

**PART I: General Information**

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**Place of Birth:** Daykin, Nebraska, USA

**Education:**

1955 A.B. magna cum laude	Harvard College, Cambridge MA
1959 M.D. cum laude	Harvard Medical School, Boston MA
1983 M.A. ad eundum (hon)	Brown University, Providence RI

**Postdoctoral Training:**

1959-1960 Intern in Medicine	Massachusetts General Hospital, Boston MA
1960-1962 Associate in Biochemistry	National Institutes of Health, Bethesda MD
1962-1963 Postdoctoral Fellow in Medicine	Massachusetts General Hospital
1963-1965 Research Fellow in Biology	Harvard University, Cambridge MA
1963-1964 Research Associate in Genetics	Glasgow University, Scotland
1965-1968 Clinical and Research Fellow in Pathology	Massachusetts General Hospital

**Licensure and Certification:**

1959	Diplomate, National Board of Medical Examiners
1965-	Physician, Commonwealth of Massachusetts
1968	Diplomate, American Board of Pathology, Anatomic and Clinical Pathology
1981-1988	Doctor of Medicine, State of Rhode Island and Providence Plantations

### **Academic Appointments:**

1965-1968	Assistant in Pathology	Harvard Medical School
1968-1970	Instructor in Pathology	Harvard Medical School
1970-1978	Assistant Professor of Pathology	Harvard Medical School
1970-1978	Assistant Professor of Pathology	Harvard-MIT Program in Health Sciences and Technology
1981-1986	Associate Professor of Pathology	Brown Medical School
1986-1988	Associate Clinical Professor of Pathology	Brown Medical School
1997-2001	Associate Clinical Professor of Pathology and Laboratory Medicine	Brown Medical School
2001-	Associate Clinical Professor of Pathology	Harvard Medical School

### **Hospital or Affiliated Institution Appointments:**

1968-1974	Assistant Pathologist	Massachusetts General Hospital
1974-1978	Associate Pathologist	Massachusetts General Hospital
1981-1998	Pathologist	Veterans Affairs Medical Center, Providence RI
1998-2001	Chief, Pathology and Laboratory Medicine Service	Veterans Affairs Medical Center Providence RI
2001-	Chief, Pathology and Laboratory Medicine Service	Veterans Affairs Boston Health Care System
2001-	Director, Boston Area Consolidated Laboratories	Veterans Affairs Boston Health Care System
2005-	Medical Director, Network Consolidated Laboratories	Veterans Integrated Service Network-1 VA New England Healthcare System

### **Other Professional Positions and Major Visiting Appointments:**

1968-1974	Consultant in Pathology	Chelsea Soldiers Home, Chelsea MA
1970-1972	Consultant in Pathology	Somerville Hospital, Somerville MA
1971-1981	Consultant in Pathology	Spaulding Rehabilitation Hospital, Boston MA
1973-1978	Consultant in Pathology	McLean Hospital, Belmont MA
1979-1981	Visiting Professor of Laboratory Medicine	University of Connecticut, Farmington CT

### **Hospital and Health Care Organization Service Responsibilities:**

1986-1999	Quality Assurance Coordinator, Pathology	Veterans Affairs Medical Center, Providence RI
1998-2001	Chief, Pathology and Laboratory Medicine Service	Veterans Affairs Medical Center, Providence RI

### **Major Committee Assignments;**

1973-1976	Committee on Research, member	Massachusetts General Hospital
1981-1998	Committee on Research and Development, member	Veterans Affairs Medical Center Providence RI
1982-1986	Infection Control Committee, member	Veterans Affairs Medical Center Providence RI
1982-2001	Blood Usage Review Committee, member	Veterans Affairs Medical Center Providence RI
1983-1984	Committee on Research and Development, chairman	Veterans Affairs Medical Center Providence RI
1985-1986	Utilization Review Committee, member	Veterans Affairs Medical Center Providence RI
1999-2001	Laboratory Utilization Committee, member	Veterans Affairs Medical Center Providence RI
1986-1992	Quality Management Committee, member	Veterans Affairs Medical Center Providence RI
1992-1996	Medical Records Committee, chairman	Veterans Affairs Medical Center Providence RI
1997-2001	Operative and Invasive Procedures Committee, chairman	Veterans Affairs Medical Center Providence RI
2001-	Operative and Invasive Procedures Committee, member	Veterans Affairs Boston Health Care System
2001-	Medical Executive Committee, member	Veterans Affairs Boston Health Care System

### **Professional Societies:**

1969-	American Society for Investigative Pathology	member
1969-	American Society for the Advancement of Science	member
2010- fellow, 2010-	Association of Clinical Scientists	President, 2014, Vice President, 2013

### **Editorial Boards:**

1983-	Member	Research Communications in Molecular Pathology and Pharmacology
2001-	Member	Annals of Clinical and Laboratory Science

### **Awards and Honors:**

1955	Phi Beta Kappa, Harvard College
1959	Alpha Omega Alpha, Harvard Medical School
1962-1963	Post-Doctoral Fellowship, National Institutes of Health
1963-1968	Faculty Research Associate, American Cancer Society

- 1971-1976 Career Development Award, National Institutes of Health
- 1998 Linus Pauling Functional Medicine Award, Institute for Functional  
Medicine
- 1998 Norman C. Clarke, Sr. Award, American College for Advancement  
In Medicine
- 1999 Burton Kallman Scientific Achievement Award, National Nutritional  
Foods Association
- 1999 Kynett Foundation Cardiology Award of Excellence, College of  
Physicians of Philadelphia
- 2000 Special Achievement Award, International Journal of Integrative  
Medicine
- 2000 Dinsdale Award for Scientific Exploration, Society for Scientific  
Exploration
- 2000 Lifetime Achievement Award in Clinical Nutrition, International and  
American Associations of Clinical Nutritionists
- 2000 Twentieth Century Hall of Fame, Prevention Magazine
- 2000 Benjamin Franklin Literary and Medical Society Award
- 2001 Gallery of Heroes Award, Men's Journal Magazine
- 2001 Commendation, Providence Veterans Affairs Medical Center
- 2003 Integrity in Science Award, Weston A Price Foundation
- 2003 Edward Rhodes Stitt Award, Association of Military Surgeons of the  
United States

**Part II: Research, Teaching and Clinical contributions:**

## **A. Narrative report:**

After completing my fellowship and residency training in 1968, I became interested in investigating the biomedical significance of homocysteine. Through the efforts of investigators worldwide in the succeeding years, homocysteine has achieved the status of an important factor in vascular disease, diseases of aging and other fundamental processes in biology and medicine. Other than its important role in sulfur amino acid metabolism, little was known about the biomedical significance of homocysteine until 1962, when children with mental retardation, accelerated growth, and propensity to thrombosis of arteries and veins were found to excrete homocysteine in the urine. My analysis of an archival case of homocystinuria from 1933 disclosed widespread arteriosclerotic plaques and thrombosis of carotid artery with death from stroke in an 8-year-old boy. The cause of homocystinuria in most of these cases is deficiency of cystathionine synthase, a pyridoxal phosphate-dependent enzyme. In 1968, my analysis of a second case of homocystinuria caused by deficiency of methionine synthase, a folate and cobalamin-dependent enzyme, was critical in the discovery of the atherogenic potential of homocysteine. This 2-month-old baby boy was demonstrated to have advanced arteriosclerotic plaques in arteries throughout the body. Because of the difference in enzyme abnormality in these two cases, it was possible for me to conclude that homocysteine causes arteriosclerosis by a direct effect of the amino acid on the cells and tissues of the arteries. Several years later, arteriosclerotic plaques were demonstrated in a third major type of homocystinuria caused by deficiency of methylenetetrahydrofolate reductase, independently corroborating this conclusion.

The conclusion that homocysteine is atherogenic is supported by my demonstration of arteriosclerotic plaques in experimental animals with hyperhomocysteinemia produced by injection or feeding of the amino acid. The homocysteine theory of arteriosclerosis attributes an underlying cause of the disease to dietary deficiencies of vitamin B6 and folic acid, which lead to hyperhomocysteinemia in the general population. Dietary deficiencies of the B vitamins are caused by losses of these sensitive vitamins through important methods of food processing, including milling of grains, canning, extraction of sugar and oils, and chemical additives. When introduced in the early 1970s this revolutionary new view of the underlying cause of arteriosclerosis appeared to contradict the conventional dietary cholesterol and saturated fat approach, placing these factors in a secondary role. Since 1995, hundreds of major prospective and retrospective clinical and epidemiological studies have proven the validity of the homocysteine theory by showing that hyperhomocysteinemia is a potent independent risk factor for vascular disease.

Fortification of processed foods with folic acid in the USA and Canada in 1998 led to acceleration of the decline in stroke mortality in these countries, and blood homocysteine levels were lowered and blood folate levels increased following fortification. Multiple intervention trials with folic acid, vitamin B12 and vitamin B6 resulted in primary prevention of stroke in populations consuming an unfortified diet. However, B vitamin intervention did not reverse or prevent adverse events in multiple trials of secondary prevention of vascular disease.

A collaborative study in Africa demonstrated that protein energy malnutrition causes hyperhomocysteinemia by metabolic down regulation of the cystathionine synthase

pathway for methionine catabolism, potentially explaining the major mortality from vascular disease in vegetarian populations with adequate dietary B vitamins, low dietary saturated fat and cholesterol, and dietary sulfur deficiency. Many studies from the literature have implicated homocysteine elevation in endothelial dysfunction, oxidative stress, excitotoxicity, and inflammation. The causal role of micro-organisms in the origin of vulnerable atherosclerotic plaques has been hypothesized to result from obstruction of *vasa vasorum* by aggregates formed from homocysteinylated lipoproteins and microbes. These trapped aggregates may obstruct the lumens of these vessels that are narrowed by endothelial dysfunction from hyperhomocysteinemia, leading to micro-abscesses within the intima, systemic inflammation, and vulnerable plaques.

Experiments with cell cultures from a child with cystathionine synthase deficiency demonstrated a new biochemical pathway for conversion of the sulfur atom of homocysteine thiolactone to phosphoadenosine phosphosulfate and sulfated glycosaminoglycans. This pathway is inactive in malignant cells, causing failure of sulfate synthesis, accumulation of homocysteine thiolactone, and homocysteinylated cellular proteins, nucleic acids and glycosaminoglycans. Organic synthesis of derivatives of homocysteine thiolactone revealed the new compounds, thioretinamide and thioretinaco containing retinoic acid and cobalamin that are anticarcinogenic, antineoplastic, and antiatherogenic.

These results are explained by a theory of oxidative phosphorylation involving thioretinaco ozonide. This theory relates accumulation of free radical oxygen species to deficiency of thioretinaco ozonide in aging, cancer, arteriosclerosis, and degenerative diseases of aging. Recent studies from the literature have shown that the heme oxygenase function of cystathionine synthase produces superoxide, which catalyzes retinoic acid synthesis from retinol of plasma transthyretin. Synthesis of thioretinamide from enzyme bound retinoic acid and homocysteine thiolactone is suggested to be catalyzed by cystathionine synthase and dehydroascorbate. This theory explains the failure of oxidation of homocysteine to sulfate in scorbutic guinea pigs and in cultured malignant cells.

The early observations of aerobic glycolysis in malignant cells, inhibition of cellular oxidation by carcinogens, and the action of pancreatic enzymes during embryogenesis, can be interpreted as leading to clonal selection of malignant cells from trophoblastic stem cells that are deficient in the heme oxygenase activity of cystathionine synthase with consequent cellular deficiencies of thioretinamide and thioretinaco ozonide. A protocol of nutritional and metabolic intervention, involving thioretinamide, pancreatic enzymes, cobalamin, folate and pyridoxal, dietary nitrilosides, adenosyl methionine, essential amino acids, and ascorbate with bioflavonoids is suggested as an approach to prevention and therapy of degenerative diseases of aging, including arteriosclerosis, cancer, dementia and autoimmune diseases. In diseases exacerbated by a microbial etiology, such as arteriosclerosis and dementia, the use of appropriate antibiotics and medium chain saturated triglycerides is employed to counteract microbial growth and inflammation, facilitating resolution of pathological lesions by metabolic, nutritional and enzyme therapy.

## **Funding Information**

1966-1968	American Cancer Society	PI	Protein synthesis in organ cultures of human tumors
1969-1970	Massachusetts Heart Association	PI	Sulfur amino acids in arteriosclerosis
1969-1978	NIH, NHLI, NIAMDD, R01 grants	PI	Role of homocysteine in arteriosclerosis, cancer
1970	NIH General Research Grant	PI	Biology of sulfur amino acids in cartilage culture
1971-1976	American Heart Association	PI	Role of homocysteine in arteriosclerosis
1984-1992	VA Merit Review	Co-PI	Biology of metastasis

### B. Report of Current Research Activities

1999-2008	VA Cooperative Studies CSP#453 HOST		Executive Committee member, Hyperhomocysteinemia in Renal disease
2013-	Saudi Arabia Ministry of Health SAHACT	PI	Saudi Arabia Homocysteine Arteriosclerosis and Cancer Trial

### C. Report of Teaching

#### 1. Local contributions, medical school courses

1967-1968	HMS II		General Pathology 25 HMS students, lab instructor 6hr/wkX12; 2 hr/wk prep time
1967	HMS III		Endocrine pathophysiology 25 HMS students, lab instructor 6hr/wkX6; 2hr/wk prep time
1968-1970	HMS IV		Tutorial in pathology, 6 HMS students 3hr/wkX12; 3 hr/wkX12 prep time
1968	HMS III		Respiratory pathophysiology 25 HMS students, lab instructor 6hrwkX6; 2hr/wkX6 prep time
1969-1970	HMS II		Cell Biology 6hr/wkX12 25 HMS students, lab instructor 2hr/wkX12 prep time
1969	HMS III		Growth and development course 25 HMS students, lab instructor 6hr/wkX6; 2 hr/wk prep time
1971-1978	HST II		Human pathology course 50 HST students, co-founder

		lecturer, lab instructor 12hr/wkX12; 6hr/wkX12 prep time
1972-1974	HMS III	Hematology pathophysiology, 150 HMS students, lecturer 6hr/wkX6; 2hr/wkX6 prep time
1974	HMS III	Cardiovascular pathophysiology 150 HMS students, lecturer 6hr/wkX6; 2 hr/wkX6 prep time

1. Local contributions, invited presentations

1971	Boston City Hospital	Pathology Department seminar
1971	Massachusetts Institute of Technology	Medical Sciences seminar
1971	Harvard Medical School	Pathology Department seminar
1972	Harvard University	Chemistry Department seminar
1973	Massachusetts General Hospital	Cardiac Research seminar
1973	Massachusetts General Hospital	Connective Tissue research seminar
1973	Harvard Medical School	Orthopedic Surgery Department seminar
1974	Harvard School of Public Health	Nutrition Department seminar
1974	Schrivver Center, Waltham	Mental Retardation seminar
1974	Massachusetts General Hospital	Psychiatric Research seminar
1974	Boston Children's Hospital	Pathology Department seminar
1974	Massachusetts General Hospital	Gastroenterology Research seminar
1974	Peter Bent Brigham Hospital	Medical Grand Rounds
1975	Massachusetts Institute of Technology	Clinical Research seminar
1975	Massachusetts General Hospital	Committee on Research seminar
1976	Massachusetts Rehabilitation Hospital	Research seminar
1976	Massachusetts General Hospital	Immunopathology seminar
1981	Providence VA Medical Center	Laboratory Medicine seminar
1989	Providence VA Medical Center	Medical Grand Rounds
1993	Harvard School of Public Health	Nutrition Department seminar
1995	Roger Williams Hospital, Providence	Medical Grand Rounds
1995	Massachusetts General Hospital	Pathology Grand Rounds
1997	Brown University	Vascular Disease Symposium
1997	Massachusetts Institute of Technology	Boston Nutrition seminar
1998	Brown University	Pathology and Lab Med seminar
1998	Beth Israel Deaconess Hospitals	Endocrinology Grand Rounds
1998	Miriam Hospital, Providence	Medical Grand Rounds
1999	Boston VA Medical Center	Medical Grand Rounds
1999	Providence VA Medical Center	Medical Grand Rounds
2000	Spaulding Rehabilitation Hospital	Distinguished Lecturer
2001	Brown Medical School	Herbert Fanger Lecturer
2001	Boston VA Medical Center	Hematology-Oncology Seminar
2001	McLean Hospital, Belmont	Geriatric Psychiatry Seminar
2002	Brigham & Womens" Hospital	OB-GYN Grand Rounds



2002	Massachusetts General Hospital	Vulnerable Plaque Program Seminar
2003	Massachusetts General Hospital	Human Genetics Grand Rounds
2004	Boston VA Medical Center	Cardiology Grand Rounds
2004	Parkinson's Disease Study Group	Harvard Club of Boston
2005	Commencement Symposium	Harvard University
2006	Boston VA Medical Center	Pathology Grand Rounds
2006	Massachusetts General Hospital	Human Genetics Grand Rounds
2007	Boston VA Medical Center	Cardiology Grand Rounds
2008	Massachusetts General Hospital	Partners Neurology Grand Rounds
2008	Designs for Health Teleconference	Clinical Rounds
2009	Boston VA Medical Center	Cardiology Grand Rounds
2009	Boston VA Medical Center	Pathology Grand Rounds
2012	Boston VA Medical Center	Pathology Grand Rounds

1. Local Contributions, advisory and supervisory responsibilities

1981-1991	Gastroenterology conferences	Laboratory preceptor, 3 fellows, consultant, pathologist 50hr/yr
1981-2001	Dermatopathology conferences	Laboratory preceptor, 2 fellows, consultant, pathologist 50hr/yr
1981-2001	Autopsy pathology conferences	Laboratory preceptor, 15 residents 2 attendings 50 hr/yr
1981-2001	Mortality Morbidity conferences	Laboratory preceptor, 20 residents 10 attendings 10 hr/yr

1. Local Contributions, teaching leadership role

1971-1977 Cofounder and Codirector, Harvard-MIT Program in Health Sciences And Technology, General Pathology course. With Harvey Goldman, Alan Natapoff and Dariush Fahimi, organized and presented the original Course in General Pathology for HST II students.

1. Local Contributions, names of advisees or trainees

1969-1970	Barbara Gilcrest	Professor of Dermatology, BU
1973-1974	Katherine High	Professor of Pediatrics, U Penn
1990-1992	Andrzej Olszewski	Staff scientist, National Food and Nutrition Institute, Warsaw, Poland

2. Regional, national and international contributions

1970	New England Society of Pathologists	Lecture at annual meeting
1971	Yale University	Pathology Department seminar
1971	National Cystic Fibrosis Research Foundation	National symposium
1972	NIAMD, Bethesda	Metabolic Disease seminar
1972	Columbia-Presbyterian Medical Center	Department of Medicine seminar
1972	University of Connecticut Health Center	Laboratory Medicine seminar

1973	Stanford University	Pathology Department seminar
1974	NIH Symposium, Mobile	Endocrinology seminar
1974	Association of Clinical Scientists	Annual symposium, Philadelphia
1975	Merck Institute, New Brunswick	Nutrition seminar
1979	Editors of Prevention Magazine, Emmaus	Research seminar
1979	Wyeth Laboratories, Philadelphia	Research seminar
1979	Scripps Clinic and Research Foundation	Invited lecture
1979	Hoffman-LaRoche, Nutley	Nutrition seminar
1979	University of Wisconsin, Madison	Food Research Institute lecture
1979	Memorial-Sloan Kettering Cancer Center, Medical Center, Rockefeller University	New York Hospital-Cornell Invited lecture
1982	University of Connecticut Health Center	Laboratory Medicine lecture
1983	Cleveland Clinic Foundation	Cardiology Department lecture
1985	Wyeth Laboratories, Philadelphia	Research seminar
1986	National Food and Nutrition Institute	Visiting scientist, Warsaw Poland
1988	St. Vincent's Hospital, Worcester	Cardiology Grand Rounds
1992	Tufts Human Nutrition Research Center	Research seminar
1993	Association of Clinical Scientists	Annual symposium, Newport
1994	Polish Society for Atherosclerosis	Symposium Miedzyzdroje Poland
1994	Beckman Research Institute, Duarte	City of Hope invited lecture
1995	International Conference Homocysteine	Symposium, Dromoland Ireland
1995	Northeastern University	Science seminar
1996	International Congress of Phospholipids	Symposium, Brussels Belgium
1997	Polish Society for Atherosclerosis	International symposium, Zakopane
1997	Natural Products Expo97	Symposium, Baltimore
1997	Specialty Laboratories, Santa Monica	Research symposium
1997	American College of Physicians	Cardiology symposium, Boston
1997	VA Medical Center, Manchester NH	Medical Grand rounds
1998	American Physiological Society	Symposium, San Francisco
1998	Institute for Functional Medicine	Symposium, Hawaii
1998	Abbott Symposium on Cardiac Markers	Museum of Science, Boston
1998	National Vitamin Information	Symposium on B vitamins, New York
1998	Kellogg International Journalists	Symposium on folic acid, Boston Brewster, Mass
1999	Jefferson Medical College, Philadelphia	Medical Grand Rounds
1998	Henry Ford Hospital, Detroit	Cardiology Grand Rounds
1998	Preventive Cardiology, Sarasota	Symposium participant
1998	Abbott Laboratories, Chicago	Research seminar
1998	American College for Advancement in Medicine	Annual meeting symposium
1999	George Washington Medical School	Medical Grand Rounds
1999	American Health Foundation, Valhala	Research seminar
1999	New York University Medical School	Medical Grand Rounds
1999	University of Arizona, Tucson	Research seminar
1999	Institute for Functional Medicine	Symposium, Tucson

1999	Royal College of Pathologists, London	Symposium on homocysteine
1999	Royal Infirmary, Glasgow, Scotland	Symposium on homocysteine
1999	Royal Manchester Infirmary, Manchester	Symposium on homocysteine
1999	International Dairy Federation, San Francisco	Symposium on vascular disease
1999	Manchester Memorial Hospital, Connecticut	Medical Grand Rounds
1999	College of Physicians of Philadelphia	Kynett Foundation lecture
2000	Pantox Laboratories and Prometheus Corporation, San Diego	Research seminars
2000	International Society for Integrative Medicine, Anaheim	Symposium participant
2000	New York Academy of Medicine	National Hypertension and Stroke Association lecture
2000	Society for Scientific Exploration, London, Ontario	Annual meeting symposium
2000	International and American Associations of Clinical Nutritionists	Annual meeting symposium
2000	SwedishAmerican Hospital, Rockford	Cardiology symposium
2001	Vienna General Hospital, Austria	Homocysteine symposium
2001	American Society of Nutritional Sciences, Orlando	Heart disease symposium
2001	Yale University, New Haven	Laboratory medicine seminar
2002	National Cattlemen's Beef Association, Denver	Scientific symposium
2003	Weston A Price Foundation, Washington DC,	Heart disease symposium
2003	Association of Military Surgeons US, San Antonio,	Stitt lecture
2004	Clinical Science Investigators, Northeast Regional Conference, Boxborough	
2004	American Society of Hypertension, Symposium on risk factors, New York	
2005	Keynote lecture, 4 <sup>th</sup> International Conference on Hyperhomocysteinemia, Saarbruecken, Germany	
2005	Rhode Island Dietetic Association annual meeting, Smithfield RI	
2005	4 <sup>th</sup> World Congress, Cellular and Molecular Biology, Poitiers, France	
2007	6 <sup>th</sup> World Congress on Homocysteine Metabolism, Saarbruecken, Germany	
2007	Dean's Hour Lecture, University of North Dakota, Grand Forks	
2008	Keynote speaker, Research Day, Einstein Medical Center, Philadelphia	
2008	Keystone Symposium on Cardiovascular Risk, Breckenridge, Colorado	
2009	American Society of Clinical Laboratory Science lecture, Providence	
2010	Gitlitz Memorial Lecture, Association of Clinical Scientists, San Antonio	
2010	King of Organs 2010 Summit, Saudi Arabia	
2011	Invited Lecture, Association of Clinical Scientists, Louisville	
2011	9 <sup>th</sup> World Congress on Coronary Artery Disease, Venice, Italy	
2012	Invited Lecture, Association of Clinical Scientists, Mobile	
2013	Invited Lecture, Sippecan Philosophical Society, Marion, MA	

## 2. Regional, national or international contributions, leadership role

- 1998 American Physiological Society, national meeting in San Francisco  
Organized and co-chaired symposium on pathophysiology of homocysteine
- 2001 American Society of Nutritional Sciences, national meeting in Orlando  
Organized and co-chaired symposium on malnutrition and ischemic heart  
Disease
- 2004 Guest Editor, Theme issue on Homocysteine and Disease: Basic and  
Clinical Aspects, Cellular and Molecular Biology
- 2005 4<sup>th</sup> World Congress of Cellular and Molecular Biology Association,  
international meeting in Poitiers, France  
Organized and served as moderator of symposium on Homocysteine and  
Disease: Basic and Clinical Aspects
- 2007 6<sup>th</sup> World Congress on Homocysteine Metabolism, Saarbruecken, Germany,  
Served as Chairman, opening plenary session, and Chairman, Poster Awards  
Committee
- 2013 Association of Clinical Scientists Annual Meeting, Boston, Served as Vice  
President and member of the Program Committee
- 2014 Association of Clinical Scientists Annual Meeting, Amelia Island, served as  
President and member of Executive Committee

## 3. Teaching awards received

- 2001 Distinguished Teacher Award, in recognition of twenty years of clinical  
teaching at the Brown University School of Medicine

## 4. Major curriculum offerings

- 1971-1978 Organized, developed, and founded course in General Pathology for  
Harvard-MIT Program in Health Sciences and Technology with two other  
Faculty members of Harvard Medical School and MIT.

## **D. Report of clinical activities**

### 1. Clinical practice

- 1968-1979 Anatomic pathology, Massachusetts General Hospital, Boston
- 1981-2001 Anatomic and clinical pathology, Veterans Affairs Medical Center,  
Providence
- 2001- Anatomic and clinical pathology, Veterans Affairs Boston Health Care  
System

### 2. Patient load

- 1968-1979 Participated in analysis of 1200 autopsies and 25,000 surgicals annually.

- 1981-2001 Analysis and reporting of 25 autopsies, 3,000 surgicals, 1500 cytologies, Supervised 1,000,000 clinical tests in chemistry, hematology, microbiology, Clinical microscopy, blood bank annually.
- 2001- Participated in and directed analysis and reporting of 75 autopsies, 8,000 surgicals, 8,000 Cytologies, and 2,000,000 clinical tests in chemistry, hematology, microbiology, clinical microscopy, blood bank annually.

### 3. Clinical contributions

- 1969- Introduced the concept of elevated blood homocysteine as a risk factor for vascular disease  
Attributed decline in vascular disease mortality to fortification of food supply with synthetic pyridoxine and folic acid  
Developed and applied the homocysteine theory of arteriosclerosis to clinical medicine and preventive medicine  
Popularized the Heart Revolution diet and use of B vitamins for prevention and treatment of vascular disease  
Introduced a nutritional and metabolic protocol for treatment and prevention of diseases of aging, including arteriosclerosis, cancer, dementia, and autoimmune diseases.

### 4. Other relevant clinical information

- 1998- Recognized and received awards from national and international medical and nutritional organizations for discovery, development and application of the homocysteine theory of arteriosclerosis. These organizations include the Institute for Functional Medicine, the American College for Advancement in Medicine, the National Nutritional Foods Association, the College of Physicians of Philadelphia, the International Journal of Integrative Medicine, the Society for Scientific Exploration, the International and American Associations of Clinical Nutritionists, the Benjamin Franklin Literary and Medical Society, the Weston A. Price Foundation, and the Association of Military Surgeons of the United States. Appeared on nationally broadcast radio and television programs to explain the significance and application of the homocysteine theory of arteriosclerosis.

### Part III: Bibliography

#### Original Articles

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17. Arnason BGW, Chelmicka-Szorc E, McCully KS, Oger J, Young M. Tumor growth: suppression in mice by submandibular gland extirpation. *J Natl Cancer Inst* 1975;192:372-374.
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