogene expression and the metastatic phenotype. *Cancer Rev.* 3: 25-57 (1986).
245. Nicolson, G.L. The metastatic process of cancer: Why therapy can fail. *Primary Care & Cancer* 6(20): 0R14-32 (1986).
246. Dabbous, M. K., Walker, R., Haney, L., Carter, L.M., Nicolson, G.L. and Woolley, D.E. Mast cells and matrix degradation at sites of tumour invasion in rat mammary adenocarcinoma. *Br. J. Cancer* 54: 459-465 (1986).
247. Nicolson, G.L. Properties of metastatic tumor cells and the generation of tumor phenotypic diversity. *In Cancer in the Neck: Evaluation and Treatment.* (D.L. Larson, A.J. Ballantyne, and O.M. Guillagmondegui, eds.), 3-22, Macmillan, New York (1986).
248. North, S.M., Steck, P.A. and Nicolson, G.L. Monoclonal antibodies against cell-surface antigens of the metastatic rat 13762NF mammary adenocarcinoma and their cross-reactivity with human breast carcinoma. *Cancer Res.* 46: 6393-6399 (1987).
249. Nicolson, G.L., Kawaguchi, T., Kawaguchi, M. and Van Pelt, C. Brain surface invasion and metastasis of murine malignant melanoma. *J. Neuro-Oncol.* 4: 209-218 (1986).
250. Nicolson, G.L. and Lotan, R. Preventing diversification of malignant tumor cells during therapy. *Clin. Exp. Metastasis* 4: 231-236 (1986).

251. Updyke, T.V. and Nicolson, G.L. Malignant melanoma cell lines selected *in vitro* for increased homotypic adhesion properties have increased experimental metastatic potential. *Clin. Exp. Metastasis* 4: 273-284 (1986).
252. Steck, P.A., North, S.M. and Nicolson, G.L. Purification and partial characterization of a tumour metastasis-associated high Mr glycoprotein from rat 13762NF mammary adenocarcinoma cells. *Biochem. J.* 242: 779-787 (1987).
253. North, S.M. and Nicolson, G.L. Host responses and tumor metastasis. *In Immune Responses to Metastases, Vol. I* (R. Herberman, R. Wiltout and E. Gorelik, eds.), 1-22, CRC, Boca Raton, FL, (1987).
254. Nicolson, G.L. Differential growth properties of metastatic large cell lymphoma cells in target organ-conditioned medium. *Exp. Cell Res.* 168: 572-577 (1987).
255. Wang, Z.W., Irimura, T., Nakajima, M., Belloni, P.N. and Nicolson, G.L. Molecular characterization of extracellular matrix-associated glycosaminoglycans in the endothelium. *Acta Pharmacol. Sinica* 7(2): 152-156 (1986).
256. Nicolson, G.L. Tumor cell instability, diversification and progression to the metastatic phenotype: From oncogene to oncofetal expression. *Cancer Res.* 47: 1473-1487 (1987).
257. Steck, P.A., Cheong, P.H., Nakajima, M., Yung, W.K.A., Moser, R.P. and Nicolson, G.L. Altered expression of glycosaminoglycans in metastatic 13762NF rat mammary adenocarcinoma. *Biochemistry* 26: 1020-1028 (1987).
258. Irimura, T., North, S.M. and Nicolson, G.L. Glycoprotein profiles of macrophages at different stages of activation as revealed by lectin binding after electrophoretic separation. *Eur. J. Immunol.* 17: 73-78 (1987).
259. Lichtner, R.B., Goka, T.J., Butcher, R.W. and Nicolson, G.L. Direct effects of the pyrimidopyrimidine derivative RA233 (Rapenton) on some rat 13762NF mammary tumor cell clones. *Cancer Res.* 47: 1870-1877 (1987).
260. Lichtner, R.B. and Nicolson, G.L. Organization of cytoskeletal structures in 13762NF rat mammary adenocarcinoma cell lines and clones of varying metastatic potentials. *Invasion Metastasis* 7: 73-82 (1987).
261. Yoshida, M., Gallick, G., Irimura, T. and Nicolson, G.L. Modification of cell surface glycoproteins, macrophage cytostasis and blood-borne metastatic properties of RAW117 large cell lymphoma by virus superinfection. *Cancer Res.* 47: 2558-2562 (1987).
262. Nicolson, G.L. and Rosenberg, N.L. Diversification and progression of malignant tumors. *Bioessays* 6: 204-208 (1987).
263. Bugelski, P.J., Corwin, S.P., North, S.M., Lovett, S.C., Kirsh, R.L., Nicolson, G.L. and Poste, G. The macrophage content of spontaneous metastases at different stages of their growth. *Cancer*

Res. 47: 4141-4145 (1987).

264. Atnip, K.D., Haney, L., Nicolson, G.L. and Dabbous, M. Kh. Chemotactic response of rat mammary adenocarcinoma cell clones to tumor-derived cytokines. *Biochem. Biophys. Res. Commun.* 146: 996-1002 (1987).
265. Lichtner, R.B. and Nicolson, G.L. Effects of the pyrimido-pyrimidine derivative RX-RA 85 on metastatic tumor cell-vascular endothelial cell interactions. *Clin. Expl. Metastasis* 5: 219-231 (1987).
266. Nicolson, G.L. Oncogenes and evolution of tumor phenotypic diversity. *In Oncogenes and Hormones in Breast Cancer* (M. Sluyser, ed.), 91-122, Ellis Horwood, London (1987).
267. Lichtner, R.B. and Nicolson, G.L. The pyrimido-pyrimidine derivatives of RA233 and RX-RA85 affect growth and cytoskeletal organization of rat mammary adenocarcinoma cells. *Eur. J. Cancer Clin. Oncol.* 23: 1269-1275 (1987).
268. Nicolson, G.L. Significance of regional nodal and distant metastasis in mammary tumors. *In Regional Nodal Metastasis: Biology, Diagnosis and Treatment* (P. Moley, G.L. Nicolson and G. Poste, eds.), 1-20, Praeger, New York (1987).
269. Nakajima, M., Welch, D.R., Belloni, P.N. and Nicolson, G.L. Degradation of basement membrane type IV collagen and lung subendothelial matrix by rat mammary adenocarcinoma cell clones of differing metastatic potentials. *Cancer Res.* 47: 4869-4876 (1987).
270. Fidler, I.J. and Nicolson, G.L. The process of cancer invasion and metastasis. *Cancer Bull.* 39: 126-131 (1987).
271. Nakajima, M., Irimura, T. and Nicolson, G.L. Basement membrane degradative enzymes and tumor metastasis. *Cancer Bull.* 39: 142-149 (1987).
272. Nicolson, G.L. and Fidler, I.J. Diversification and heterogeneity of metastatic neoplasms. *Cancer Bull.* 39: 186-191 (1987).
273. Hortobagyi, G.N., Tomasovic, S.P. and Nicolson, G.L. Breast cancer metastasis. *Cancer Bull.* 39: 210-215 (1987).
274. Reading, C.L. and Nicolson, G.L. Selection of tumor cell metastatic variants by differential adhesion to immobilized-lectins. *In Cell Separation, Methods and Selected Applications* (T.G. Pretlow II, T.P. Pretlow, eds.), Vol. 5, 75-87, Academic Press, New York, (1987).
275. Lichtner, R.B., Moskwa, P.S. and Nicolson, G.L. Heterogeneous expression of cytokeratins in metastatic rat mammary adenocarcinoma cells *in vitro* and *in vivo*. *Invasion Metastasis* 7: 367-383 (1987).
276. Lotan, R. and Nicolson, G.L. Can anticancer therapy be improved by sequential use of cytotoxic and cytostatic (differentiating or immunomodulating) agents to suppress tumor cell phenotypic diversification? *Biochem. Pharmacol.* 37: 149-154 (1988).

277. Fidler, I.J. and Nicolson, G.L. Clarifications of tumor cell diversification bring new ideas for stopping the process. *Oncolog.* 33: 4-5 (1988).
278. Nicolson, G.L., Dulski, K.M. and Trosko, J.E. Loss of intercellular junctional communication correlates with metastatic potential in mammary adenocarcinoma cells. *Proc. Natl. Acad. Sci. U.S.A.* 85: 473-476 (1988).
279. Nakajima, M., Irimura, T. and Nicolson, G.L. Heparanases and tumor metastasis. *J. Cell. Biochem.* 36: 157-167 (1988).
280. Nicolson, G.L., Lembo, T.M. and Welch, D.R. Growth of rat mammary adenocarcinoma cells in semisolid clonogenic medium not correlated with spontaneous metastatic behavior: Heterogeneity in the metastatic, antigenic, enzymatic and drug sensitivity properties of cells from different sized colonies. *Cancer Res.* 48: 399-404 (1988).
281. La Biche, R.A., Yoshida, M., Gallick, G.E., Irimura, T., Robberson, D.L., Klostergaard, J. and Nicolson, G.L. Gene expression and tumor cell escape from host effector mechanisms in murine large-cell lymphoma. *J. Cell. Biochem.* 36: 393-403 (1988).
282. Nicolson, G.L. Organ specificity of tumor metastasis: Role of preferential adhesion, invasion and growth of unique malignant cells at specific secondary sites. *Cancer Metastasis Rev.* 7: 143-188 (1988).
283. Belloni, P.N. and Nicolson, G.L. Differential expression of cell surface glycoproteins on organ-derived murine vascular endothelia and endothelial cells. *J. Cell. Physiol.* 136: 398-410 (1988).
284. North, S.M., Steck, P.A., Spohn, W.H. and Nicolson, G.L. Development and characterization of a monoclonal antibody to a rat mammary tumor metastasis-associated cell surface antigen. *Intern. J. Cancer* 42: 607-614 (1988).
285. Nicolson, G.L., Lichtner, R.B. and Trosko, J.E. Cytoskeletal and junctional heterogeneity in mammary tumor cells and their possible significance in tumor progression. *In Cancer Metastasis: Biological and Biochemical Mechanisms and Clinical Aspects* (G. Prodi, L. A. Liotta, P.L. Lollini, S. Garbisa, S. Gorini and K. Hellmann, eds.), 21-26, Plenum, New York (1988).
286. Irimura, T., Nakajima, M., Yamori, T., Ota, D.M., Cleary, K.R. and Nicolson, G.L. Glycoconjugates and tumor metastasis. *In Molecular Immunology of Complex Carbohydrates* (A.M. Wu, ed.), 677-704, Plenum, New York (1988).
287. Dabbous, M.K., North, S.M., Haney, L. and Nicolson, G.L. Macrophage and lymphocyte potentiation of syngeneic tumor cell and host fibroblast collagenolytic activity in rats. *Cancer Res.* 48: 6832-6836 (1988).
288. Lichtner, R.B., Gallick, G.E. and Nicolson, G.L. Pyrimido-pyrimidine modulation of EGF growth-promoting activity and p21<sup>ras</sup> expression in rat mammary adenocarcinoma cells. *J. Cell. Physiol.* 137: 285-292 (1988).

289. Nicolson, G.L. Cancer metastasis: Tumor cell and host organ properties important in colonization of specific secondary sites. *Biochim. Biophys. Acta* 948: 175-224 (1988).
290. Nicolson, G.L. Differential organ tissue adhesion, invasion and growth properties of metastatic rat mammary adenocarcinoma cells. *Breast Cancer Res. Treat.* 12: 167-176 (1988).
291. Kawaguchi, T., Kawaguchi, M., Lembo, T.M. and Nicolson, G.L. Differential tumor growth of blood-borne B16 melanoma variants in cerebral dura mater is related to tumor-host cell reactions. *Clin. Expl. Metastasis* 7: 1-14 (1989).
292. Nicolson, G.L. Cell surfaces and secondary tumor formation. *In* Influence of Tumor Development On The Host. Vol. 3, Cancer Growth And Progression (L.A. Liotta, Vol. ed.), 84-96, Kluwer Academic Publishers, Dordrecht, Netherlands (1989).
293. Lichtner, R.B., Erkell, L.J., Schirmacher, V. and Nicolson, G.L. Effects of RA 233 treatment on the adhesive, invasive and metastatic properties of rat mammary tumor cells. *Clin. Expl. Metastasis* 7: 175-186 (1989).
294. Lichtner, R.B., Julian, J.A., Glasser S.R. and Nicolson, G.L. Characterization of cytokeratins expressed in metastatic rat mammary adenocarcinoma cells. *Cancer Res.* 49: 104-111 (1989).
295. Tressler, R.J. and Nicolson, G.L. Cell surface biochemical and metastatic properties of *Lens culinaris* hemagglutinin-binding variants of a murine large cell lymphoma. *Invasion Metastasis* 8: 351-363 (1989).
296. Nicolson, G.L., Belloni, P.N., Tressler, R.J., Dulski, K., Inoue, T. and Cavanaugh, P.G. Adhesive, invasive, and growth properties of selected metastatic variants of a murine large-cell lymphoma. *Invasion Metastasis* 9:102-116 (1989).
297. Nakajima, M. and Nicolson, G.L. Metalloproteinases and cancer metastasis. *Exp. Med.* 7: 542-550 (1989).
298. Ames R.S., North, S.M., Tainsky, M.A., Nicolson, G.L. and Roth, J.A. Analysis of expression of cell surface antigen M<sub>r</sub> 74,000 phosphoglycoprotein in normal, oncogene-transformed and neoplastic rat cell lines. *Cancer Res.* 49: 2312-2319 (1989).
299. Lichtner, R.B., Belloni, P.N. and Nicolson, G.L. Differential adhesion of metastatic rat mammary carcinoma cells to organ-derived microvessel endothelial cells and subendothelial matrix. *Exp. Cell Biol.* 57:146-152 (1989).
300. Tressler, R.J. and Nicolson, G.L. Correlation of inhibition of adhesion of large cell lymphoma and hepatic sinusoidal endothelial cells by RGD-containing peptide polymers with metastatic potential: Role of integrin-dependent and -independent adhesion mechanisms. *Cancer Commun.* 1: 55-63 (1989).
301. Nicolson, G.L. Adhesive, invasive and growth properties of organ-specific metastatic cells. *In* Cancer Metastasis: Molecular and Cellular Biology, Host Immune Responses and Prospective for Treatment (V. Schirmacher and R. Schwartz-Albiez, eds.), 71-85, Springer-Verlag, Heidelberg

(1989).

302. Villanueva, G.B., Nakajima, M. and Nicolson, G.L. Heparin derivatives as inhibitors of heparanase from metastatic melanoma cells. *Ann. N.Y. Acad. Sci.* 556: 496-498 (1989).
303. Cavanaugh, P.G. and Nicolson, G.L. Purification and some properties of a lung-derived growth factor that differentially stimulates the growth of tumor cells metastatic to the lung. *Cancer Res.* 49: 3928-3933 (1989).
304. Nicolson, G.L. Experimental approaches for the prevention of hematogenous metastasis--Commentary. *Oncology* 3: 95-98 (1989).
305. Nicolson, G.L. Metastatic tumor cell interactions with endothelium, basement membrane and tissue. *Curr. Opinion Cell Biol.* 1: 1009-1019 (1989).
306. Rosenberg, N.L. and Nicolson, G.L. Immunolocalization of a subnucleolar nucleoprotein complex containing RNA polymerase I in ascites hepatoma cells using monoclonal antibodies. *Exp. Cell Biol.* 57: 330-338 (1989).
307. Nicolson, G.L., Inoue T., Van Pelt, C. and Cavanaugh, P.G. Differential expression of a  $M_r$  90,000 cell surface transferrin-related glycoprotein on murine B16 metastatic melanoma sublines selected for enhanced brain or ovary colonization. *Cancer Res.* 50: 515-520 (1990).
308. Powis, G., Hickman, J., Workman, P., Tritton, T.R., Abita J-P., Berdel, W.E., Gescher, A., Moses, H.L. and Nicolson, G.L. The cell membrane and cell signals as targets in cancer chemotherapy. *Cancer Res.* 50: 2203-2211 (1990).
309. Nicolson, G.L., Gallick, G.E., Dulski, K.M., Spohn, W.H., Lembo, T. and Tainsky, M.A. Lack of correlation between intercellular junctional communication, p21<sup>rasEJ</sup> expression, and spontaneous metastatic properties of rat mammary cells after transfection with c-H-ras<sup>EJ</sup> or *neo* genes. *Oncogene* 5: 747-753 (1990).
310. Jin, L., Nakajima, M. and Nicolson, G.L. Immuno-histochemical localization of heparanase in mouse and human melanoma metastases. *Intern. J. Cancer* 45: 1088-1095 (1990).
311. Cavanaugh, P.G. and Nicolson, G.L. Purification and characterization of a  $M_r$  66,000 lung-derived paracrine growth factor that preferentially stimulates the *in vitro* proliferation of lung metastasizing tumor cells. *J. Cell. Biochem.* 43: 127-138 (1990).
312. Nicolson, G.L. Organ specificity of metastasis: Adhesive, invasive and growth properties of organ-specific metastatic cells. *In* *New Concepts in Cancer Metastasis: Oncogenes and Growth Factors* (C. Eievant, J. Cros and Y.M. Rustum, eds.), 22-41, Macmillan, New York (1990).
313. North, S.M., Irimura, T. and Nicolson, G.L. Heterogeneity in tumor and macrophage population in the recognition, cytostasis, and cytolysis of neoplastic cells. *In* *Macrophages and Cancer* (G.H. Heppner and A.N. Fulton, eds.), 129-145, CRC Press, FL (1990).
314. Nicolson, G.L. and Hug, V. Regulation of breast cancer growth and metastasis. *Oncol. Case Rep.*

Rev. 5(4): 1-11 (1990).

315. Fidler, I.J. and Nicolson, G.L. Concepts and mechanisms for breast cancer metastasis. *In The Breast: A Comprehensive Textbook for the Management of Benign and Malignant Diseases of the Breast* (K.I. Bland and L.E.M. Copeland III, eds.), 395-408, W.B. Saunders, New York (1990).
316. Li, L., Nicolson, G.L. and Fidler, I.J. Direct *in vitro* lysis of tumor cells by cytokine-activated murine vascular endothelial cells. *Cancer Res.* 51: 245-254 (1991).
317. Irimura, T., Matsushita, Y., Sutton, R.C., Carralero, D., OHannesian, D.W., Cleary, K.R., Ota, D.M., Nicolson, G.L. and Lotan, R. Increased content of an endogenous lactose-binding lectin in human colorectal carcinoma progressed to metastatic stages. *Cancer Res.* 51: 387-393 (1991).
318. Cavanaugh, P.G. and Nicolson, G.L. Organ preference of metastasis: Role of organ paracrine growth factors. *Cancer Bull.* 43: 9-16 (1991).
319. Nicolson, G.L. Quantitative variations in gene expression: Possible role in cellular diversification and tumor progression. *J. Cell. Biochem.* 46: 277-283 (1991).
320. Nicolson, G.L. Tumor and host molecules important in organ preference of metastasis. *Semin. Cancer Biol.* 2: 143-154 (1991).
321. Nicolson, G.L. Molecular mechanisms of cancer metastasis: Tumor and host properties and the role of oncogenes and suppressor genes. *Curr. Opin. Oncol.* 3: 75-92 (1991).
322. Nakajima, M., De Chavigny, A.S., Johnson, C.E., Hamada, J-I., Stein, C.A. and Nicolson, G.L. Suramin: A potent inhibitor of melanoma heparanase and invasion. *J. Biol. Chem.* 266: 9661-9666 (1991).
323. Dabbous, M. Kh., Haney, L., Nicolson, G.L., Eckley, D. and Woolley, D.E. Mast cell modulation of tumour cell proliferation in rat mammary adenocarcinoma 13762NF. *Br. J. Cancer* 63: 873-878 (1991).
324. Lotan, R., Matsushita, Y., Ohannesian, D., Carralero, D., Ota, D.M., Cleary, K.R., Nicolson, G.L. and Irimura, T. Lactose-binding lectin expression in human colorectal carcinomas: Relation to tumor progression. *Carbohydr. Res.* 213: 47-57 (1991).
325. Nicolson, G.L. Gene expression and tumor progression to the metastatic phenotype. *Bioessays* 13: 337-342 (1991).
326. Nicolson, G.L., Custead, S.E., Dulksi, K.M., and Milas, L. Effects of gamma irradiation on cultured rat and mouse microvessel endothelial cells: metastatic tumor cell adhesion, subendothelial matrix degradation, and secretion of tumor growth factors. *Clin. Exp. Metastasis* 9: 457-468 (1991).
327. Cavanaugh, P.G. and Nicolson, G.L. Lung-derived growth factor that stimulates the growth of lung-metastasizing tumor cells: Identification as a transferrin. *J. Cell. Biochem.* 47: 261-271



(1991).

328. Irimura, T., Matsushita, Y., Sutton, R.C., Carralero, D., OHannesian, D.W., Clearly, K.R., Ota, D.M., Nicolson, G.L. and Lotan, R. Increased content of an endogenous lactose-binding lectin in human colorectal carcinoma progressed to metastatic stages. *Cancer Res.* 51: 387-393 (1991).
329. Lichtner, R.B., Julian, J.A., North, S.M., Glasser, S.R. and Nicolson, G.L. Coexpression of cytokeratins characteristics for myoepithelial and luminal cell lineages in rat 13762NF mammary adenocarcinoma tumors and their spontaneous metastases. *Cancer Res.* 51: 5943-5950 (1991).
330. Belloni, P.N., Carney, D.H. and Nicolson G.L. Organ-derived endothelial cells exhibit differential respon-siveness to thrombin and other growth factors. *Microvasc. Res.* 43: 20-45 (1992).
331. Belloni, P.N. and Nicolson, G.L. Role of the vascular endothelium in cancer metastasis. *In Endothelial Cell Dysfunction* (N. Simionescu and M. Simionescu, eds.), 395-425, Plenum Press, New York (1992).
332. Tressler, R.J. and Nicolson, G.L. Butanol-extractable and detergent-solubilized cell surface components from murine large cell lymphoma cells associated with adhesion to organ microvessel endothelial cells. *J. Cell. Biochem.* 148: 162-171 (1992).
333. Nicolson, G.L., Gallick, G.E., Spohn, W.H., Lembo T.M. and Tainsky, M.A. Transfection of activated c-H-ras<sup>EJ</sup>/pSV2neo or pSV2neo genes into rat mammary cells: Rapid stimulation of clonal diversification in spontaneous metastatic and cell surface properties. *Oncogene* 7: 1127-1135 (1992).
334. Nakajima, M. and Nicolson, G.L. Association of high level of serum M<sub>r</sub>~92,000 metalloproteinase activity with lung metastasis of rat 13762NF mammary adenocarcinoma. *Matrix* 1: 409-410 (1992).
335. Menter, D.G., Patton, J.T., Updyke, T.V., Kerbel, R.S., Maamer, M., McIntire, L.V. and Nicolson, G.L. Transglutaminase stabilizes melanoma cell adhesion under laminar flow. *Cell Biophys.* 18: 123-143 (1992).
336. Rosenberg-Nicolson, N.L. and Nicolson, G.L. Nucleo-protein complexes released from large-cell lymphoma nuclei that contain the *abl* oncogene and RNA and DNA polymerase and RNA primase activities. *J. Cell. Biochem.* 50: 43-52 (1992).
337. LaBiche, R.A., DeMars, M. and Nicolson, G.L. Transcripts of the mitochondrial gene ND5 are overexpressed in high metastatic murine large cell lymphoma cells. *In Vivo* 6:317-324 (1992).
338. Nicolson, G.L., Cavanaugh, P.G. and Inoue, T. Differential stimulation of the growth of lung-metastasizing tumor cells by lung (paracrine) growth factors: Identification of transferrin-like mitogens in lung tissue-conditioned medium. *J. Nat. Cancer Inst. Monogr.* 13: 153-161 (1992).
339. Hamada, J.-I., Cavanaugh, P.G., Lotan, O. and Nicolson, G.L. Separable growth and migration factors for large-cell lymphoma cells secreted by microvascular endothelial cells derived from

- target organs for metastasis. *Br. J. Cancer* 66: 349-354 (1992).
340. Rosenberg-Nicolson, N.L. and Nicolson, G.L. Nucleoproteins derived from subnuclear RNA polymerase complexes of metastatic large-cell lymphoma cells possess transcription activities and regulatory properties *in vitro*. *J. Cell. Biochem.* 50: 301-315 (1992).
  341. Yu, D., Hamada, J.-I., Zhang, H., Nicolson, G. L. and Hung, M.-C. Mechanism of *c-erbB2/neu* oncogene-induced metastasis and repression of metastatic properties by adenovirus 5 E1A gene products. *Oncogene* 7: 2263-2270 (1992).
  342. Nicolson, G.L. Paracrine/autocrine growth mechanisms in tumor metastasis. *Oncology Res.* 4: 389-399 (1993).
  343. Yeatman, T.J., Updyke, T.V., Dedman, J.R. and Nicolson, G.L. Expression of annexins on the surfaces of nonmetastatic and metastatic human and rodent tumor cells. *Clin. Exp. Metastasis* 11: 37-44 (1993).
  344. Okumura, Y., Hamada, J-I., Cavanaugh, P. G., and Nicolson, G.L. Preferential growth stimulation of metastatic rat mammary adenocarcinoma cells by organ-derived syngeneic fibroblasts *in vitro*. *Invasion Metastasis* 12: 275-283 (1993).
  345. Nicolson, G.L. Growth mechanisms and cancer progression. *Hospital Practice* 28: 43-53 (1993).
  346. Nicolson, G.L. Cancer progression and growth: Relationship of paracrine and autocrine growth mechanisms to organ preference of metastasis. *Exp. Cell Res.* 204: 171-180 (1993).
  347. Nicolson, G.L. Rapid stimulation of clonal diversification of spontaneous metastatic and cell surface properties by *c-H-ras<sup>EJ</sup>* oncogenes. *In: Heterogeneity of Cancer Cells* (M. D'Incalci, A. Mantovani, S. Garattini, eds.), 77-88, Raven Press, New York (1993).
  348. Nicolson, G.L., Yeatman, T., Tressler, R., Updyke, T., Hamada, J-I, Cavanaugh, P. Tumor cell-endothelial cell interactions during blood-borne metastasis: Role of specific adhesion, motility and growth molecules. *In Pezcoller Foundation Symposia Series* (M.E. Hemler and E. Mihich, eds.), 221-243, Plenum Press, New York (1993).
  349. Inoue, T., Cavanaugh, P.G. and Nicolson, G.L. Differences in transferrin response and numbers of transferrin receptors in rat and human mammary carcinoma lines of different metastatic potentials. *J. Cell. Physiol.* 156: 212-217 (1993).
  350. Menter, D.G., Cavanaugh, P.G. and Nicolson, G.L. Adhesion and growth properties of metastatic tumor cells that colonize specific organ sites. *In Metastasis: Basic Research and Clinical Applications in Oncology*, (H.M. Rabes, ed.), S. Krager, Basel (1993).
  351. Gallick, G.E., Talamonti, M.S. and Nicolson, G.L. Proto-oncogene and tumor suppressor genes in endocrine tumors. *In Endocrine Tumors*, (E.L. Mazzaferri and N.A. Samaan, eds.), 25-35, Balckwell Scientific, Cambridge, MA (1993).
  352. Steck, P. A., and Nicolson, G.L. Metastases to the central nervous system. *In Molecular*

Genetics of Nervous System Tumors, (A. Levine and H. Schmidek, eds.), 371-379, Wiley & Sons, New York (1993).

353. Nicolson, G.L. Invasion and metastasis: an old problem with new approaches—Commentary. *Oncology* 7(4): 52-60 (1993).
354. Yeatman, T.J. and Nicolson, G.L. The molecular basis of tumor progression: The mechanisms of organ-specific tumor metastasis. *Semin. Surg. Oncol.* 9: 256-263 (1993).
355. Tressler, R.J., Updyke, T.V., Yeatman, T. and Nicolson, G.L. Extracellular annexin II is associated with divalent cation-dependent tumor cell-endothelial cell adhesion of metastatic RAW117 large-cell lymphoma cells. *J. Cell. Biochem.* 53: 265-276 (1993).
356. Clayman, G., Wang, S.W., Nicolson, G.L., El-Naggar, A., Mazar, A., Henkin, J., Blasi, F., Goepfert, H., and Boyd, D.D. Regulation of urokinase-type plasminogen activator expression in squamous cell carcinoma of the oral cavity. *Intern. J. Cancer* 54: 73-80 (1993).
357. Patton, J.T., Menter, D.G., Benson, D.M., Nicolson, G.L., and McIntire, L.V. Computerized analysis of tumor cells flowing in a parallel plate chamber to determine their adhesion stabilization lag time. *Cell Mot. Cytoskel.* 26: 88-98 (1993).
358. Pencil, S.D., Toh, Y., and Nicolson, G.L. Candidate metastasis-associated genes of rat 13762NF mammary adenocarcinoma. *Breast Cancer Res. Treat.* 25: 165-174 (1993).
359. Nicolson, G.L. Paracrine and autocrine growth mechanisms in tumor metastasis to specific sites with particular emphasis on brain and lung metastasis. *Cancer Metastasis Rev.* 12: 325-343 (1993).
360. Nicolson, G.L. Tumor microenvironment: paracrine and autocrine growth mechanisms and metastasis to specific sites. *Front. Radiat. Ther. Oncol.* 28: 11-24 (1994).
361. LaBiche, R.A. and Nicolson, G.L. Modulating the metastatic potential of murine RAW117 large cell lymphoma by selection for resistance to interferon-gamma. *Intern. J. Cancer* 54: 1003-1010 (1993).
362. Juarez, J., Clayman, G., Nakajima, M., Tanabe, K., Saya, H., Nicolson, G.L. and Boyd, D. Role and regulation of expression of 92 kDa type IV collagenase (MMP-9) in 2 invasive squamous cell carcinoma cell lines of the oral cavity. *Intern. J. Cancer* 55: 10-18 (1993).
363. Marchetti, D., Menter, D., Jin, L., Nakajima, M. and Nicolson, G.L. Nerve growth factor effects on human and mouse melanoma cell invasion and heparanase production. *Intern. J. Cancer* 55: 692-699 (1993).
364. LaBiche, R.A., Tressler, R.J. and Nicolson, G.L. Selection for enhanced adhesion to microvessel endothelial cells or resistance to interferon- $\gamma$  modulates the metastatic potential of murine RAW117 large-cell lymphoma cells. *Clin. Expl. Metastasis* 11: 472-481 (1993).
365. Hamada, J.-I., Cavanaugh, P.G., Miki, K. and Nicolson, G.L. A paracrine migration-stimulating

- factor for metastatic tumor cells secreted by mouse hepatic sinusoidal endothelial cells: identification as complement component 3b. *Cancer Res.* 53: 4418-4423 (1993).
366. Nakajima, M., Welch, D.R., Wynn, D.M., Tsuruo, T. and Nicolson, G.L. Serum and plasma M<sub>r</sub> 92,000 Progelatinase levels correlate with spontaneous metastasis of rat 13762NF mammary adenocarcinoma. *Cancer Res.* 53: 5802-5807 (1993).
367. Herrmann, J.L., Menter, D.G., Hamada, J.-I., Marchetti, D., Nakajima, M. and Nicolson, G.L. Mediation of NGF-stimulated extracellular matrix invasion by the human melanoma low-affinity p75 neurotrophin receptor: melanoma p75 functions independent of *trkA*. *Mol. Biol. Cell* 4: 1205-1216 (1993).
368. Rosenberg-Nicolson, N.L. and Nicolson, G.L. Nucleoprotein complexes from metastatic cells containing oncogenes and tissue-specific genes: A novel method to track genes associated with specific nucleoproteins. *Cancer Detect. Prev.* 18: 31-42 (1993).
369. Rosenberg-Nicolson, N.L. and Nicolson, G.L. The *p53* gene is bound to specific nucleoproteins of nonmetastatic and metastatic murine large-cell lymphoma cells. *Cancer Mol. Biol.* 1: 95-106 (1994).
370. Nicolson, G.L. Tumor cell adhesion and growth properties and organ-specific metastasis. *In* *Homing Mechanisms and Cellular Targeting*, (B. Zetter, ed.), 123-152, Marcel Dekker Publishers, New York (1994).
371. Yamamoto, M., Sawaya, R., Loskutoff, D.J., Bruner, J.M., Oka, K., Tomonaga, M., Nicolson, G.L. and Rao, J.S. Expression and cellular localization of messenger RNA for plasminogen activator inhibitor type-1 in human astrocytomas in vivo. *Cancer Res.* 54: 3329-3332 (1994).
372. Nicolson, G.L. and G. Barnes, Jr. Malignant cell properties important in the organ preference of metastasis. *In* *Biochemical and Molecular Aspects of Selected Cancers* (Pretlow, T.P. and Pretlow, T.G., eds.), 467-494, Academic Press, New York (1994).
373. Yu, D., Wang, S.S., Dulski, K.M., Nicolson, G.L. and Hung, M.C. *c-erb-2/neu* overexpression enhances metastatic potential in human lung cancer cells by induction of metastasis-associated properties. *Cancer Res.* 54: 3260-3266 (1994).
374. Rosenberg-Nicolson, N.L. and Nicolson, G.L. The isolation, purification and analysis of specific gene-containing nucleoproteins and nucleoprotein complexes. *Meth. Mol. Genet.* 5: 281-298 (1994).
375. Tressler, R.J., Updyke, T.V., Yeatman, T. and Nicolson, G.L. Extracellular annexin VI is associated with divalent cation-dependent endothelial cell adhesion of metastatic RAW117 large-cell lymphoma cells. *Exp. Cell Res.* 215: 395-400 (1994).
376. Nicolson, G.L., Nakajima, M., Herrmann, J.L., Menter, D.G., Cavanaugh, P.G., Park, J.S. and Marchetti, D. Malignant melanoma metastasis to brain: role of degradative enzymes and responses to paracrine growth factors. *J. Neuro-Oncol.* 18: 139-149 (1994).

377. Yamamoto, M., Sawaya, R., Mohanam, S., Bindal, A.K., Bruner, J.M., Oka, K., Rao, V.H., Tomonaga, M., Nicolson, G.L. and Rao, J.S. Expression and localization of urokinase-type plasminogen activator in human astrocytomas in vivo. *Cancer Res.* 54: 3656-3661 (1994).
378. Nicolson, G.L. The use of animal tumor models to study the role of the tumor microenvironment and paracrine and autocrine growth mechanisms in metastasis to specific sites. *In: Cell Culture in Pharmaceutical Research*, (N.E. Fusenig and H. Graf, eds.), 103-123, Springer-Verlag, Berlin (1994).
379. Nicolson, G.L. and Nakajima, M. Tumour rejection antigens of the hsp90 family (gp96) closely resemble tumour-associated heparanase enzymes—reply. *Biochem. J.* 301: 917-918 (1994).
380. Toh, Y., Pencil, S.D. and Nicolson, G.L. A novel candidate metastasis-associated gene *mtal* differentially expressed in highly metastatic mammary adenocarcinoma cell lines: cDNA cloning, expression and protein analyses. *J. Biol. Chem.* 269: 22958-22963 (1994).
381. Yamamoto, M., Sawaya, R., Mohanam, S., Rao, V.H., Bruner, J.M., Nicolson, G.L. and Rao, J.S. Expression and localization of urokinase-type plasminogen activator receptor in human gliomas. *Cancer Res.* 54: 5016-5020 (1994).
382. Nicolson, G.L., Menter, D., Herrmann, J., Cavanaugh P., Jia, L.-B. Hamada, J., Yun, Z. and Marchetti, D. Tumor metastasis to brain: role of endothelial cells, neutrophins and paracrine growth factors. *Crit. Rev. Oncogenesis* 5: 451-471 (1994).
383. Yamamoto, M., Sawaya, R., Mohanam, S., Rao, V.H., Brunner, J.M., Nicolson, G.L., Ohsima, K. and Rao, J.S. Activities, localization and role of serine proteases and their inhibitors in human brain tumor progression. *J. Neuro-Oncol.* 22: 139-151 (1994).
384. Wakabayashi, H., Cavanaugh, P.G. and Nicolson, G.L. Responses to paracrine chemotactic factor and autocrine chemokinetic factor correlates with lung-specific metastatic capability of mouse RAW117 large-cell lymphoma cells. *Br. J. Cancer* 70: 1089-1094 (1994).
385. Lotan, R., Belloni, P.N., Tressler, R.J., Lotan, D., Xu, X.-C. and Nicolson, G.L. Expression of galectins in endothelial cells and their involvement in tumor cell adhesion. *Glycoconjugate J.* 11: 462-468 (1994).
386. Nicolson, G.L. and Mora, E.M. Metastasis cancerosa cerebral. *Pathol. (Mex.)* 32: 155-169 (1994).
387. Mohanam, S., Sawaya, R.E., Yamamoto, M., Bruner, J.M., Nicolson, G.L. and Rao, J.S. Proteolysis and invasiveness of brain tumors: role of urokinase-type plasminogen activator activator receptor. *J. Neuro-Oncol.* 22: 153-160 (1994).
388. Menter, D.G., Herrmann, J.L., Marchetti, D. and Nicolson, G.L. Involvement of neurotrophins and paracrine growth factors in brain metastasis formation. *Invasion Metastasis* 14: 372-384 (1995).
389. Mohanam, S., Wang, S.W., Rayford, A., Yamamoto, M., Sawaya, R., Nakajima, M., Stetler-

- Stevenson, W.G., Liotta, L.A., Nicolson, G.L. and Rao, J.S. Expression of tissue inhibitors of metalloproteinases: negative regulators of human glioblastoma invasion in vivo. *Clin. Expl. Metastasis* 13: 57-62 (1995).
390. Toh, Y., Pencil, S.D. and Nicolson, G.L. Analysis of the complete sequence of the novel gene *mta1* differentially expressed in highly metastatic mammary adeno-carcinoma and breast cancer cell lines and clones. *Gene* 159: 99-104 (1995).
391. Nicolson, G.L. Cancer progression. *Odyssey* 1: 22-29 (1995).
392. Sivaparvathi, M., Sawaya, R., Wang, S.W., Rayford, A., Yamamoto, M., Liotta, L.A., Nicolson, G.L., and Rao, J.S. Overexpression and localization of cathepsin B during the progression of human gliomas. *Clin. Expl. Metastasis* 13: 49-56 (1995).
393. Nicolson, G.L. Tumor cell interactions with the vascular endothelium and its role in cancer metastasis. In: *Epithelial Mesenchymal Interactions in Cancer*, (Goldberg, I.D., Ed.), 123-156, Birkhauser Verlag, Basel (1995).
394. Boyd, D.D. and Nicolson, G.L. Mechanisms of invasion by head and neck cancers. In: *Head and Neck Oncology IV* (W.K. Hong and R. Weber, eds.), 117-130, Kluwer Academic Publishers (1995).
395. Dabbous, M.Kh., North, S.M., Haney, L. and Nicolson, G.L. Effects of mast cell-macrophage interactions on the production of collagenolytic enzymes by metastatic tumor cells and tumor-derived and stromal fibroblasts. *Clin. Expl. Metastasis* 13: 33-41 (1995).
396. Nicolson, N.L., Talpaz, M. and Nicolson, G.L. Interferon- $\alpha$  directly inhibits DNA polymerase activity in isolated chromatin nucleoprotein complexes: correlation with IFN- $\alpha$  treatment outcome in patients with chronic myelogenous leukemia. *Gene* 159: 105-111 (1995).
397. Menter, D.G., Herrmann, J.L. and Nicolson, G.L. The role of trophic factors and paracrine and autocrine growth factors in brain metastasis. *Clin. Expl. Metastasis* 13: 67-88 (1995).
398. Nicolson, G.L. and Nicolson, N.L. Doxycycline treatment and Desert Storm. [letter] *JAMA* 273: 618-619 (1995).
399. Marchetti, D., McCutcheon, I.E., Ross, M.J. and Nicolson, G.L. Inverse expression of neurotrophins and neurotrophin receptors at the invasion front of human melanoma brain metastases. *Intern. J. Oncol.* 7: 87-94 (1995).
400. Hu, M., Pollock, R.E., Nakamura, T. and Nicolson, G.L. Human peritumoral and lung fibroblasts produce paracrine motility factors for recently established human sarcoma cell strains. *Intern. J. Cancer* 62: 585-592 (1995).
401. Rao, V.H., Bridge, J.A., Neff, J.R., Schaefer, G.B., Bueler, B.A., Viswanatha, J.K., Pollock, R.E., Nicolson, G.L., Yamamoto, M., Stetler-Stevenson, W.G., Sawaya, R. and Rao, J.S. Expression of 72-kDa and 92-kDa type IV collagenases from human giant-cell tumor of bone. *Clin. Expl. Metastasis* 13: 420-426 (1995).

402. Wakabayashi, H., Cavanaugh, P.G. and Nicolson, G.L. Purification and identification of mouse lung microvessel endothelial cell-derived chemoattractant for lung-metastasizing murine large-cell lymphoma cells: identification as mouse monocyte chemotactic protein-1. *Cancer Res.* 55: 4458-4464 (1995).
403. Boyd, D.D. and Nicolson, G.L. Mechanisms of invasion by head and neck cancers. *Cancer Treat Res.* 74: 117-130 (1995).
404. Menter, D.G., Herrmann, J.L. and Nicolson, G.L. p75 neurotrophin receptor-mediated trophism as a survival mechanism for malignant melanoma cells. *Cancer Bull.* 47: 131-139 (1995).
405. Nicolson, G.L., Hyman, E., Korényi-Both, A., Lopez, D.A., Nicolson, N.L., Rea, W. and Urnovitz, H. Progress on Persian Gulf War illnesses—reality and hypotheses. *Intern. J. Occup. Med. Tox.* 4: 365-370 (1995).
406. Nicolson, G.L. and Menter, D.G. Trophic factors and central nervous metastasis. *Cancer Metastasis Rev.* 14: 303-321 (1995).
407. Boyd, D.B. and Nicolson, G.L. Invasion of skin squamous cell and basal cell carcinomas of the head and neck: role of matrix-degrading hydrolyses. *In Basal and Squamous Cell Skin Cancers of the Head and Neck* (R.S. Weber, M. Miller, and H. Goepfert, eds.), Lea & Febiger Publishers, Malvern, PA, 57-63 (1995).
408. Menter, D.G., Fitzgerald, L., Patton, J.T., McIntire, L.V. and Nicolson, G.L. Human melanoma integrins contribute to arrest and stabilization potential while flowing over extracellular matrix. *Aust. J. Expl. Biol. Med. Sci.* 73(6): 575-583 (1996).
409. Nicolson, G.L. and Nicolson, N.L. Chronic fatigue illnesses and Operation Desert Storm. *J. Occup. Environ. Med.* 38: 14-16 (1996).
410. Yamamoto, M., Mohanam, S., Sawaya, R., Fuller, G.N., Seiki, M., Sato, H., Gokslan, Z.L., Liotta, L.A., Nicolson, G.L. and Rao, J.S. Differential expression of membrane-type metalloproteinase and its correlation with gelatinase A activation in human malignant brain tumors in vivo and in vitro. *Cancer Res.* 56: 384-392 (1996).
411. Nicolson, G.L., Menter, D., Herrmann, J., Yun, Z., Cavanaugh P. and Marchetti, D. Brain metastasis: role of trophic, autocrine and paracrine factors in tumor invasion and colonization of the central nervous system. *In: Attempts to Understand Metastasis Formation II* (U. Günthert and W. Birchmeier, eds.), Springer, Berlin, 89-115 (1994).
412. Nicolson, G.L. Autocrine and paracrine growth mechanisms in cancer progression and metastasis. *In Encyclopedia of Cancer* (J.R. Bertino, ed.), Academic Press, San Diego, 112-124 (1996).
413. Rajagopalan, S., Updyke, T.V., Nicolson, G.L. and McIntire, L.V. Effect of dynamic stresses on the growth properties of tumor cells of varying metastatic potentials. *Biophys. J.* (1996).
414. Smith, T.W., Yun, Z., Menter, D.G., McIntire, L.V. and Nicolson, G.L. Computerized analysis of

- tumor cell interactions with extracellular matrix proteins, peptides and endothelial cells under laminar flow. *Biotech. Bioengineer.* 50: 598-607 (1996).
415. Sawaya, R.E., Yamamoto, M., Wang, S.W., Mohanam, S., Fuller, G.N., Stetler-Stevenson, W.G., Nicolson, G.L. and Rao, J.S. Expression and localization of 72-kDa type IV collagenase (MMP-2) in human malignant gliomas in vivo. *Clin. Expl. Metastasis* 14: 35-42 (1996).
  416. Nicolson, G.L., Menter, D.G., Herrmann, J.L., Yun, Z., Cavanaugh, P.G. and Marchetti, D. Brain metastasis: role of trophic, autocrine and paracrine factors in tumor invasion and colonization of the central nervous system. *Curr. Top. Microbiol. Immunol.* 213: 89-115 (1996).
  417. Nicolson, G.L. Further information about Persian Gulf War Illnesses. *Intern. J. Occup. Med. Immunol. Tox.* 5: 83-86 (1996).
  418. Menter, D.G., Smith, T.W., Yun, Z., Patton, J., McIntire, L.V. and Nicolson, G.L. Adhesion stabilization of blood-borne cancer cells in the microcirculation. *In: Analytical use of fluorescent probes in oncology* (E. Kohen and J.G. Hirschberg, eds.), Plenum Press, New York, NATO Series A 286: 137-148 (1996).
  419. Rao, J.S., Yamamoto, M., Mohaman, S., Gokaslan, Z.L., Fuller, G.N., Stetler-Stevenson, W.G., Rao, V.H., Liotta, L.A., Nicolson, G.L. and Sawaya, R. Expression of and localization of 92-kDa type IV collagenase/gelatinase B (MMP-9) in human gliomas. *Clin. Expl. Metastasis* 14: 12-18 (1996).
  420. Ellis, L., Nicolson, G.L. and Fidler, I.J. Concepts and mechanisms for breast cancer metastasis. *In The Breast: A Comprehensive Textbook for the Management of Benign and Malignant Diseases of the Breast* (K.I. Bland and L.E.M. Copeland III, eds.), 2nd Ed., W.B. Saunders, New York, pp. 564-581 (1998).
  421. Nicolson, G.L. and Nicolson, N.L. Diagnosis and treatment of mycoplasmal infections in Persian Gulf War Illness-CFIDS patients. *Intern. J. Occup. Med. Immunol. Tox.* 5: 69-78 (1996).
  422. Nicolson, G.L. Further information about Persian Gulf War Illnesses. *Intern. J. Occup. Med. Immunol. Tox.* 5: 83-86 (1996).
  423. Smith, T.W., Menter, D.G., Nicolson, G.L. and McIntire, L.V. Regulation of melanoma cell adhesion stabilization to fibronectin. *Melanoma Res.* 6: 351-362 (1996).
  424. Nicolson, G.L. Bioregulators come of age in the control of tumor growth and metastasis. *J. Natl. Cancer Inst.* 88: 479-480 (1996).
  425. Sivaparvathi, M., Yamamoto, M., Nicolson, G.L., Gokaslan, Z.L., Fuller, G.N., Liotta, L.A., Sawaya, R. and Rao, J.S. Expression and immunohistochemical localization of cathepsin L during the progression of human gliomas. *Clin. Expl. Metastasis* 14: 27-34 (1996).
  426. Nicolson, N.L., Talpaz, M. and Nicolson, G.L. Chromatin nucleoprotein complexes containing tightly-bound *c-abl*, *p53* and *bcl-2* gene sequences: correlation of nucleoprotein-bound genes with progression of chronic myelogenous leukemia. *Gene* 169: 173-178 (1996).



427. Chintala, S.K, Ali-Osman, F., Mohanan, S., Rayford, A., Go, Y., Gokaslan, Z.L., Gagercas, E., Venkaiah, B., Sawaya, R., Nicolson, G.L. and Rao, J.S. Effect of cisplatin and BCNU on MMP-2 levels in human glioblastoma cell lines in vitro. *Clin. Expl. Metastasis* 15: 361-367 (1997).
428. Fukuda, M., Ishii, A., Yasutomo, Y., Shimada, N., Ishikawa, N., Hanai, N., Nagata, N., Irimura, T., Nicolson, G.L. and Kimura, N. Decreased expression of nucleoside diphosphate kinase  $\alpha$  isoform, an *nm23-H2* gene homolog, is associated with metastatic potential of rat mammary adenocarcinoma cells. *Intern. J. Cancer* 65: 531-537 (1996).
429. Nicolson, G.L. The role of cancer metastasis-associated genes in the progression of a tumor to the metastatic state. *Cope* 12: 16-17 (1996).
430. Yun, Z., Menter, D.G. and Nicolson, G.L. Involvement of integrin  $\alpha v \beta 3$  in cell adhesion, motility and liver metastasis of murine RAW117 large-cell lymphoma. *Cancer Res.* 56: 3103-3111 (1996).
431. Sawada, H., Wakabayashi, H., Nawa, A., Mora, E., Cavanaugh, P.G. and Nicolson, G.L. Differential motility stimulation but not growth stimulation or adhesion of metastatic human colorectal carcinoma cells by target organ-derived liver sinusoidal endothelial cells. *Clin. Expl. Metastasis* 14: 308-314 (1996).
432. Kim, C.G., Kim, E.E., Kim, H.J., Choe, J.G., Hong, S.C., Wong, F.C., Theriault, R.L, Nicolson, G.L., Podoloff, D.A. Correlation between bone scan findings and collagenase activities in patients with breast cancer. *Invest. Radiol.* 32(5):302-305 (1997).
433. Nicolson, G.L. and Nicolson, N.L. Chronic Fatigue Illnesses Associated with Service in Operation Desert Storm. Were Biological Weapons Used Against our Forces in the Gulf War? *Townsend Lett. Doctors* 154: 42-48 (1996).
434. Sivaparvathi, M., McCutcheon, I., Sawaya, R., Nicolson, G.L. and Rao, J.S. Expression of cysteine protease inhibitors in human gliomas and meningiomas. *Clin. Expl. Metastasis* 14: 344-350 (1996).
435. Nicolson, G.L. In vitro cell monolayer invasion assay. *Jap. J. Cancer Res. Gann* 86(4): inside cover (1996)
436. Marchetti, D., McQuillan, D.J., Spohn, W.C., Carson, D.D. and Nicolson, G.L. Neurotrophin stimulation of human melanoma cell invasion: enhancement of heparanase activity and degradation of specific heparan sulfate subpopulations. *Cancer Res.* 56: 2856-2863 (1996).
437. Chintala, S.K., Gokaslan, Z.L., Go, Y., Sawaya, R., Nicolson, G.L. and Rao, J.S. Role of extracellular matrix proteins in regulation of human glioma cell invasion in vitro. *Clin. Expl. Metastasis* 14: 358-366 (1996).
438. Nicolson, G.L. and Nicolson, N.L. Mycoplasmal infections—Diagnosis and treatment of Gulf War Illness/CFIDS. *CFIDS Chronicle* 9(3): 66-69 (1996).

439. Nicolson, G.L. and Nicolson, N.L. British Society for Allergy and Environmental Medicine: Comments on the Gulf-War or human laboratory. *Med. Conflict & Survival* 12: 260-262 (1996).
440. Simon, C., Juarez, J., Nicolson, G.L. and Boyd, D. PD 098059, a specific inhibitor of mitogen-activated protein kinase reduces urokinase expression and in vitro invasion. *Cancer Res.* 56: 5369-5374 (1996).
441. Wakabayashi, H. and Nicolson, G.L. Transfilter cell invasion assays. In: *Cell Biology: A Laboratory Handbook*, (J.E. Celis, ed.), Academic Press, New York, 1: 296-301 (1997).
442. Nicolson, G.L. Breast cancer metastasis-associated genes: role in tumor progression to the metastatic state. In: *Mammary Development and Cancer*, P.S. Rudland, D.G. Fernig, S. Leinster, G.G. Lunt, eds., *The Biochemical Society Symp.* 63: 231-243 (1997).
443. Yun, Z., Smith, T.W., Menter, D.G., McIntire, L.V. and Nicolson, G.L. Differential adhesion of metastatic RAW117 large-cell lymphoma cells under static or hydrodynamic conditions: role of integrin  $\alpha v \beta 3$ . *Clin. Expl. Metastasis* 15: 3-11 (1997).
444. Ahn, S.-H., Sawada, H., Ro, J.-Y. and Nicolson, G.L. Expression of annexin I in human mammary ductal epithelial cells from normal tissue and benign and malignant breast lesions. *Clin. Expl. Metastasis* 15: 151-156 (1997).
445. Go, Y., Chintala, S.K., Mohanam, S., Gokaslan, Z., Bjerking, R., Oka, K., Nicolson, G.L., Sawaya, R. and Rao, J.S. Inhibition of in vivo tumorigenicity and invasiveness of a human glioblastoma cell line transfected with antisense uPAR vectors. *Clin. Expl. Metastasis* 15: 440-446 (1997).
446. Marchetti, D. and Nicolson, G.L. Neurotrophin stimulation of human melanoma cell invasion: selected enhancement of heparanase activity and heparanase degradation of specific heparan sulfate subpopulations. *Adv. Enzyme Regul.* 37: 111-134 (1997).
447. Toh, Y., Oki, E., Oda, S., Tokunaga, E., Ohno, S., Maehara, Y., Nicolson, G.L. and Sugimachi, K. Overexpression of *MTA1* gene in colorectal and gastrointestinal carcinomas: correlation with invasion and metastasis. *Intern. J. Cancer* 74: 459-463 (1997).
448. Nicolson, G.L. and Nicolson, N.L. The eight myths of Operation Desert Storm and Gulf War Syndrome. *Medicine, Conflict & Survival* 13: 140-146 (1997).
449. Go, Y., Chintala, S.K., Rayford, A., Gagercas, E., Ali-Osman, F., Venkaiah, B., Sawaya, R., Gokaslan, Z., Nicolson, G.L., and Rao, J.S. Inhibition of in vivo tumorigenicity and invasiveness of a human glioblastoma cell line transfected with antisense uPAR vectors. *Clin. Expl. Metastasis* 15: 440-446 (1997).
450. Nicolson, G.L., Nicolson, N.L. and Nasralla, M. Mycoplasmal infections and Fibromyalgia/Chronic Fatigue Illness (Gulf War Illness) associated with deployment to Operation Desert Storm. *Intern. J. Med.* 1: 80-92 (1998).
451. Go, Y., Chintala, S.K., Rayford, A., Gagercas, E., Ali-Osman, F., Venkaiah, B., Sawaya, R.,

- Gokaslan, Z., Nicolson, G.L., and Rao, J.S. Cisplatin but not BCNU inhibits urokinase-type plasminogen activator levels in human glioblastoma cell lines *in vitro*. *Clin. Expl. Metastasis* 15: 447-452 (1997).
452. Cavanaugh, P.G. and Nicolson, G.L. Selection of highly metastatic rat MTLn2 mammary adenocarcinoma cell variants using *in vitro* growth response to transferrin. *J. Cell. Physiol.* 174: 48-57 (1997).
453. Rao, V.H., Singh R.K., Bridge, J.A., Neff, J.R., Scoffer, G.B., Delaminate, D.C., Dunn, C.M., Sager, W.G., Buehler, B.A., Sawaya, R., Nicolson, G.L. and Rao, J.S. Regulation of MMP-9 (92 kDa type IV collagenase /gelatinase B) expression in stromal cells of human giant cell tumor of bone. *Clin. Expl. Metastasis* 15: 400-409 (1997).
454. Marchetti, D. and Nicolson, G.L. Human melanoma cell invasion: Selected neurotrophin enhancement of melanoma invasion and heparanase activity. *J. Investig. Dermatol. Symp.* 2: 99-105 (1997).
455. Hu, M., Pollock, R.E. and Nicolson, G.L. Purification and characterization of human lung fibroblast motility-stimulating factor for human soft tissue sarcoma cells. Identification as an N-terminal fragment of human fibronectin. *Cancer Res.* 57: 3577-3584 (1997).
456. Nicolson, G.L., Nakajima, M., Wakabayashi, H., Boyd, D., Diaz, D. and Irimura, T. Cancer cell heparanase associated with invasion and metastasis. *Adv. Enzyme Regulat.* 38: 19-32 (1998).
457. Moustafa, A. and Nicolson, G.L. Breast cancer metastasis-associated genes: prognostic significance and therapeutic implications. *Oncol. Res.* 9: 505-525 (1998).
458. Nicolson, G.L. and Nicolson, N.L. Gulf War Illnesses: complex medical, scientific and political paradox. *Med. Conflict & Survival* 14: 156-165 (1998).
459. Nicolson, N.L. and Nicolson, G.L. Politics interfere with diagnosis and treatment of Gulf War Illnesses. *Intern. J. Med.* 1: 161-164 (1998).
460. Gokaslan, Z.L., Chintala, S.K., York, J.E., Boyapati, V., Jasti, S., Sawaya, R., Fuller, G., Wildrick, D.M., Nicolson, G.L. and Rao, J.S. Expression and localization of urokinase-type plasminogen activator in human spinal column tumors. *Clin. Expl. Metastasis* 16: 713-719 (1998).
461. Nicolson, G.L. Chronic infections as a common etiology for many patients with Chronic Fatigue Syndrome, Fibromyalgia Syndrome and Gulf War Illnesses. *Intern. J. Med.* 1: 42-46 (1998).
462. Gokaslan, Z.L., Chintala, S.K., York, J.E., Boyapati, V., Jasti, S., Sawaya, R., Fuller, G., Wildrick, D.M., Nicolson, G.L. and Rao, J.S. Expression and role of matrix metalloproteinases MMP-2 and MMP-9 in human spinal column tumors. *Clin. Expl. Metastasis* 16: 721-728 (1998).
463. Nicolson, G.L., Nicolson, N.L. and Nasralla, M. Mycoplasmal infections and Chronic Fatigue Illness (Gulf War Illness) associated with deployment to Operation Desert Storm. *Intern. J. Med.* 1: 80-92 (1998).

464. Nicolson, G.L. Considerations when undergoing treatment for chronic infections found in Chronic Fatigue Syndrome, Fibromyalgia Syndrome and Gulf War Illnesses. Part 1: Commentary. Part 2: Antibiotics and General Considerations. Intern. J. Med. 1: 115-117 (Part 1), 123-128 (Part 2) (1998).
465. Nicolson, G.L., Nasralla, M, Hier, J. and Nicolson, N.L. Diagnosis and treatment of chronic mycoplasmal infections in Fibromyalgia Syndrome and Chronic Fatigue Syndrome: relationship to Gulf War Illness. Biomed. Therapy 16: 266-271 (1998).
466. Nicolson, G.L. and Moustafa, A.S. Metastasis-associated genes and metastatic tumor progression. In Vivo 12: 579-588 (1998).
467. Haier, J. Nasralla, M., Buhr, H.J. and Nicolson, G.L. Different integrin-mediated adhesion of poorly and highly metastatic colon carcinoma cell lines on extracellular matrix. Langebecks Arch. Surg. 383: 307-313 (1998).
468. Leisure, K.M., Nicolson, N.L. and Nicolson, G.L. Hospitalizations for unexplained illnesses among U.S. veterans of the Persian Gulf War. [letter] Emerg. Infect. Dis. 4: 707-709 (1998).
469. Nasralla, M., Haier, J. and Nicolson, G.L. Mycoplasmal infections in blood from patients with Chronic Fatigue Syndrome, Fibromyalgia Syndrome or Gulf War Illness. In: The Clinical and Scientific Basis of Chronic Fatigue Syndrome, (T. K. Roberts, ed.), Proc. Intern. CFS Congress, Lloyd Scott Enterp., Sydney, 16-20 (1998).
470. Toh, Y., Kuwano, H., Mori, M., Nicolson, G.L. and Sugimachi, K. Overexpression of metastasis-associated *MTA1* mRNA in invasive oesophageal carcinomas. Brit. J. Cancer. 79: 1723-1726 (1999).
471. Cavanaugh, P.G., Jia, L. and Nicolson, G.L. Transferrin receptor overexpression enhances transferrin responsiveness and the metastatic capability of a rat mammary adenocarcinoma cells. Breast Cancer Res. Treat. 56: 203-217 (1999).
472. Nicolson, G.L. Brain invasion, trophic factors and central nervous system metastasis. In: Brain Tumor Invasion: Biological, Clinical and Therapeutic Considerations, (R. Bjerkvig, O.D. Laerum and M.L. Rosenblum, eds.), Wiley-Liss, NY, 357-374 (1999).
473. Haier, J. Nasralla, M., Franco, A.R. and Nicolson, G.L. Detection of mycoplasmal infections in blood of patients with rheumatoid arthritis. Rheumatol. 38: 504-509 (1999).
474. Haier, J. and Nicolson, G.L. Role of the vascular endothelium in cancer metastasis. In: Intramolecular Cross-talk in Metastasis, (G. Skouteris and G.L. Nicolson, eds.), NATO ASI series, IOS Press, Amsterdam, 225-249 (1999).
475. Nicolson, G.L. and Moustafa, M. Gene expression in tumor metastasis and malignant cell progression. In: Intramolecular Cross-talk in Metastasis, (G. Skouteris and G.L. Nicolson, eds.), NATO ASI series, IOS Press, Amsterdam, 1-9 (1999).

476. Haier, J., Nasralla, M. and Nicolson, G.L. Different adhesion properties of poorly and highly metastatic HT-29 colon carcinoma cell lines with extracellular matrix components: role of integrin expression and cytoskeletal components. *Brit. J. Cancer* 80: 1867-1874 (1999).
477. Nicolson, G.L., Nasralla, M, Haier, J., Erwin, R., Nicolson, N.L. and Ngwenya, R. Mycoplasmal infections in chronic illnesses: Fibromyalgia and Chronic Fatigue Syndromes, Gulf War Illness, HIV-AIDS and Rheumatoid Arthritis. *Med. Sentinel* 4: 172-176 (1999).
478. Haier, J., Nasralla, M. and Nicolson, G.L. Influence of phosphotyrosine kinase inhibitors on adhesive properties of highly and poorly metastatic HT-29 colon carcinoma cells to collagen. *Intern. J. Colorectal Dis.* 14: 119-127 (1999).
479. Nasralla, M., Haier, J. and Nicolson, G.L. Multiple mycoplasmal infections detected in blood of Chronic Fatigue Syndrome and Fibromyalgia Syndrome patients. *Eur. J. Clin. Microbiol. Infect. Dis.* 18: 859-865 (1999).
480. Nicolson, G.L. The role of microorganism infections in chronic illnesses: support for antibiotic regimens. *CFIDS Chronicle* 12(3):19-21 (1999).
481. Zucker, S., Hymowitz, M., Conner, C., Zarrabi, H.M, Hurewitz, A.N., Matrisian, L., Boyd, D. Nicolson, G.L. and Montana, S. Measurement of matrix metallo-proteinases (MMPs) and Tissue Inhibitors of Metalloproteinases (TIMPs) in blood and tissues: clinical and experimental applications. *Ann. N. Y. Acad. Sci.* 878: 212-227 (1999).
482. Haier, J., Nasralla, M. and Nicolson, G.L.  $\beta$ 1-integrin mediated dynamic adhesion of colon carcinoma cells to extracellular matrix under laminar flow. *Clin. Expl. Metastasis* 17: 377-387 (1999).
483. Nicolson, N.L. and Nicolson, G.L. Nucleoprotein Gene Tracking: localization of specific HIV-1 genes to subchromatin nucleoprotein complexes in HIV-1 infected human cells. *J. Cell. Biochem. Suppl.* S32: 158-165 (1999).
484. Nicolson, G.L., Nasralla, M, and Nicolson, N.L. The pathogenesis and treatment of mycoplasmal infections. *Antimicrob. Infect. Dis. Newsl.* 17(11): 81-88 (1999).
485. Nicolson, G.L., Nasralla, M., Haier, J., Erwin, R., Nicolson, N.L. and Ngwenya, R. The role of chronic infections in the maintenance and progression of Chronic Fatigue Syndrome, Fibromyalgia Syndrome Rheumatoid Arthritis, Immune Deficiency Syndromes and Gulf War Illness. In: *The Challenge of Chronic Illness: A role for Complex Infections and Channel-opathy*, (T. K. Roberts, ed.), Lloyd Scott Enterp. Ltd., Sydney, Australia, 1-8 (1999).
486. Haier, J. and Nicolson, G.L. Role of the cytoskeleton in adhesion stabilization of human colorectal carcinoma cells to extracellular matrix components under dynamic conditions of laminar flow. *Clin. Expl. Metastasis* 17: 713-721 (1999).
487. Haier, J. and Nicolson, G.L. Tumor cell adhesion of human colon carcinoma cells with different metastatic properties to extracellular matrix under dynamic conditions of laminar flow. *J. Cancer Res. Clin. Oncol.* 126: 699-709 (2000).

488. Nicolson, G.L., Nasralla, M., Franco, R., De Meirleir, K., Nicolson, N.L. Ngwenya, R. and Haier, J. Role of Mycoplasmal infections in fatigue illnesses: chronic fatigue and fibromyalgia syndromes, Gulf War illness and rheumatoid arthritis. In: Chronic Fatigue Syndrome: Critical Reviews and Clinical Advances (K De Meirleir, R. Patarca-Montero, eds.), Haworth Medical Press, New York, 23-39 (2000).
489. Nicolson, N.L. and Nicolson, G.L. HIV-1 genes are localized in specific nucleoproteins in subchromatin complexes in HIV-1 infected human cells. Intern. J. Med. Biol. Environ. 28(1): 25-31 (2000).
490. Haier, J., Nasralla, M. and Nicolson, G.L. Cell Surface molecules and their prognostic values in assessing colorectal carcinomas. Ann. Surgery 231(1): 11-24 (2000).
491. Papadimitriou, M.N.B., Menter, D.M., Konstantopoulos, K., Nicolson, G.L. and McIntire, L.V. Integrin  $\alpha 4\beta 1$ /VCAM-1 pathway mediates primary adhesion of RAW117 lymphoma cells to hepatic sinusoidal endothelial cells under laminar flow. Clin. Expl. Metastasis 17: 669-676 (2000).
492. Haier, J. and Nicolson, G.L. Role of the cytoskeleton in adhesion stabilization of human colorectal carcinoma cells to extracellular matrix components under dynamic conditions of laminar flow. Clin. Expl. Metastasis 17: 713-721 (2000).
493. Toh, Y., Kininaka, S., Endo, H., Ohshiro, T., Ikeda, Y., Nakashima, H., Baba, H., Kohnoe, S., Okamura, T., Nicolson, G.L. and Sugimachi, K. Molecular analysis of a candidate metastasis-associate gene *mta1*: interaction with histone deacetylase. J. Exp. Clin. Cancer Res. 19: 105-111 (2000).
494. Nicolson, G.L., Nass, M. and Nicolson, N.L. Safety and efficacy problems with the anthrax vaccine. Why we must not use this vaccine for military personnel. J. Degenerative Disease 2(1): 5-11 (2000).
495. Haier, J. and Nicolson, G.L. Time-dependent dephosphorylation through Ser/Thr phosphatases is required for stable adhesion of highly and poorly metastatic HT-29 colon carcinoma cells to collagen. Anticancer Res. 20: 2265-2271 (2000).
496. Lakka, S.S., Konduri, S.D., Mohanam, S. Nicolson, G.L. and Rao, J.S. In vitro modulation of human lung cancer cell line invasiveness by antisense cDNA of tissue factor pathway inhibitor-2. Clin. Expl. Metastasis 18: 239-244 (2000).
497. Nasralla, M., Haier, J., Nicolson, N.L. and Nicolson, G.L. Examination of mycoplasmas in blood of 565 Chronic Illness patients by polymerase chain reaction. Intern. J. Med. Biol. Environ. 28(1): 15-23 (2000).
498. Nawa, A., Nishimori, K., Lin, P., Maki, Y., Moue, K., Sawada, H., Toh, Y., Funitaka, K. and Nicolson, G.L. Tumor metastasis-associated human *MTA1* gene: its deduced protein sequence, localization and association with breast cancer cell proliferation using antisense phosphorothioate oligonucleotides. J. Cell. Biochem. 79: 202-212 (2000).

499. Haier, J. and Nicolson, G.L. Prognostic value of cell surface molecules in colorectal carcinomas. *Visceralchirurgie* 35: 172-181 (2000).
500. Nicolson, G.L., Haier, J., Nasralla, M, Nicolson, N.L. Ngwenya, R. and De Meirleir, K. Mycoplasmal infections in Chronic Fatigue Syndrome, Fibromyalgia Syndrome and Gulf War Illness. *J. Chron. Fatigue Syndr.* 6(3/4): 23-39 (2000).
501. Mohan, P.M., Lakka, S.S., Mohanam, S., Yoshiaki Kin, Y., Sawaya, Kyritsis, A.P., Nicolson, G.L. and Rao, J.S. Down-regulation of urokinase-type plasminogen activator receptor by antisense construct is due to inhibition of protein translation. *Clin. Exp. Metastasis* 17: 617-621 (2000).
502. Nicolson, G.L., Nasralla, M, Franco, A.R., Nicolson, N.L., Erwin, R., Ngwenya, R. and Berns, P.A. Diagnosis and integrative treatment of intracellular bacterial infections in Chronic Fatigue and Fibromyalgia Syndromes, Gulf War Illness, Rheumatoid Arthritis and other chronic illnesses. *Clin. Pract. Alt. Med.* 1(2): 92-102 (2000).
503. Nicolson, G.L., Nass, M, and Nicolson, N.L. Anthrax vaccine: controversy over safety and efficacy. *Antimicrob. Infect. Dis. Newsl.* 18(1): 1-6 (2000).
504. Nawa, A., Sawada, H., Toh, Y., Nishimori, K. and Nicolson, G.L. Tumor metastasis-associated human *MTA1* gene: effects of antisense oligonucleotides on cell growth. *Intern. J. Med. Biol. Environ.* 28(1): 33-39 (2000).
505. Nicolson, G.L., Nass, M, and Nicolson, N.L. The anthrax vaccine controversy. Questions about its efficacy, safety and strategy. *Medical Sentinel* 5(2): 97-101 (2000).
506. Haier, J. and Nicolson, G.L. Cell biology and clinical implications of adhesion molecules in colorectal diseases: colorectal cancers, infections and inflammatory bowel diseases. *Clin. Expl. Metastasis* 18: 623-638 (2001).
507. Haier, J., Gallick, G.E., Buhr, H.J. and Nicolson, G.L. Adhesion stabilization of HT-29 colon carcinoma cells to extracellular matrix is regulated by pp60src under dynamic conditions of laminar flow. *Owen Wangenstein Surgical Forum LI*, 260-262 (2000).
508. Konduri, S.D., Tasiou, A., Chandrasekar, N., Nicolson, G.L. and Rao, J.S. Role of tissue factor pathway inhibitor-2 (TFPI-2) in amelanotic melanoma (C-32) invasion. *Clin. Expl. Metastasis* 18: 303-308 (2000).
509. Nicolson, G.L., Nasralla, M, Hier, J. and Nicolson, N.L. Gulf War Illnesses: role of chemical, radiological and biological exposures. In: *War or Health*, (H. Tapanainen, ed.), Zed Press, Helsinki, 431-446 (2001).
510. Haier, J. and Nicolson, G.L. Role of tumor cell adhesion as an important factor in formation of distant metastases. *Diseases Colon Rect.* 44(6): 876-884 (2001).
511. Haier, J., Buhr, H.-J. and Nicolson, G.L. Focal adhesion kinase (FAK) regulates cell adhesion of

- HT-29 colon carcinoma cells to extracellular matrix under hydrodynamic conditions of fluid flow. *Langenbecks Arch. Surg.* 30: 55-57 (2001).
512. Yanamandra, N., Konduri, S.D., Mohanam, S., Dinh, D.H., Olivero, W.C., Gujrati, M., Nicolson, G.L. and Rao, J.S. Down-regulation of urokinase-type plasminogen activator receptor (uPAR) induces capase-mediated cell death in human glioblastoma cells. *Clin. Expl. Metastasis* 18: 611-615 (2001).
513. Nicolson, G.L. and Nasralla, M. Advantages and limitations of models for cancer and malignant cell progression in breast cancer. In: *Cancer Handbook*, (Alison, M., Nicolson, G.L., Haier, J., eds.), Macmillan Publishers, 863-872 (2001).
514. Haier, J. and Nicolson, G.L. Models for tumor cell adhesion and invasion. In: *Cancer Handbook*, (Alison, M., Nicolson, G.L., Haier, J., eds.), Macmillan Publishers, London, 983-998 (2001).
515. Nicolson, G.L. Continuing research into Gulf War Illness. *Science* 292: 853 (2001) [Letter]
516. Lakka, S.S., Jasti, S.L., Kyritsis, A.P., Yung, W.K.A., Ali-Osman, F., Nicolson, G.L. and Rao, J.S. Regulation of MMP-9 (Type IV Collagenase) production and invasiveness in gliomas by the extracellular signal-regulated kinase and Jun amino-terminal kinase signaling cascades. *Clin. Expl. Metastasis* 18: 245-252 (2000).
517. Marchetti, D. and Nicolson, G.L. Human heparanase: a molecular determinant of brain metastasis. *Adv. Enzyme Regulat.* 41: 343-359 (2001).
518. Chandrasekar, N., Jasti, S., Yung, A.W.K., Ali-Osman, F., Kyritsis, A.P., Nicolson, G.L., Rao, J.S. and Mohanam, S. Modulation of endothelial cell morphogenesis in vitro by MMP-9 during glial-endothelial cell interactions. *Clin. Expl. Metastasis* 18: 337-342 (2001).
519. Nicolson, G.L., Nawa, A., Sawada, H., Toh, Y., Taniguchi, S., and Nishimori, K. Tumor metastasis-associated human *MTAI* gene: role in epithelial cell proliferation and regulation. In: *Cancer Metastasis--related Genes*, Welch, D., ed., Kluwer Publishers, Amsterdam, 51-63 (2001).
520. Nicolson, G.L. and Nasralla, M.Y. Advantages and limitations of models for cancer and malignant cell progression. In: *Cancer Handbook*, (Alison, M., Nicolson, G.L., Haier, J., eds.), Macmillan Publishers, London, 863-872 (2001).
521. Konduri, S.D., Tasiou, A., Chandrasekar, N., Nicolson, G.L. and Rao, J.S. Role of Tissue Factor Pathway Inhibitor-2 in amelanotic melanoma (C-32) invasion. *Clin. Expl. Metastasis* 18: 303-308 (2001).
522. Haier, J. and Nicolson, G.L. Tumor cell adhesion under hydrodynamic conditions of fluid flow. *Acta Pathol. Microbiol. Immunol. Scand. (APMIS)* 109: 241-262 (2001).
523. Nicolson G.L. and Berns P. Tracking down a treatable cause of Chronic Fatigue Syndrome [Letter]. *Consultant Prim. Care* 41: 168-169 (2001).
524. Nicolson, G.L. Gulf War Illnesses—Causes and Treatments. *Armed Forces Med. Develop.* 2: 41-



44 (2001).

525. Nicolson, G.L. and Ngwenya, R. Dietary considerations for patients with chronic illnesses and multiple chronic infections. A brief outline of eighteen dietary steps to better health. *Townsend Lett.* 219:62-65 (2001).
526. Nicolson, G.L. Gulf War Illnesses—Their Causes and New Treatments. *Emerg. Resp. Disaster Manag.* 3: 41-44 (2001).
527. Haier, J. and Nicolson, G.L. Models for hematological malignancies in cancer research. In: *Cancer Handbook*, (Alison, M., Nicolson, G.L., Haier, J., eds.), Macmillan Publishers, London, 1009-1024 (2001).
528. Cavanaugh P.G. and Nicolson, G.L. Partial purification of a liver-derived tumor cell growth inhibitor that differentially inhibits poorly-liver metastatic cell lines: identification as an active subunit of arginase. *Clin. Expl. Metastasis* 18: 509-518 (2001).
529. Nicolson, G.L. Protection from bioterror and biological warfare agents. *Townsend Lett. Doctors* 221: 62-67 (2001).
530. Haier, J. and Nicolson, G.L. Cell surface molecules as indicators of prognosis in colorectal carcinomas. *New Surgery* 1: 152-157 (2001).
531. De Meirleir, K., De Becker, P., Nijs, J. Perterson, D.L., Nicolson, G.L., Patarca-Montero, R. and Englebienne, P. CFS etiology, the immune system and infection. In: *Chronic Fatigue Syndrome: a Biological Approach*. De (Meirleir, K. and Englebienne, P. eds.), CRC Press, New York, 201-228 (2002).
532. Nicolson, G.L., Nasralla, M., Haier, J and Pomfret, J. High frequency of systemic mycoplasmal infections in Gulf War veterans and civilians with Amyotrophic Lateral Sclerosis (ALS). *J. Clin. Neurosci.* 9: 525-529 (2002).
533. Nicolson, G.L. Autocrine and paracrine growth mechanisms in cancer progression and metastasis. *In: Encyclopedia of Cancer* (J.R. Bertino, ed.), 2<sup>nd</sup> Edition, Academic Press, San Diego, 1: 165-177 (2002).
534. Nicolson, G.L. Bioterror and biological warfare agents—A brief summary. *Emerg. Resp. Disas. Manag.* 4: 61-66 (2002).
535. Nijs, J., Nicolson, G.L., De Becker, P., Coomans, D., De Meirleir, K. High prevalence of mycoplasmal infections among European Chronic Fatigue Syndrome patients. Examination of four *Mycoplasma* species in Chronic Fatigue Syndrome patients. *FEMS Immunol. Med. Microbiol.* 34: 209-214 (2002).
536. Haier, J. and Nicolson, G.L. PTEN regulates tumor cell adhesion of colon carcinoma cells under dynamic conditions of fluid flow. *Oncogene* 21(9): 1450-1460 (2002).
537. Nicolson, G.L., Nawa, A., Toh, Y., Taniguchi, S., and Nishimori, K. Tumor metastasis-associated

human *MTA1* gene and its MTA1 protein product: role in epithelial cancer cell invasion, proliferation and nuclear regulation. *Clin. Expl. Metastasis* 20: 19-24 (2003).

538. Nicolson, G.L., Nasralla, M., De Meirleir, K., Haier, J. Bacterial and viral co-infections in Chronic Fatigue Syndrome (CFS/ME) patients. In: *Clinical and Scientific Aspects of Myalgic Encephalopathy/Chronic Fatigue Syndrome, the Practitioners Challenge*, Alison Hunter Foundation, Sydney, Australia, 27-34 (2002).
539. Haier, J., Gallick, G.E. and Nicolson, G.L. Src protein kinase pp60<sup>c-src</sup> influences adhesion stabilization of HT-29 colon carcinoma cells to extracellular matrix components under dynamic conditions of laminar flow. *J. Exp. Therapeutics Oncol.* 2: 237-246 (2002).
540. Nass, M. and Nicolson, G.L. Anthrax vaccine: historical perspective and current controversy. *J. Nut. Environ. Med.* 12(4): 277-286 (2002).
541. Nijs, J., De Meirleir, K., Coomans, D., De Becker, P. and Nicolson, G.L. Associations between mycoplasmae and 2.5A synthetase RNase L antiviral pathway in Chronic Fatigue Syndrome. In: *Clinical and Scientific Aspects of Myalgic Encephalopathy/Chronic Fatigue Syndrome, the Practitioners Challenge*, Alison Hunter Foundation, Sydney, Australia, 43-48 (2002).
542. Nijs, J., Nicolson, G.L., De Becker, P. and De Meirleir, K. Prevalence of mycoplasmal infections among Belgium CFS patients. In: *Clinical and Scientific Aspects of Myalgic Encephalopathy/Chronic Fatigue Syndrome, the Practitioners Challenge*, Alison Hunter Foundation, Sydney, Australia, 179-180 (2002).
543. De Meirlier, K., De Becker, P., Nijs, J., Peterson, D.L., Nicolson, G.L., Patarca-Montero, R. and Englebienne, P. CFS etiology, the immune system, and infection. In: *Chronic Fatigue Syndrome: A biological approach* (P. Englebienne and K. De Meirlier, eds.), CRC Press, Boca Raton, 201-228 (2002).
544. Hu, M., Nicolson, G.L., Trent, J.C., Yu, D., Zhang, L., Lang, A., Killary, A., Ellis, L.M., Bucana, C.D., and Pollock, R.E. Characterization of 11 human sarcoma cell strains: evaluation of cytogenetics, tumorigenicity, metastasis, and production of angiogenic factors. *Cancer* 95: 1569-1576 (2002).
545. Haier, J., Senninger, N. and Nicolson, G.L. The tumor suppressor PTEN regulates metastatic tumor cell adhesion of colon carcinoma cells. *Langenbecks Arch. Surg./Surgical Forum for Experimental Research* 31: (2002).
546. Nicolson G.L, Berns P., Nasralla M., Haier J., Nicolson N.L., Nass M. Gulf War Illnesses: chemical, radiological and biological exposures resulting in chronic fatiguing illnesses can be identified and treated. *J. Chronic Fatigue Syndr.* 11(1): 135-154 (2003).
547. Nicolson, G.L., Nasralla, M., Gan, R., Haier, J. and De Meirleir, K. Evidence for bacterial (*Mycoplasma*, *Chlamydia*) and viral (HHV-6) co-infections in chronic fatigue syndrome patients. *J. Chronic Fatigue Syndr.* 11(2): 7-20 (2003).
548. Nicolson G.L., Nasralla M., Nicolson N.L. and Haier J. High prevalence of mycoplasmal

- infections in symptomatic (Chronic Fatigue Syndrome) family members of mycoplasma-positive Gulf War Illness patients. *J. Chronic Fatigue Syndr.* 11(2): 21-36 (2003).
549. Nijs, J., De Meirleir, K., Coomans, D., De Becker, P., Nicolson, G.L. Deregulation of the 2.5A synthetase RNase L antiviral pathway by mycoplasmas in subsets of Chronic Fatigue Syndrome. *J. Chronic Fatigue Syndr.* 11(2): 37-50 (2003).
550. Nijs, J., De Meirlier, K., Coomans, D., De Becker, P. and Nicolson, G.L. Immunophenotyping predictive of mycoplasma infection in patients with chronic fatigue Syndrome. *J. Chronic Fatigue Syndr.* 11(2): 51-70 (2003).
551. Nicolson, G.L., Gan, R. and Haier, J. Multiple co-infections (Mycoplasma, Chlamydia, human herpes virus-6) in blood of chronic fatigue syndrome patients: association with signs and symptoms. *Acta Pathol. Microbiol. Immunol. Scand. (APMIS)* 111: 557-566 (2003).
552. Ellithorpe, R.R., Settineri, R. and Nicolson, G.L. Reduction of fatigue by use of a dietary supplement containing glycopospholipids. *J. Am. Nutraceut. Assoc.* 6(1): 23-28 (2003).
553. Nicolson, G.L. Chronic fatigue, aging, mitochondrial function and nutritional supplements. *Townsend Letter* 240(7): 72-76 (2003).
554. Yanamandra, N., Berhow, M.A., Konduri, S., Dinh, D.H., Olivero, W.C., Nicolson, G.L. and Rao, J.S. Triterpenoids from *Glycine max* decrease invasiveness and induce caspase-mediated cell death in human SNB19 glioma cells. *Clin. Expl. Metastasis* 20: 375-383 (2003).
555. Nicolson, G.L. Lipid replacement as an adjunct therapy in chronic fatigue, anti-aging and restoration of mitochondrial function. *J. Am. Nutraceut. Assoc.* 6(3): 22-28 (2003).
556. Agadjanyan, M., Vasilevko, V., Ghochikyan, A., Berns, P., Kesslak, P., Settineri, R.A. and Nicolson, G.L. Nutritional supplement (NT Factor) restores mitochondrial function and reduces moderately severe fatigue in aged subjects. *J. Chronic Fatigue Syndr.* 11(3): 23-36 (2003).
557. Vasilevko, V., Ghochikyan, A., Sadzikava, N., Petrushina, I., Tran, M., Cohen, E.P., Kesslak, P.J., Cribbs, D.H., Nicolson, G.L. and Agadjanyan, M.G. Immunization with a vaccine that combines the expression of MUC1 and B7 co-stimulatory molecules prolongs the survival of mice and delays the appearance of syngenic mouse mammary tumors. *Clin. Expl. Metastasis* 20: 489-498 (2003).
558. Nicolson, G.L. Lipid replacement/antioxidant therapy for anti-aging, fatigue and restoration of mitochondrial function. *AgroFood High Tech* 16(3): 20-23 (2004).
559. Toh, Y., Ohga, T., Endo, K., Adachi, E., Kusumoto, H., Haraguchi, M., Okamura, T., Nicolson, G.L. Expression of the metastasis-associated MTA1 protein and its relationship to deacylation of the histone H4 in esophageal squamous cell carcinomas. *Intern. J. Cancer* 110: 362-367 (2004).
560. Korb, T., Schluter, K., Enns, A., Spiegel, H.U., Senninger, N., Nicolson, G.L. and Haier, J. Integrity of actin fibers and microtubules influences metastatic tumor cell adhesion. *Exp. Cell Res.* 299: 236-247 (2004).

561. Nigs, J. and Nicolson, G.L. Gulf War veterans: Evidence for chromosomal alterations and their significance. *J. Chronic Fatigue Syndr.* 12(1): 79-83 (2004).
562. Nicolson, G.L. and Mareel, M. Molecular cell biology and cancer metastasis: an interview with Garth Nicolson. *Intern. J. Dev. Biol.* 48: 355-363 (2004).
563. Nicolson, G.L., Gan, R. and Haier, J. Evidence for *Brucella* spp. and *Mycoplasma* spp. co-infections in the blood of chronic fatigue syndrome patients. *J. Chronic Fatigue Syndr.* 12(2): 5-17 (2005).
564. von Sengbusch, A., Gassmann, P., Fisch, K., Nicolson, G.L. and Haier, J. Focal adhesion kinase regulates dynamic adhesion of carcinoma cells to collagens. *Am. J. Pathol.* 166: 585-596 (2005).
565. Nicolson, G.L., Berns, P., Gan, R. and Haier, J. Chronic mycoplasmal infections in Gulf War veterans' children and autism patients. *Med. Veritas* 2: 383-387 (2005).
566. Nicolson, G.L. Lipid Replacement/Antioxidant Therapy as an adjunct supplement to reduce the adverse effects of cancer therapy and restore mitochondrial function. *Pathol. Oncol. Res.* 11: 139-144 (2005).
567. Toh, Y. and Nicolson, G.L. *MTA1* (metastasis-associated gene 1). *Atlas Genet. Cytogenet. Oncol. Haematol.* 9(3): 212-213 (2005).
568. Gassmann P, Haier, J., Nicolson, G.L. Cell adhesion and invasion during secondary tumor formation. In: *Cancer Growth and Progression*, vol. 3, Kluwer, Amsterdam, (2005).
569. Nicolson, G.L. Transfilter cell invasion assays. In: *Cell Biology: A Laboratory Handbook*, 3<sup>rd</sup> Edition (J.E. Celis, ed.), Academic Press, New York, 359-362 (2006).
570. Nicolson, G.L. and Ellithrope, R. Lipid replacement and antioxidant nutritional therapy for restoring mitochondrial function and reducing fatigue in chronic fatigue syndrome and other fatiguing illnesses. *J. Chronic Fatigue Syndr.* 13(1): 57-68 (2006).
571. Nicolson, G.L. and Conklin, K.A. Molecular replacement for cancer metabolic and mitochondrial dysfunction, fatigue and the adverse effects of cancer therapy. *Cancer Genomics Proteomics* 3: 159-168 (2006).
572. Gassmann, P., Nicolson, G.L. and Haier, J. Models for tumor cell – endothelial cells interactions. In: *The Cancer Handbook*, 2nd edition (M. R. Alison, ed.), John Wiley & Sons Ltd., Chichester. ISBN-13 978-0-470-01852-1, 1-13 (2007).
573. Haier, J. and Nicolson, G.L. Advantages and Limitations of Models for Cancer and Malignant Cell Progression. In: *The Cancer Handbook*, 2nd edition (Malcolm R. Alison, ed.), John Wiley & Sons Ltd., Chichester, ISBN-13 978-0-470-01852-1 (2007).
574. Nicolson, G.L., Gan, R., Nicolson, N.L. and Haier, J. Evidence for *Mycoplasma*, *Chlamydia pneumoniae* and HHV-6 co-infections in the blood of patients with Autistic Spectrum Disorders.

- J. Neuroscience Res. 85: 1143-1148 (2007).
575. Nicolson, G.L. Metabolic syndrome and mitochondrial function: molecular replacement and antioxidant supplements to prevent membrane oxidation and restore mitochondrial function. *J. Cell. Biochem.* 100(6): 1352-1369 (2007).
576. Nicolson, G.L. Diagnosis and therapy of chronic systemic co-infections in Lyme Disease and other tick-borne infectious diseases. *Townsend Lett.* 285: 93-98 (2007).
577. Nicolson, G.L. Lipid replacement and antioxidant supplements to prevent membrane oxidation and restore mitochondrial function in metabolic syndrome and fatiguing illnesses. *Townsend Lett.* 286: 112-120 (2007).
578. Ellithorpe, R., Mazur, P., Gum, G., Button, G., Pfadenhauer, E.H., Settineri, R.A. and Nicolson, G.L. Comparison of the absorption, brain and prostate distribution, and elimination of  $\text{CaNa}_2\text{EDTA}$  of rectal chelation suppositories to intravenous administration. *J. Amer. Nutraceut. Assoc.* 10(2): 38-44 (2007).
579. Nicolson, G.L., Nicolson, N.L., Haier, J. Chronic Fatigue Syndrome patients subsequently diagnosed with Lyme Disease *Borrelia burgdorferi*: evidence for *Mycoplasma* species co-infections. *J. Chronic Fatigue Syndr.* 14(4): 5-17 (2008).
580. Conklin, K.A. and Nicolson, G.L. Molecular replacement in cancer therapy: reversing cancer metabolic and mitochondrial dysfunction, fatigue and the adverse effects of therapy. *Curr. Cancer Therapy Rev.* 4: 66-76 (2008).
581. Nicolson, G.L. Systemic intracellular bacterial infections (*Mycoplasma*, *Chlamydia*, *Borrelia* species) in neurodegenerative (Alzheimers, MS, ALS) and behavioral diseases (Autistic Spectrum Disorders). *Townsend Lett.* 295: 74-84 (2008).
582. Nicolson, G.L. and Conklin, K.A. Reversing mitochondrial dysfunction, fatigue and the adverse effects of chemotherapy of metastatic disease by Molecular Replacement Therapy. *Clin. Expl. Metastasis* 25: 161-169 (2008).
583. Gassmann, P., Haier, J. and Nicolson, G.L. Cell adhesion and invasion during secondary tumor formation. In: *Cancer Growth and Progression*, Vol. 11, Springer, Berlin DOI: 10.1007/978-1-4020-6729-7-3, 21-32 (2008).
584. Nicolson, G.L. Chronic infections in neurodegenerative and neurobehavioral diseases. *Lab. Medicine* 39(5): 291-299 (2008).
585. Nicolson, G.L. and Nicolson, N.L. New emerging infections: Their development, testing and resulting diseases. *J. Degenerative Dis.* 9(1): 50-53 (2008).
586. Gassmann, P., Haier, J. and Nicolson, G.L. Cell adhesion and invasion during secondary tumor formation: interactions between tumor cells and host organs. In: *Selected Aspects of Cancer Progression: Metastasis, Apoptosis and Immune Response*, (H.E. Kaiser and A. Nasir, eds.), Springer Science, 21-32 (2008).

587. Toh, Y. and Nicolson, G.L. The role of the *MTA* family and their encoded products in human cancers: molecular functions and clinical implications. *Clin. Expl. Metastasis* 26: 215-227 (2009).
588. Nicolson, G.L., Ellithorpe, R., and Settineri, R. Dietary supplement Healthy Curb for reducing weight, girth, body mass, appetite and fatigue while improving blood lipid values with NTFactor Lipid Replacement Therapy. *J. Invest Myalgic Encephalomyelitis* 3(1): 39-48 (2009).
589. Nicolson, G.L., Nicolson, N.L., and Haier, J. Similarities of ME/Chronic Fatigue Syndrome and Autism Spectrum Disorders: Comparisons of co-infections. *J. Invest Myalgic Encephalomyelitis* 3(1): 14-20 (2009).
590. Ellithorpe, R., Jimenez, T., Jacques, B., Settineri, R., Clapp, L. and Nicolson, G.L. Calcium disodium EDTA chelation suppositories: a novel approach for removing heavy metal toxins in clinical practice. In: *Anti-Aging Therapeutics*, R. Klatz and R. Goldman, eds., vol. 11, American Academy of Anti-Aging Medicine, 107-118 (2009).
591. Nicolson, G.L. and Haier, J. Role of chronic bacterial and viral Infections in neurodegenerative, neurobehavioral, psychiatric, autoimmune and fatiguing illnesses: Part 1. *Brit. J. Med. Practit.* 2(4): 20-28 (2009).
592. Nicolson, G.L. and Haier, J. Role of chronic bacterial and viral Infections in neurodegenerative, neurobehavioral, psychiatric, autoimmune and fatiguing illnesses: Part 2. *Brit. J. Med. Practit.* 3(1): 301-311 (2010).
593. Nicolson, G.L. Finally an answer to the most common medical complaint—Fatigue. *Public Health Alert* (10): 1-5 (2011).
594. Nicolson, G.L. Lipid replacement therapy: a nutraceutical approach for reducing cancer-associated fatigue and the adverse effects of cancer therapy while restoring mitochondrial function. *Cancer Metastasis Rev.* 29(3): 543-552 (2010).
595. Nicolson, G.L., Ellithorpe, R.R., Ayson-Mitchell, C., Jacques, B., and Settineri, R. Lipid Replacement Therapy with a glycopospholipid-antioxidant-vitamin formulation significantly reduces fatigue within one week. *J. Am. Nutraceutical Assoc.* 13(1): 10-14 (2010).
596. Nicolson, G.L. and Settineri, R. Lipid Replacement Therapy: a functional food approach with new formulations for reducing cellular oxidative damage, cancer-associated fatigue and the adverse effects of cancer therapy. *Funct. Food Health Dis.* 1(4): 135-160 (2011).
597. Onuma, K., Suenaga, Y., Sakaki, R., Yoshitome, S., Takeya, H., Sato, Y., Ogawara, S., Suzuki, S., Kuramitsu, M., Yokoyama, H., Murakami, A., Ohigashi, H., Hamada, J., Nicolson, G.L., Kobayashi, M., Fujii J. and Okada, F. Development of a quantitative bioassay to assess preventive compounds against inflammation-based carcinogenesis. *Nitric Oxide* 25: 183-194 (2011).
598. Nicolson, G.L. Lipid Replacement Therapy for restoring mitochondrial function and reducing cancer-associated fatigue and the adverse effects of cancer therapy. *In Topics in Cancer*

Survivorship, vol. 2, ISBN 978-953-307-894-6, InTech, Rijeka, 147-164 (2011).

599. Ellithorpe, R.A., Settineri, R., Mitchell, C.A., Jacques, B., Ellithorpe, E. and Nicolson, G.L. Lipid replacement therapy drink containing a glycopospholipid formulation rapidly and significantly reduces fatigue while improving energy and mental clarity. *Funct. Food Health Dis.* 1(8): 245-254 (2011).
600. Toh, Y. and Nicolson, G.L. *MTA1* of the *MTA* (metastasis-associated) gene family and its encoded proteins: molecular and regulatory functions and its role in human cancer progression. *Atlas Genet. Cytogenet. Oncology Haematol.* 15(3): 303-315 (2011).
601. Ellithorpe, R., Calpp, L, Jimenez, T., Jacques, B., Settineri, R., Dyck, H. and Nicolson, G.L. Anti-microbial plus CaNa<sub>2</sub>EDTA chelation suppository therapy for chronic prostatitis/chronic pelvic pain syndrome: preliminary study. Revised (2012).
602. Ellithorpe, R.A., Settineri, R., Jacques, B. and Nicolson, G.L. Lipid Replacement Therapy functional food with NT Factor for reducing weight, girth, body mass, appetite, cravings for foods and fatigue while improving blood lipid profiles. *Funct. Food Health Dis.* 2(1): 11-24 (2012).
603. Nicolson, G.L., Settineri, R. and Ellithorpe, E. Lipid Replacement Therapy with a glycopospholipid formulation with NADH and CoQ10 significantly reduces fatigue in intractable chronic fatiguing illnesses and chronic Lyme disease. *Intern. J. Clin. Med.* 3(3): 163-170 (2012).
604. Nicolson, G.L., Settineri, R. and Ellithorpe, E. Glycopospholipid formulation with NADH and CoQ10 significantly reduces intractable fatigue in Western blot-positive chronic Lyme disease patients: preliminary report. *Funct. Food Health Dis.* 2(3): 35-47 (2012).
605. Nicolson, G.L., Settineri, R. and Ellithorpe, E. Lipid Replacement Therapy with a Glycopospholipid Formulation, NADH and CoQ10 Significantly Reduces Fatigue and Improves Mood and Cognition in Intractable Fatiguing Illnesses and Chronic Lyme Disease. *Townsend Lett.* 347(6): 58-61 (2012).
606. Breeding, P.C., Russell, N. C. and Nicolson, G.L. An integrative model of chronically activated immune-hormonal pathways important in the generation of fibromyalgia. *Brit. J. Med. Practit.* 5(3): a524-a534 (2012).
607. Nicolson, G.L. Mitochondrial dysfunction and disease: loss of mitochondrial function in chronic diseases and its reversal with Lipid Replacement Therapy. *Public Health Alert* (10): 1-4 (2012).
608. Ash, M., Settenari R. and Nicolson, G.L. Fatigue, Immunity and Inflammation: their resolution using natural medicine. *Townsend Lett.* 352(10): 48-51 (2012).
609. Ellithorpe, R.R, Settineri R., Ellithorpe, T. and Nicolson, G.L. Blood homocysteine and fasting insulin levels are reduced and erythrocyte sedimentation rates are increased with a glycopospholipid-vitamin formulation: a retrospective study in older subjects. *Funct. Food Health Dis.* In press (2013).

610. Nicolson, G.L. Mitochondrial dysfunction and chronic disease: treatment with natural supplements. *Alt. Ther. Health Med.* In press (2013).

### **Books and Monographs Edited**

1. Nicolson, G.L., Raftery, M.A., Rodbell, M. and Fox, C.F., eds. *Cell Surface Receptors*, Vol. 8 of *Prog. Clin. Biol. Res.*, Alan R. Liss, Inc., New York (1976), 396 pp.
2. Poste, G. and Nicolson, G.L. eds. *The Cell Surface in Animal Embryogenesis and Development*, Elsevier, North-Holland, Amsterdam (1976), 766 pp.
3. Poste, G. and Nicolson, G.L., eds. *Virus Infection and the Cell Surface*, Elsevier, North-Holland, Amsterdam (1976), 442 pp.
4. Poste, G. and Nicolson, G.L., eds. *Dynamic aspects of Cell Surface Organization*, Elsevier, North-Holland, Amsterdam (1977), 744 pp.
5. Poste, G. and Nicolson, G.L., eds. *Membrane Assembly and Turnover*, Elsevier, North-Holland, New York (1977), 883 pp.
6. Poste, G. and Nicolson, G.L., eds. *Membrane Fusion*, Elsevier, North-Holland, New York (1978), 863 pp.
7. Cotman, C., Poste, G. and Nicolson, G.L., eds. *The Cell Surface and Neuronal Function*, Elsevier, North-Holland, Amsterdam (1980), 546 pp.
8. Poste, G. and Nicolson, G.L., eds. *Cytoskeletal Elements and Plasma Membrane Organization*, Elsevier, North-Holland, Amsterdam (1981), 349 pp.
9. Poste, G. and Nicolson, G.L., eds. *Membrane Reconstitution*, Elsevier, New York (1982), 273 pp.
10. Moloy, P. and Nicolson, G.L., Eds. *Cellular Oncology: New Approaches in Biology, Diagnosis and Treatment*, Praeger, New York (1983) 305 pp.
11. Nicolson, G.L. and Milas, L., eds. *Cancer Invasion and Metastasis: Biologic and Therapeutic Aspects*, Raven Press, New York (1984), 481 pp.
12. Moloy, P., and Nicolson, G.L., eds. *Regional Nodal Metastasis: Biology, Diagnosis and Treatment*, Praeger Press, New York (1987), 256 pp.
13. Nicolson, G. L. and Fidler, I.J., eds. *Tumor Progression and Metastasis*, Alan R. Liss, New York (1988), 302 pp.
14. Deisseroth, A.B., Gutterman, J.U., Nicolson, G.L. *Growth Factors and their Receptors in Cancer*, 43<sup>rd</sup> Annual Symposium on Fundamental Cancer Research, University of Texas Press, Austin, (1990), 117 pp.
15. Skouteris, G. and Nicolson, G.L., eds. *Intramolecular Cross-Talk in Metastasis*, NATO ASI series,



IOS Press, Amsterdam, (1999), 309 pp.

16. Alison, M., Nicolson, G.L., Haier, J.: Cancer Handbook, Macmillan, London, (2001)
17. Nicolson, G.L. and Nicolson, N.L. Project Daylily. Xlibris Press, Philadelphia (2006), 567 pp.
18. Alison, M., Haier, J. and Nicolson, G.L., Cancer Handbook. 2<sup>nd</sup> ed., Wiley & Sons, London, (2007), 1616 pp.
19. Martirosyan, D. and Nicolson, G.L. Functional Food Components in Health and Disease: Science and Practice, CreateSpace, Seattle (2011), 290 pp.