

Curriculum Vitae

PART I: General Information

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Name: **Shuji Ogino**

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Place of Birth: Akashi-City, Japan

Education

1993	MD	Medicine	University of Tokyo
2001	PhD	Pathology and Pathogenesis (Advisor, Masashi Fukayama, MD, PhD)	University of Tokyo
2010	MS	Epidemiology	Harvard School of Public Health

Postdoctoral Training

07/95-06/97	Resident	Anatomic and Clinical Pathology	Allegheny General Hospital and Medical College of Pennsylvania (currently Drexel University)
07/97-06/99	Resident	Anatomic and Clinical Pathology	Case Western Reserve University
07/99-06/00	Fellow	Molecular Pathology	University of Pennsylvania
07/00-10/01	Post-doc	Molecular Pathology (PI, Robert B. Wilson, MD, PhD)	University of Pennsylvania

Faculty Academic Appointments

11/01-09/04	Instructor	Pathology	Harvard Medical School
10/04-06/08	Assistant Professor	Pathology	Harvard Medical School
07/08-01/15	Associate Professor	Pathology	Harvard Medical School
07/12-03/15	Associate Professor	Epidemiology	Harvard T.H. Chan School of Public Health
02/15-	Professor	Pathology	Harvard Medical School
04/15-	Professor	Epidemiology	Harvard T.H. Chan School of Public Health

Appointments at Hospitals / Affiliated Institutions**Current**

11/01-	Pathologist	Pathology	Brigham and Women's Hospital
11/01-06/16	Faculty Member	Medical Oncology	Dana-Farber Cancer Institute
03/16-	Chief, Division of MPE Molecular Pathological Epidemiology	Pathology	Brigham and Women's Hospital
07/16-	Faculty Member	Oncologic Pathology	Dana-Farber Cancer Institute

Other Professional Positions

2004-	Member	Gastrointestinal Malignancies Program, Dana-Farber / Harvard Cancer Center	
2004-	Member	Cancer Epidemiology Program, Dana-Farber / Harvard Cancer Center	
2007-2016	Associate Member	Center for Molecular Oncologic Pathology, Dana-Farber Cancer Institute and Brigham and Women's Hospital	
2015-	Faculty Member	Program in Quantitative Genomics, Harvard T.H. Chan School of Public Health	

Major Administrative Leadership Positions**Local**

2002-2009	Leader, Pathology Advisory Board for the Nurses' Health Study, and the Health Professionals Follow-up Study		
2012-	Leader, Molecular Pathological Epidemiology (MPE) Working Group		

Regional

2009-2015	Member of Board of Directors, Boston Japanese Researchers Forum		
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International

2013-	Chair, The International Molecular Pathological Epidemiology (MPE) Meeting Series		
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Committee Service**Local**

2010-	Member, Gastrointestinal Cancer Center CRIS/STIP Steering Committee, Dana-Farber Cancer Institute		
2016	Member, <i>Ad Hoc</i> Committee to review the proposed appointment of Jerrold R. Turner, M.D., Ph.D., as Professor of Pathology and Medicine at Brigham and Women's Hospital		

Regional

2007-2008	Advisor, Japanese Researchers' Academic Network of Greater Boston (JARAN)		
2007-2012	Member, Scientific Organizing Committee, International Epigenomics and Sequencing		

2015- Advisor, Boston Japanese Researchers Forum

National and International

2002-2005 Member, Clinical and Laboratory Standards Institute (CLSI) Subcommittee on Sample Collection and Handling for Molecular Test Methods
 2003-2005 Advisor, Clinical and Laboratory Standards Institute (CLSI) Subcommittee on Human Tissue Procurement and Use for Diagnostic and Pharmaceutical Research
 2006-2008 Member, International Meeting on Clinical and Laboratory Genomic Standards (CLGGS)
 2011 Member, Biospecimen Advisory Group, American Cancer Society (ACS)
 2011 Member, National Comprehensive Cancer Network (NCCN) Task Force: Evaluating the Clinical Utility of Tumor Markers in Oncology
 2014-2016 Advisor, the Lower GI Panel of the American Joint Committee on Cancer (AJCC)
 2014- Member, Federation of American Societies for Experimental Biology (FASEB) Excellence in Science Award Committee
 2016- Member, Advisory Board, Universal Scientific Education and Research Network (USERN)

Professional Societies

1998- United States and Canadian Academy of Pathology (USCAP)
 2009-2013 Member, Scientific Abstract Review Board
 1998-2011 College of American Pathologists (CAP)
 2000-2001 Junior Member, Biochemical and Molecular Genetics Resource Committee
 2007-2011 Member, Molecular Oncology Committee
 2000- Association for Molecular Pathology (AMP)
 2005-2006 Member, Training and Education Committee
 2006-2009 CHAMP Moderator
 2006-2009 Member, Publications Committee
 2006-2009 Member, Methylation Testing Working Group
 2007-2008 Member, Nominating Committee
 2008-2011 Member, Membership and Professional Development Committee
 2011 Chair-elect, Membership and Professional Development Committee
 2011-2012 Member, Mutation Nomenclature Working Group
 2012-2013 Chair, Membership Affairs Committee
 2012-2015 Member, Board of Directors
 2013 Chair-elect, Solid Tumor Subdivision
 2013-2015 Member, Strategic Opportunities Committee
 2014-2015 Chair, Solid Tumor Subdivision
 2014-2015 Member, Executive Committee
 2002- American Society of Investigative Pathology (ASIP)
 2012- Society for Epidemiologic Research (SER)
 2013-2016 Member, Education and Professional Development Committee
 2015 Abstract Reviewer for SER Annual Meeting
 2015 Chair, Concurrent Contributor Session at SER Annual Meeting
 2016 Reviewer for Regular Abstracts and Later Breaker Abstracts for Epidemiology Congress of Americas 2016
 2014- American Society for Clinical Investigation (ASCI)
 Elected Member
 2016- Japanese Society of Cancer and Molecular Epidemiology
 2016- American Association for Cancer Research (AACR)

2013 Co-Chairperson, 12th Annual AACR Frontiers in Cancer Prevention Research Meeting

[Joint project of 4 societies]

American Society for Clinical Pathology (ASCP), American Society of Clinical Oncology (ASCO), Association for Molecular Pathology (AMP), and College of American Pathologists (CAP)

2013-2016 Member, AMP/ASCO/ASCP/CAP Molecular Testing for Colorectal Cancer Biomarkers Advisory Panel

Licensure and Certifications

1993- Full Medical License, Japan
 1999- Full Medical License, Commonwealth of Pennsylvania (currently inactive)
 2000- Diplomate in Anatomic Pathology and Clinical Pathology, American Board of Pathology
 2001- Diplomate in Molecular Diagnostics, American Board of Clinical Chemistry
 2001- Full Medical License, Commonwealth of Massachusetts
 2003- Diplomate in Molecular Genetic Pathology, American Board of Pathology

Research Grant Review Committees

2002	National Peer Reviewer Panel (Ad Hoc Member)	Arizona Disease Control Research Commission
2006	Grant Reviewer Panel(Ad Hoc Member)	Association for International Cancer (AICR)
2008	Epidemiology of Cancer (EPIC) Study Section (Ad Hoc Member)	NIH
2011	Biological Sciences Committee (Ad Hoc Reviewer)	Cancer Research UK
2011	Study Section Member: Special Emphasis Panel For RFA-ES-10-002: Epigenomics of Human Health and Diseases	NIH
2011	Training & Career Development Board (Ad Hoc Reviewer)	Cancer Research UK
2011-2012	Grant Reviewer Board (External Referee)	The Netherlands Organisation for Health Research and Development
2012	Grant Evaluation Unit (External Reviewer)	European Commission (Research and Development),European Union (EU)
2016	Study Section Member: Special Emphasis Panel for PAR-15-342 [2016/05 ZCA1 GRB-S (M1) S]: NCI R35 Outstanding Investigator Award	NIH
2016-2017	Biomedical Commission (External Referee)	Flemish Cancer Society, Belgium

Editorial Activities

Ad Hoc Reviewer (for a total of 198 journals)

The number of journals is excessively large because of my multidisciplinary expertise. Hence, I use Impact Factor as a general guide to separate journals into groups. I do not intend to use it as a definitive metric of quality of any given journal.

Journals with Impact Factor 20 or greater

JAMA
Journal of Clinical Oncology
Lancet
Lancet Oncology
Nature Medicine
Nature Reviews Cancer
New England Journal of Medicine

Journals with Impact Factor 10 to 20

American Journal of Gastroenterology
American Journal of Human Genetics
European Urology
Gastroenterology
Genome Biology
Gut
Journal of Clinical Investigation
Journal of The National Cancer Institute
Nature Communications
Nature Reviews Clinical Oncology
Nature Reviews Gastroenterology and Hepatology
PLOS Medicine
Progress in Lipid Research

Journals with Impact Factor 5 to 10

American Journal of Clinical Nutrition
Analytical Chemistry
Biochimica et Biophysica Acta - Reviews on Cancer
British Journal of Cancer
Cancer
Cancer Letters
Cancer Research
Cancer Treatment Reviews
Carcinogenesis
Clinical Cancer Research
Clinical Chemistry
Environment International
Environmental Health Perspectives
Epidemiology
European Journal of Cancer
European Journal of Epidemiology
Human Mutation
International Journal of Cancer
International Journal of Epidemiology
Journal of Medical Genetics
Journal of Pathology
Molecular Cancer Therapeutics
Modern Pathology
Molecular Oncology
Mutation Research - Reviews in Mutation Research
Nucleic Acids Research
Oncogene
Oncoimmunology
Oncotarget
PLoS Genetics
Proceedings of the National Academy of Sciences of the USA (PNAS)
Trends in Molecular Medicine

Other Nature title journal

Nature Reviews Disease Primers

Other journals

Immunology

Cancer Immunology, Immunotherapy
Clinical and Developmental Immunology

Microbiology

Infectious Agents and Cancer
Journal of Infection and Public Health

Pathology

American Journal of Clinical Pathology
American Journal of Pathology
Analytical and Quantitative Cytology and Histology
Analytical Cellular Pathology
Archives of Pathology and Laboratory Medicine
Diagnostic Molecular Pathology
Disease Markers
Experimental and Molecular Pathology
Expert Review of Molecular Diagnostics
Human Pathology
Journal of Clinical Pathology
Journal of Molecular Diagnostics
Journal of OncoPathology
Pathology – Research and Practice
Pathology Research International
Virchows Archiv
World Journal of Pathology
Molecular Diagnosis and Therapy

Oncology

Annals of Surgical Oncology
BMC Cancer
Cancer Biology and Medicine
Cancer Biomarkers
Cancer Genetics
Cancer Investigation
Cancer Management and Research
Cancer Medicine
Cancer Prevention Research
Cancer Science
Cancers
Clinical and Experimental Metastasis
Clinical Colorectal Cancer
Colorectal Cancer
Expert Review of Quality of Life in Cancer Care
Frontiers in Gastrointestinal Cancers
Frontiers in Oncology
Future Oncology
Genes, Chromosomes and Cancer
Journal of Cancer Research and Clinical Oncology
Journal of Cancer Research and Experimental Oncology

Journal of the Egyptian National Cancer Institute
Molecular Cancer Research
Molecular Carcinogenesis
Neoplasia
OncoTargets and Therapy
Onkologie
The Oncologist
Translational Gastrointestinal Cancer
World Journal of Clinical Oncology
World Journal of Gastrointestinal Oncology
World Journal of Surgical Oncology

Epidemiology / Public Health

Austin Journal of Public Health and Epidemiology
Cancer Causes and Control
Cancer Epidemiology
Cancer Epidemiology, Biomarkers and Prevention
Clinical Epidemiology Reviews
Emerging Themes in Epidemiology

Gastroenterology

BMC Gastroenterology
Canadian Journal of Gastroenterology and Hepatology
Expert Review of Gastroenterology and Hepatology
Gastroenterology Research and Practice
ISRN Gastroenterology
Journal of Gastrointestinal and Liver Diseases
World Journal of Gastroenterology
World Journal of Gastrointestinal Pathophysiology
World Journal of Gastrointestinal Endoscopy
World Journal of Hepatology

Medicine

African Journal of Internal Medicine
BMJ Open
Chronic Diseases and Translational Medicine
Journal of Cellular and Molecular Medicine
Journal of Medical Internet Research (JMIR) Research Protocols
Journal of Molecular Medicine
Journal of Personalized Medicine
Journal of Postgraduate Medicine
Journal of Translational Medicine
Medical Science Monitor
Molecular Medicine
Personalized Medicine
Res Medica
World Journal of Translational Medicine

Genomics / Genetics

Annals of Human Genetics
Applied and Translational Genomics
BMC Medical Genetics
BMC Medical Genomics
Clinical Genetics
Cytogenetics and Genomic Research
European Journal of Human Genetics

European Journal of Medical Genetics
Genes
Genetics Research International
Genomics
Heredity
Journal of Genetics
Molecular Genetics and Metabolism
Pharmacogenomics

Endocrinology, Metabolism, and Metabolic Diseases
Journal of Glycomics and Metabolism
World Journal of Diabetes

Epigenetics / Epigenomics
Clinical Epigenetics
Epigenetics

Pharmacology
Anti-Cancer Agents in Medicinal Chemistry
Current Cancer Drug Targets
Current Pharmacogenomics and Personalized Medicine
Drug Discovery Today
E3 Journal of Biotechnology and Pharmaceutical Research
Expert Opinion on Biological Therapy
Expert Opinion on Drug Discovery
Expert Opinion on Investigational Drugs
Expert Review of Anticancer Therapy
Pharmacogenomics and Personalized Medicine
Pharmacological Research

Nutrition Science
Nutrients
Nutrition Research

Biology / Biochemistry / Molecular Biology
Analytical Chemistry
Biomolecules
BioTechniques
DNA and Cell Biology
Expert Review of Proteomics
Journal of Proteomics
Non-coding RNA
Organic Chemistry Insights

Informatics / Bioinformatics
Cancer Informatics

Multidisciplinary or Other Fields
Advancements in Genetic Engineering
Archives of Gynecology and Obstetrics
BioMed Research International
Computers in Biology and Medicine
EBioMedicine
Evolution, Medicine, and Public Health
Frontiers in Biosciences
Interdisciplinary Sciences: Computational Life Sciences

International Journal of Molecular Sciences
 International Journal of Nanomedicine
 International Journal of Nanomedicine and Nanosurgery
 Journal of Neurology
 Journal of Pathology and Epidemiology
 Molecules
 Mutation Research - Fundamental and Molecular Mechanisms of Mutagenesis
 PLoS ONE
 Scientific Reports
 Translational Research
 World Journal of Ophthalmology
 World Journal of Radiology

Other Editorial Roles (selected)

2005 NIH	Expert Reviewer	Genetics Home Reference, National Library of Medicine,
2007-2012	Editorial Board Member	Journal of Molecular Diagnostics
2008-	Editorial Board Member	Clinical Cancer Research
2008-	Editorial Board Member	Modern Pathology
2009-	Editorial Board Member	Journal of Pathology
2010-	Editorial Board Member	International Journal of Clinical and Experimental Pathology
2010-	Editorial Board Member	Expert Review of Molecular Diagnostics
2011-	Review Editor	Frontiers in Gastrointestinal Cancers
2011-	Editorial Board Member	American Journal of Pathology
2012-	Associate Editor	World Journal of Pathology
2012-	Editorial Board Member	Laboratory Investigation
2013-	Editorial Board Member	Clinical Epidemiology Reviews
2014-	Section Editor (Molecular Pathological Epidemiology)	Annals of Clinical Cytology and Pathology
2014-	Section Editor (Molecular Pathological Epidemiology)	Journal of OncoPathology
2014-	Section Editor (Molecular Pathological Epidemiology)	Journal of Disease Markers
2014-	Editorial Board Member	Gut
2014-	Editorial Board Member	British Journal of Cancer
2016-	Editorial Board Member	Matters

Honors and Prizes

1999	Resident Seminar Competition Finalists Award	Ohio Society of Pathologists
1999	Designee for CAP Foundation Scholars Award	College of American Pathologists
2000	Pathologist-in-Training Award	Pulmonary Pathology Society
2004	Executive Officer's Award	Association for Molecular Pathology
2011	Ramzi Cotran Young Investigator Award	United States and Canadian Academy of Pathology (USCAP)
2012	Meritorious Service Award	Association for Molecular Pathology
2014	The Best of AACR Journals	American Association for Cancer Research (AACR)
2014-2016	The Most Influential Scientific Minds: 2014 and 2015; Highly Cited Researcher 2015 and 2016	Thomson Reuters

2014-	Member of Excellence in Science Award Committee	FASEB (Federation of American Societies for Experimental Biology)
2014-	Elected Member	American Society for Clinical Investigation (ASCI)
2015-	Recipient of R35 Outstanding Investigator Award	National Cancer Institute, National Institute of Health

Report of Funded Projects**Funding Information****Past Funded Projects**

- 2001-2007 A Prospective Study of Diet and Cancer
 NCI/NIH P01 CA55075
 Co-Investigator (PI, Walter Willett)
 This Program Project utilizes the Health Professionals Follow-Up Study and the Nurses' Health Study, and the hypotheses relate to dietary and hormonal influences, external carcinogens, physical activity, body mass index, tumor promoting hormonal and growth factors, and NSAID use.
- 2001-2006 A Prospective Study of Pancreatic Cancer Pathogenesis
 NCI/NIH R01 CA86102
 Co-Investigator (PI, Charles Fuchs)
 The purpose of this application was to understand underlying mechanisms, interrelations among etiologic and pathogenic factors, and specificity in relation to specific tumor markers.
- 2007-2011 Molecular Epidemiology of Colorectal Cancer
 NCI/NIH K07 CA122826
 PI (\$556,000 direct; plus Administrative Supplement \$50,800 in 2009-2011)
 The specific aims are: 1) to examine the relationship between one-carbon nutrients and epigenetic changes in colorectal cancer; and 2) to examine the relation between energy balance and related molecular events in tumor as well as patient survival.
- 2007-2012 Prospective Studies of Diet and Cancer in Men and Women
 NCI/NIH P01 CA55075
 Co-Investigator (PI, Walter Willett)
 This Program Project utilizes the Health Professionals Follow-Up Study and the Nurses' Health Study, and the hypotheses relate to dietary and hormonal influences, external carcinogens (including dietary), physical activity, tumor promoting hormonal and growth factors, and NSAID use.
- 2007-2013 DF/HCC SPORE in Gastrointestinal Cancer
 NCI/NIH P50 CA127003
 Co-Investigator in Tissue and Pathology Core (PI, Charles Fuchs)
 The overall aims of this SPORE project are to comprehensively understand carcinogenic mechanisms of gastrointestinal cancers and to apply novel findings to clinical practice. This SPORE represents a large multidisciplinary effort encompassing various fields such as cell biology, oncology, gastroenterology, pathology, radiology, epidemiology and biostatistics. My role is to analyze molecular and pathologic features of gastrointestinal cancer.
- 2008-2009 Gene Expression Profiling of Colorectal Cancer in Prospective Cohort Studies
 DFCI Friends
 Co-PI (with Charles Fuchs)

The aim is to conduct genome-wide analysis of gene expression by microarrays in nearly 1000 colorectal cancers identified in the Nurses' Health Study and Health Professionals Follow-up Study cohorts.

- 2008-2013 Prospective Cohort Collaborative in Pancreatic Cancer Epidemiology and Pathogenesis
 NCI/NIH R01 CA124908
 Co-Investigator (PI, Charles Fuchs)
 This application helps understanding of underlying mechanisms, interrelations among etiologic and pathogenic factors, variation in response due to genetic susceptibility, and specificity in relation to specific tumor markers. We can specify recommendations aimed to reduce its incidence and mortality.
- 2010-2011 Role of Host Immune Response in Colorectal Cancer
 NCI/NIH P50 CA127003 (DF/HCC SPORE in Gastrointestinal Cancer)
 PI for Developmental Project (Overall PI, Charles Fuchs) \$35,000 (direct)
 The aims of this GI SPORE Developmental Project are to examine the role of host immune response in colorectal cancer, to analyze expressions of immunoregulatory molecules in tumor microenvironment, and to explore genome-wide expression data for the identification of potential targets for immunotherapy.
- 2012-2013 Molecular Predictors of Neuroendocrine Tumor Risk and Outcome
 Novartis CRAD001KUS172T
 Co-PI (PI, Matthew Kulke)
 Our overall aims are to identify clinical, pathological and tumor molecular characteristics of neuroendocrine tumors which can predict clinical outcome, and to identify risk factors.
- 2012-2013 Prospective Studies of Diet and Cancer in Men and Women
 NCI/NIH U19 CA55075
 Co-Investigator (PI, Walter Willett)
 The purpose of this subcontract to the U19 project is to address hypotheses relate to dietary, lifestyle and hormonal influences on colorectal neoplasias in the Health Professionals Follow-Up Study and the Nurses' Health Study.
- 2014-2015 Analysis of Host Immunity and Tumor Molecular Characteristics in Colorectal Cancer
 NCI/NIH P50 CA127003 (DF/HCC SPORE in Gastrointestinal Cancer)
 PI for Developmental Project (Overall PI, Charles Fuchs) \$50,000
 The project aims are to analyze expression of immunoregulatory molecules in the tumor microenvironment, and to explore whole exome sequencing and gene expression profiling data for the identification of potential targets for immunotherapy.
- 2015
 for Obesity-driven PDAC: A Comprehensive Study to Define Mechanisms and New Targets
 Prevention and Therapy
 Lustgarten Foundation
 Co-Investigator (PI, Charles Fuchs)
 This project will run (from January 2015) through December 2017. My effort was removed due to effort adjustment for NCI R35 Outstanding Investigator Award funding.
- 2010-2015 The Influence of Diet and Lifestyle on Patients with Advanced Colorectal Cancer
 NCI/NIH R01 CA149222
 Co-Investigator (PI, Jeffrey Meyerhardt)

The aim of this proposal is to examine the role of dietary and lifestyle factors on outcome of patients with metastatic colorectal cancer who enrolled in clinical trials. My role is to analyze molecular and pathologic features of metastatic colorectal cancer.

- 2011-2015 Molecular and Genetic Analysis of Neuroendocrine Tumor Risk and Survival
 NCI/NIH R01 CA151532
 Co-Investigator (PI, Matthew Kulke)
 The aim of this proposal is to examine etiologies and behavior of neuroendocrine tumors (carcinoids and pancreatic endocrine tumors). My role is to analyze molecular and pathologic features of tumors.
- 2010-2015 Epigenetic Events and Colorectal Cancer Epidemiology
 NCI/NIH R01 CA151993
 PI (\$1,821,170 direct)
 This grant has been incorporated into NCI R35 CA197735 Outstanding Investigator Award (project period 8/10/2015 to 7/31/2022). We propose to examine epigenetic changes in cancer cells in relation to one-carbon nutrients and constitutive loss of imprinting, to shed lights on epigenetic events during carcinogenic process. In addition, we will utilize genome-wide mRNA expression data to explore for genes potentially important in altered one-carbon metabolism and DNA methylation reactions.
- 2013-2016 Microbiome Profiling and Colorectal Cancer Outcome
 Friends of the Dana-Farber Cancer Institute
 PI (\$59,335 for 3 years)
 (2013-2014) Role of Gut Microbiota in Colorectal Cancer Development and Progression
 (2014-2015) Analysis of Microbiome in Colorectal Cancer
 (2015-2016) Microbiome Profiling and Colorectal Cancer Outcome
 The aims are to conduct a pilot study of microbiome analysis on paraffin-embedded colorectal cancer tissue by 16S rRNA sequencing and PathSeq analysis using whole exome sequencing (WES) data, and to apply a validated method to over 1500 colorectal cancers identified in the Nurses' Health Study and Health Professionals Follow-up Study.

Current Funded Projects

- 2001-2020 Dietary and Hormonal Determinations of Cancer in Women
 NCI/NIH P01 CA87969
 Subcontract PI (Co-Investigator until December 2016) (PI, Graham Colditz 2001-2006, Susan Hankinson 2006-2015, Meir Stampfer 2015-2020)
 The objective of this Program Project, utilizing the Nurses' Health Study cohort of 121,700 women followed since 1976, is to identify dietary and hormonal determinants of breast, gastrointestinal, and ovarian cancer risk in women, with the ultimate aim to find means for prevention and improved survival.
- 2007-2020 Dietary and Lifestyle Determinants of Colon Cancer Recurrence and Survival
 NCI/NIH R01 CA118553
 Co-Investigator (PI, Charles Fuchs)
 We propose to utilize a NCI-sponsored adjuvant chemotherapy trial in stage III colon cancer (CALGB 89803) which provides: 1) longitudinal prospective assessments of diet, medication, and lifestyle; 2) paraffin-embedded tumor specimens; and 3) comprehensive data on recurrence, mortality, and chemotherapy toxicity.

- 2009-2019 Inflammation and Colorectal Neoplasia
 NCI/NIH R01 CA137178
 Subcontract PI (Co-Investigator until December 2016) (PI, Andrew Chan)
 The primary aim of this proposal is to understand the role of inflammation in colorectal carcinogenic process. Especially, the roles of PTGS2 (cyclooxygenase-2), and downstream inflammatory mediators will be examined in the Nurses' Health Study and the Health Professionals Follow-Up Study.
- 2012-2017 Cancer Epidemiology Cohort in Male Health Professionals
 NCI/NIH UM1 CA167552
 DFCI Subcontract PI (\$755,966) (PI, Walter Willett)
 This grant supports the Health Professionals Follow-Up Study. My roles are to manage pathology laboratory and to provide expertise in tumor tissue analysis and molecular pathological epidemiology (MPE).
- 2013-2018 Impact of Celecoxib and Inflammation on Survival in Stage III Colon Cancer
 NCI/NIH R01 CA169141
 Co-Investigator (PI, Charles Fuchs)
 We aim to utilize resource of Alliance trial (CALGB 80702), including a) assessments of diet, medication usage, and lifestyle; b) tumor specimens; c) blood and germline DNA; and d) extensive data on cancer recurrence and mortality. My role is to assess tumor molecular changes and their interactive effects on outcome.
- 2013-2018 DF/HCC SPORE in Gastrointestinal Cancer
 NCI/NIH P50 CA127003
 Co-Director of Tissue and Pathology Core (PI, Charles Fuchs)
 The overall aims of this SPORE project are to comprehensively understand carcinogenic mechanisms of gastrointestinal cancers and to translate novel findings into clinical practice. This SPORE represents a large multidisciplinary effort encompassing various fields such as cell biology, oncology, pathology, radiology, epidemiology and biostatistics.
- 2014-2019 Molecular Pathological Epidemiology of Colorectal Cancer
 NCI/NIH U01 CA137088
 DFCI Subcontract PI (PI, Ulrike Peters)
 This competitive renewal application is based on a multi-institutional large-scale consortium, Genetics and Epidemiology of Colorectal Cancer Consortium (GECCO). In the renewal application, molecular pathological epidemiology (MPE) has become a central theme, to address etiologic heterogeneity of colorectal carcinomas. I will play a major role as a molecular pathological epidemiologist in this proposal.
- 2015-2022 Accelerating Transdisciplinary Epidemiology of Colorectal Cancer
 NCI/NIH R35 CA197735
 PI (\$3,711,193 direct for 7 years)
 This R35 Outstanding Investigator Award (OIA) application, which received the best Impact Score of 10, has two broad-term goals. One is to conduct "Molecular Pathological Epidemiology (MPE)" of tumor molecular pathology, omics, microbiota, immunity and intratumor heterogeneity, in relation to diet, lifestyle and environmental exposures, colorectal cancer incidence and clinical outcome. We utilize the resources of the Nurses' Health Study (NHS), NHS II, and the Health Professionals Follow-up Study. For the second goal to accelerate transdisciplinary MPE, I plan to develop new statistical

methodologies, organize the International Molecular Pathological Epidemiology (MPE) Meeting Series (to develop STROBE-MPE guideline), and explore new frontiers in integrative population science such as "immuno-MPE", "pharmaco-MPE", "social-MPE", "lifecourse-MPE", "causal inference-MPE", and "MPE-health communication research".

- 2016-2017 The Third International Molecular Pathological Epidemiology (MPE) Meeting
NCI/NHGRI/NIEHS/NIH R13 CA203287
PI (\$20,000 direct)
The meeting was held in Boston, MA, USA on May 12 and 13, 2016. The aims of the Third International MPE Meeting are to integrate molecular pathology and health data science, address challenges and expand opportunities in transdisciplinary frontiers.
- 2016-2018 Transdisciplinary Approach to Colorectal Cancer Immunity, Molecular Pathology, and Clinical Outcome
Nodal Award, Dana-Farber Harvard Cancer Center (DFHCC)
PI (\$99,518 direct for 2 years)
This project aims to integrate cancer immunology and epidemiology, to better understand cancer immunity in relation to risk factors, colorectal tumor molecular pathology and clinical outcome, and to identify possible targets for immuno-prevention and immunotherapy.

Report of Local Teaching and Training

Teaching of Students in Courses

Teaching prior to start of current Harvard appointment

1997-1999	Pathology Laboratory Course Second year medical students	Case Western Reserve University 3-hour session/day for 14 days/year
1997-1998	Pathologic Basis of Diseases Second year medical students	Case Western Reserve University 3-hour session/day for 5 days/year
1997-1998	Renal Pathology Second year medical students	Case Western Reserve University 3-hour session/day for 3 days/year
1997-1998	Infectious Diseases Second year medical students	Case Western Reserve University 3-hour session/day for 5 days/year
1998-1999	Pulmonary Pathology Second year medical students	Case Western Reserve University 3-hour session/day for 3 days/year

Teaching during current Harvard appointment

2003-2004	HST030 Human Pathology Laboratory Second year medical students	Harvard Medical School 2-hour session/day for 7 days/year
2011	HST030 Human Pathology Laboratory Second year medical students	Harvard Medical School 1-hour session/day for 15 days/year

2011	Nutritional Epidemiology of Cancer Doctoral and Master students (ID510)	Harvard School of Public Health 2-hour lecture
2012	HST030 Human Pathology Laboratory Second year medical students	Harvard Medical School 1-hour session/day for 5 days/year
2013	Nutritional Epidemiology of Cancer Doctoral and Master students (ID510)	Harvard School of Public Health 2-hour lecture
2015	Nutritional Epidemiology of Cancer Doctoral and Master students (ID510) (co-lecturer with Reiko Nishihara)	Harvard T.H. Chan School of Public Health 2-hour lecture

Formal Teaching of Residents, Clinical Fellows and Research Fellows

Teaching during current Harvard appointment

2002-2003	Genetic Risk Analysis Molecular Genetic Pathology Fellows	Brigham and Women's Hospital 2-hour session/year
2003-2010	Genetic Risk Assessment Workshop Genetics and Pathology Residents/Fellows	Brigham and Women's Hospital 2-hour session/day for 2 days/year
2003-2011	Advanced Genetic Risk Assessment Genetics and Pathology Residents/Fellows	Brigham and Women's Hospital 1-hour lecture/year
2010-	Molecular Diagnostics Lecture (Statistics) Pathology Residents/Fellows	Brigham and Women's Hospital 1-hour lecture/year

Clinical Supervisory and Training Responsibilities

Teaching prior to start of current Harvard appointment

1996-1997	Supervision of junior residents / Allegheny General Hospital	200 hours/year
1997-1999	Supervision of junior residents / Case Western Reserve University	200 hours/year
1999-2000	Supervision of pathology residents and medical students in Molecular Pathology Laboratory / University of Pennsylvania	800 hours/year
2000-2001	Supervision of fellows, residents and medical students in Molecular Pathology Laboratory / University of Pennsylvania	100 hours/year

Teaching during current Harvard appointment

2001-2007	Supervision of residents in general surgical pathology / Brigham and Women's Hospital	450 hours/year
2004-	Supervision of residents and fellows in molecular diagnostics / Brigham and Women's Hospital	300 hours/year

Laboratory and Other Research Supervisory and Training Responsibilities

2002-	Supervision of research fellows / Dana-Farber Cancer Institute	Daily mentorship for 11 years
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Formally Supervised Trainees (publication data are based on up to the 157th original article)

2001-2002	Ruliang Xu, MD, PhD / Associate Professor of Pathology, New York University He published one paper as the first author under my supervision.
2002-2003	Chong Xu, MD / Former Instructor in Obstetrics and Gynecology, Harvard Medical School
2005-2006	Taiki Yamaji, MD, MPH / Staff Scientist, National Cancer Center, Japan
2003-2007	Takako Kawasaki, MD, PhD / Physician, Singapore She published 5 original papers as the first author and 2 other original papers as a co-first author under my supervision.
2006-2008	Mutsuko Ohnishi, MD / Postdoctoral Fellow, Harvard School of Dental Medicine She received a fellowship grant (2007-2008) from Japanese Society for Multidisciplinary Treatment of Cancer, and published 2 original papers as a co-first author under my supervision.
2006-2008	Aditi Hazra, PhD, MPH / Assistant Professor, Harvard Medical School She received 2008 American Association of Cancer Research Scholar-in-Training Award under my supervision.
2007-2010	Katsuhiko Nosho, MD, PhD / Assistant Professor of Medicine, Sapporo Medical University He received a fellowship grant (2008-2010) from Japan Society for Promotion of Science, and published 8 original papers as the first author and 17 other original papers as a co-first author under my supervision.
2008-2009	Shoko Kure, MD / Resident in Pathology, Japan Medical University She published 1 original paper as the first author, and 3 other original papers as a co-first author under my supervision.
2008-2009	Natsumi Irahara, PhD / Senior Medical Science Liaison Specialist, MSD (Merck) She published 2 original paper as the first author, and 4 other original papers as a co-first author under my supervision.
2008-2010	Yoshifumi Baba, MD, PhD / Assistant Professor of Surgery, Kumamoto University

He received a fellowship grant (2009-2010) from Uehara Memorial Foundation, and published 8 original papers as the first author and 10 other original papers as a co-first author under my supervision.

- 2008-2011 Kaori Shima, DDS, PhD / Assistant Professor, Kagoshima University
She published 3 original papers as the first author and 12 other original papers as a co-first author under my supervision.
- 2009-2010 Noriko (Yamaguchi) Tanaka, PhD / Chief, Division of Biostatistics, National Center for Global Health and Medicine, Japan
She published 1 original paper as the first author and 3 other original papers as a co-first author under my supervision.
- 2009-2013 Kimmie Ng, MD, MPH / Assistant Professor of Medicine, Dana-Farber Cancer Institute
I serve as a consultant and advisor for her K07 entitled "Role of Vitamin D, Inflammation, and Energy Balance in Colorectal Cancer Survival" (K07 CA148894. 7/19/11-6/30/16).
- 2010-2013 Levi Waldron, PhD / Assistant Professor, City University of New York
He published one original paper as the first author under my supervision.
- 2010-2011 Jing Xie, ScD
- 2010 Maiko Suzuki, DDS, PhD / Research Assistant Professor, Ohio State University
- 2010-2014 Mai Yamauchi, PhD / Former Assistant Professor, University of Tokyo
She published 2 original paper as the first author, and 4 other original papers as a co-first author under my supervision.
- 2010-2012 Teppei Morikawa, MD, PhD / Assistant Professor of Pathology, University of Tokyo
He received a fellowship grant (2010-2011) from Japan Society for Promotion of Science, and published 7 original papers as the first author (including one in JAMA 2011) and 9 other original papers as a co-first author, under my supervision.
- 2010-2013 Aya Kuchiba, PhD / Biostatistician, National Cancer Center, Tokyo
She published 1 original paper as the first author, and 11 other original papers as a co-first author under my supervision.
- 2010-2013 Yu Imamura, MD, PhD / Staff Surgeon, Kyushu University
He published 1 original paper as the first author, and 4 other original papers as a co-first author under my supervision.
- 2010-2013 Xiaoyun Liao, MD, PhD
She published 2 original papers as the first author (including one in NEJM 2012), and published 3 other original papers as a co-first author under my supervision.
- 2011-
Harvard Zhirong Qian, MD, PhD / Instructor in Medicine, Dana-Farber Cancer Institute and Medical School
He published 1 original paper as the first author, and 1 other original paper as a co-first author under my supervision.

- 2011-2016 Reiko Nishihara, PhD / Instructor in Medicine, Dana-Farber Cancer Institute, Harvard Medical School and Harvard T.H. Chan School of Public Health
She has been PI of K07 CA190673 (2014-2019) under my mentorship.
She published 4 original papers as the first author (including one in NEJM 2013, one in JAMA 2013, and one in Am J Clin Nutr 2014), and over a dozen original papers as a co-first author under my supervision.
- 2011-2016 Akihiro Nishi, MD, DrPH / Assistant Professor, University of California Los Angeles (UCLA)
Under my supervision, he received a fellowship grant from Japan Society for Promotion of Science (2013-2015).
- 2011-2012 Paul Lochhead, MBBCh, PhD, MRCP / Clinical Fellow, Massachusetts General Hospital
Under my supervision, he received Frank Knox Memorial Fellowship Grant (2011-2012), and published 2 original papers as the first author, and 9 other original papers as a co-first author.
- 2011-2012 Ruifang Sun, MB / Research Scholar, Xi'an Jiaotong University
Under my supervision, she received a scholarship grant from Chinese Scholarship Council and National Scholarship for Building High Level University.
- 2012-2015 Nadine J McCleary, MD / Instructor in Medicine, Dana-Farber Cancer Institute
- 2012-2013 Seungyoun Jung, ScD / Research Fellow, University of Maryland
- 2012-2015 Kentaro Inamura, MD, PhD / Staff Pathologist, Japanese Foundation of Cancer Research
Under my supervision, he received fellowship grants from Japan Society for Promotion of Science, and Takashi Tsuruo Memorial Fund.
- 2012-2013 Chen (Cindy) Wu, MD, PhD
- 2013-2014 Sung Kwan Shin, MD, PhD
- 2013-2015 Kathryn Fitzgerald, ScD
- 2013-2015 Sun A Kim, MD, PhD / Pathology Resident, National Institute of Health
Under my supervision, she received Early Exchange Postdoctoral Fellowship Grant from Asan Medical Center, Korea
- 2013-2016 Kosuke Mima, MD, PhD / Staff Surgeon, Kumamoto University
Under my supervision, he received a fellowship grant from Uehara Memorial Foundation (2013-2015).
- 2013-2015 Yasutaka Sukawa, MD, PhD / Staff Physician, Keio University Hospital
Under my supervision, he received Sapporo Hibarigaoka Hospital Postdoctoral Fellowship Grant for Research Abroad.
- 2013-2015 Ting-Ting Li, MD
- 2013-2016 Xuehong Zhang, MD, ScD / Assistant Professor of Medicine, Brigham and Women's Hospital, and Harvard Medical School

Under my supervision, he received NIH/NCI R03 award, and K07 award (Calcium and Colorectal Cancer: Gene-Environment Interactions and Molecular Pathways; K07CA188126; 2015 to 2019)

- 2013- Mingyang Song, MD, ScD / Instructor in Medicine, Massachusetts General Hospital
- 2014-2015 Atsuhiko Masuda, MD, PhD / Assistant Professor, Kobe University
- 2014-2015 Juhong Yang, PhD
- 2014-2015 Ruoxu Dou, MD, PhD
- 2014- Jonathan A. Nowak, MD, PhD / Instructor in Pathology, Brigham and Women's Hospital
Under my supervision, he received Stanley Robbins Research Award in 2015.
- 2014- Akiko Hanyuda, MD, MPH / Visiting Scientist, Harvard T.H. Chan School of Public Health
- 2015- Lauren L. Ritterhouse, MD, PhD / Pathology Fellow, Brigham and Women's Hospital
- 2015- Yin Cao, ScD / Instructor in Medicine, Massachusetts General Hospital
- 2015-2017 Yohei Masugi, MD, PhD / Research Fellow, Dana-Farber Cancer Institute
- 2015- David A. Drew, PhD / Research Fellow, Massachusetts General Hospital
- 2015- Annacarolina da Silva, MD, PhD / Research Fellow, Dana-Farber Cancer Institute
- 2015- Wanwan Li, PhD / Research Fellow, Dana-Farber Cancer Institute
- 2015- Mancang Gu, PhD / Research Fellow, Dana-Farber Cancer Institute
- 2015- Tsuyoshi Hamada, MD, PhD / Research Fellow, Dana-Farber Cancer Institute
- 2015- Daniel Nevo, PhD / Research Fellow, Harvard T.H. Chan School of Public Health
- 2015- NaNa Keum, ScD / Research Fellow, Harvard T.H. Chan School of Public Health
- 2016- Li Liu, PhD / Research Fellow, Dana-Farber Cancer Institute
- 2016- Keisuke Kosumi, MD, PhD / Research Fellow, Dana-Farber Cancer Institute
- 2016- Thing Rinda Soong, MD, PhD / Pathology Fellow, Brigham and Women's Hospital
- 2016- Chunxia Du, MD / Research Fellow, Dana-Farber Cancer Institute
- 2016- Wenbin Li, MD, PhD / Research Fellow, Dana-Farber Cancer Institute
- 2016- Yang Chen, MD / Research Fellow, Dana-Farber Cancer Institute
- 2016- Hideo Koh, MD, PhD / Research Fellow, Dana-Farber Cancer Institute

2016- Iny Jhun, ScD / Post-sophomore Fellow, Brigham and Women's Hospital

2017- Hongli Liu, MD, PhD / Research Fellow, Dana-Farber Cancer Institute

Formal Teaching of Peers (e.g., CME and other continuing education courses)

1996	Pathology of Endocrine Tumors Pathology Seminar	Single presentation Allegheny General Hospital
1998	TGF- β Pathway in Disease Pathogenesis Clinical Pathology Seminar	Single presentation Case Western Reserve University
1999	ABH and Blood Group Tissue Antigens Clinical Pathology Seminar	Single presentation Case Western Reserve University
2000	Spinal Muscular Atrophy Genetic Testing Department of Pathology Seminar	Single presentation University of Pennsylvania
2001	PCR and Heteroduplex Formation Department of Pathology Seminar	Single presentation University of Pennsylvania
2002-2007	Interesting Case Presentation Surgical Pathology Update	Three presentations / year Brigham and Women's Hospital
2003	Molecular Epidemiology of Colon Cancer Surgical Pathology Update	Single presentation Brigham and Women's Hospital
2007	Molecular Correlates in Colorectal Cancer Surgical Pathology Update	Single presentation Brigham and Women's Hospital
2011	Molecular Pathological Epidemiology: A Great Opportunity for Pathologists Surgical Pathology Update	Single presentation Brigham and Women's Hospital
2015	Integration of Molecular Pathology and Big-Data Health Science: How Can We Utilize Big Data? Clinical Pathology Conference	Single presentation Brigham and Women's Hospital
2016	How Can Data Science Work for You in Pathology Research and Practice? Surgical Pathology Update	Single presentation Brigham and Women's Hospital

Formal Teaching in Degree Programs outside of Harvard

2004-2009	Advanced Genetic Risk Assessment Students in Master in Genetic Counseling Program	Brandeis University 2-hour session / year
2007-2009	Advanced Genetic Risk Assessment Students in Master in Genetic Counseling Program	Boston University 3-hour session / 2 years

Local Invited Presentations

- 1994 Pathology and Pathogenesis of Adult Respiratory Distress Syndrome / Grand Rounds
The United States Naval Hospital Okinawa, Japan
- 1997 IGF2 & Related Proteins in Neoplastic/Non-Neoplastic Choroid Plexus / Grand Rounds
Department of Pathology, Case Western Reserve University
- 2005 Molecular Epidemiology and Outcomes of Colorectal Cancer / Research Seminar
Department of Medical Oncology, Dana-Farber Cancer Institute
- 2006 Epigenetic and Epidemiologic Research on Colorectal Cancer / Research Seminar
Department of Medical Oncology, Dana-Farber Cancer Institute
- 2007 Molecular Pathologic Epidemiology of Colorectal Cancer / Special Lecture
Harvard School of Public Health Japanese Student Club
- 2008 Molecular Pathology and Epidemiology of Colorectal Cancer / Invited Lecture
Health Professionals Follow-up Study, Harvard School of Public Health
- 2008 Molecular Epidemiology of Colorectal Cancer / Invited Lecture
Harvard Biotechnology Club
- 2009 Molecular Pathologic Epidemiology of Cancer: An Evolving Field / Invited Lecture
Department of Epidemiology, Harvard School of Public Health
- 2009 Significance of Inflammation and Immune Reaction in Colorectal Cancer / Invited Lecture
Dana-Farber Cancer Institute
- 2010 Genome-Wide Expression Profiling of Colorectal Cancer / Invited Lecture
Channing Laboratory, Department of Medicine, Brigham and Women's Hospital
- 2011 Molecular Pathological Epidemiology (MPE) of Colorectal Cancer / Invited Lecture
Channing Laboratory, Department of Medicine, Brigham and Women's Hospital
- 2012 Molecular Pathological Epidemiology (MPE) Adds New Dimension to Nutrition Analysis / Invited
Lecture
Department of Nutrition, Harvard School of Public Health
- 2012 Molecular Pathological Epidemiology (MPE): Integrated Molecular and Population Science /
Invited Lecture
Department of Epidemiology, Harvard School of Public Health
- 2012 Molecular Pathological Epidemiology (MPE) for Current and Future Pathology / Grand Rounds
Brigham and Women's Hospital (Harvard / Longwood Combined Pathology Grand Rounds)
- 2014 Molecular Pathological Epidemiology (MPE) of Colorectal Cancer / Lecture
Molecular and Cellular Oncology Division Retreat, Dana-Farber Cancer Institute

- 2014 Molecular Pathological Epidemiology (MPE): Insights into Vitamin D and Cancer Immunity / Invited Lecture
Department of Nutrition, Harvard School of Public Health
- 2014 Molecular Pathological Epidemiology (MPE): Opportunities and Insights on Exposome to Cancer Immunity / Invited Lecture (Research Conference)
Department of Pathology, Brigham and Women's Hospital
- 2016 Integrating Immunology + Molecular Pathology (e.g., Exome) + Epidemiology = "Immuno-MPE" / Invited Lecture (Departmental Seminar Series)
Department of Epidemiology, Harvard T.H. Chan School of Public Health
- 2016 Molecular Pathological Epidemiology (MPE) Gives New Insights on Environment, Microbiota, Immunity, and Tumor / Invited Lecture (Research Conference)
Department of Pathology, Brigham and Women's Hospital
- 2017 Translational Microbial- and Immuno-MPE (Molecular Pathological Epidemiology) Invited Lecture
Gastrointestinal Oncology Conference, Dana-Farber Cancer Institute
- 2017 How Is Subtyping (Pathological, Molecular, Microbial, Immune) Useful to Study Cancer? Invited Lecture
Channing Division of Network Medicine

Report of Regional, National, and International Invited Teaching and Presentations

Regional

- 2001 Proficiency Testing Program in Genetic Testing / Invited Lecture
Boston Law and Genetics Group Meeting
- 2002 Risk Assessment in Genetic Testing / Invited Lecture
Boston Law and Genetics Group Meeting
- 2004 Genetic Testing: An Update and Future Perspectives / Invited Lecture
Boston Japanese Researchers Forum
- 2006 Molecular Diagnostics in Research and Clinical Practice / Invited Lecture
Wellesley College
- 2007 Molecular Classification of Colorectal Cancer: An Update / Grand Rounds
Weill Cornell Medical College and New York Presbyterian Hospital
- 2007 Career Paths in Medical Science and Practice / Invited Lecture
Japanese Researchers Academic Network of Greater Boston
- 2007 Road to Independent Investigator / Invited Lecture
Japanese Researchers Academic Network of Greater Boston

- 2008 Career Development in Life Science / Invited Lecture
Japanese Researchers Academic Network of Greater Boston
- 2010 Large-Scale Genetic and Epigenetic Analyses of Colorectal Cancer / Invited Lecture
Qiagen Symposium Series 2010, Cambridge, MA (Qiagen)
- 2012 Molecular Pathological Epidemiology (MPE) Adds New Dimensions to Nutritional Science /
Invited Lecture
Tufts University USDA Human Nutrition Research Center Retreat
- 2012 Molecular Pathological Epidemiology (MPE): Novel Integrative Science / Keynote Lecture
Chinese American Biomedical Association (CABA) Expert Forum and Regulatory Training
Graduation, Boston, MA
- 2016 Transforming Science Can Help Your Career Development: Molecular Pathological Epidemiology
as an Example / Keynote Lecture
Boston Japanese Researchers Forum, Cambridge, MA

National

- 2006 Molecular Insights into Colorectal Cancer / Grand Rounds
Department of Pathology, Case Western Reserve University
- 2006 Molecular Classification and Diagnostics of Colorectal Cancer / Invited Lecture
Department of Pathology, Cleveland Clinic Foundation
- 2006 Molecular Classification of Colorectal Cancer / Grand Rounds
The University of Texas M.D. Anderson Cancer Center
- 2009 Molecular Epidemiologic Pathology of Colorectal Cancer / Grand Rounds
Department of Pathology, Thomas Jefferson University
- 2009 Mutation Nomenclature / Invited Lecture
Department of Pathology and Laboratory Medicine, University of Pennsylvania
- 2009 Colorectal Cancer “Molecular Epidemiologic Pathology” / Invited Lecture
Department of Pathology and Laboratory Medicine, University of Pennsylvania
- 2011 Molecular Pathological Epidemiology of Cancer: New Research Opportunities / Invited Lecture
Department of Pathology, University of Alabama at Birmingham
- 2013 Molecular Pathological Epidemiology (MPE): Integrative Analysis of Environment, Host and
Cancer / Invited Lecture
Division of Cancer Epidemiology and Genetics, National Cancer Institute, NIH
- 2014 Molecular Pathological Epidemiology (MPE): Integrative Science to Analyze Host (Immunity),
Environment, and Tumor / Invited Lecture
Center for Cancer Research, National Cancer Institute, NIH

- 2015 Molecular Pathological Epidemiology (MPE) for Novel Integrative Scientific Framework, Paradigms and Methods / Invited Lecture
Icahn Medical School of Mount Sinai
- 2015 Integration of Molecular Pathology and Big-Data Health Science: How and What Can We Do? / Invited Lecture
Columbia University
- 2015 Integration of Molecular Pathology and Big-Data Health Science: How Can We Synergize Diverse Approaches / Invited Lecture
University of Minnesota
- 2016 Integration of Molecular Pathology and Big-Data Health Science: How Can Diverse Approaches Synergize? / Invited Lecture
Fred Hutchinson Cancer Research Center
- 2016 Tailoring Lifestyle to Enhance Efficacy of Immunoprevention and Immunotherapy / Cancer Center Grand Rounds
University of Michigan
- (anticipated)
- 2017 Integration of Molecular Pathology, Microbiology, Immunology, and Population Health Science: How Can Diverse Approaches Synergize? / Grand Rounds
Roswell Park Cancer Institute

International (including lectures at international meetings)

- 2004 Molecular Epidemiologic Data from Nurses' Health Study / Invited Lecture
Association for Molecular Pathology Meeting, Los Angeles, CA
- 2004 Molecular Epidemiology of Colon Cancer / Grand Rounds
Tokai University School of Medicine, Japan
- 2004 Molecular Diagnostics in the United States / Grand Rounds
Tokai University School of Medicine, Japan
- 2004 Genetic Risk Assessment for Genetic Counseling / Grand Rounds
Tokai University School of Medicine, Japan
- 2004 Molecular Epidemiology of Colon Cancer / Invited Lecture
University of Tokyo School of Medicine, Japan
- 2004 Molecular Diagnostics in the United States: An Update / Invited Lecture
University of Tokyo School of Medicine, Japan
- 2004 Diagnostic Molecular Pathology: An Update and Hurdles / Invited Lecture
Keio University School of Medicine, Japan
- 2004 Molecular Pathology and Epidemiology of Colon Cancer / Invited Lecture

National Cancer Center, Japan

- 2004 Gene Tests: An Update and Practical Issues / Invited Lecture
Hosei University School of Law, Japan
- 2004 Molecular Diagnosis: An Overview and Update / Grand Rounds
Tohoku University School of Medicine, Japan
- 2004 Molecular Pathology and Preventive Medicine / Invited Lecture
Tokyo Medical University, Japan
- 2005 Bayesian Risk Analysis / Invited Lecture
Association for Molecular Pathology Meeting, Scottsdale, AZ
- 2006 Postgraduate Training and Risk Management in Pathology / Grand Rounds
Yokohama City University, Japan
- 2006 Epigenetic Analysis of Colon Cancer / Grand Rounds
Yokohama City University, Japan
- 2006 Epigenetics of Colorectal Cancer / Invited Seminar
National Cancer Center, Japan
- 2006 CpG Island Methylator Phenotype of Colon Cancer / Invited Lecture
Kobe University School of Medicine, Japan
- 2006 Mutation Nomenclature Guidelines / Invited Lecture
Association for Molecular Pathology Meeting, Orlando, FL
- 2006 Bayesian Genetic Risk Analysis / Invited Lecture
Association for Molecular Pathology Meeting, Orlando, FL
- 2007 CpG Island Methylator Phenotype (CIMP) in Colorectal Cancer / Invited Lecture
3rd International Quantitative PCR Meeting and Epigenomics Meeting, San Diego, CA
- 2007 Epigenetic Profiling of Colorectal Cancer / Invited Lecture
Digestive Disease Week (American Gastroenterological Association), Washington, DC
- 2007 Epigenetic Profiling of Colorectal Cancer in a Large-Scale Study / Invited Lecture
First International Epigenomics & Sequencing, Boston, MA
- 2007 Mutation Nomenclature / Invited Lecture
Association for Molecular Pathology Meeting, Los Angeles, CA
- 2007 Methods of CpG Methylation Testing / Invited Lecture
Association for Molecular Pathology Meeting, Los Angeles, CA
- 2008 CpG Island Methylator Phenotype (CIMP) / Workshop Panelist
American Association for Cancer Research (AACR) Cancer Epigenetics Meeting, Boston, MA
- 2008 Significance of Epigenomic Aberrations in Colorectal Cancer / Invited Lecture

Second International Epigenomics and Sequencing , Boston, MA

- 2008 Epigenetics of Colorectal Cancer / Invited Lecture
Colorectal Cancer Summit, Cleveland, OH
- 2008 Bayesian Analysis Workshop / Invited Lecture
Association for Molecular Pathology Meeting, Grapevine, TX
- 2008 LINE-1 Hypomethylation in Colorectal Cancer / Invited Lecture
Association for Molecular Pathology Meeting, Grapevine, TX
- 2009 Clinical and Pathological Significance of Epigenomic Changes in Colorectal Cancer / Invited Lecture
United States and Canadian Academy of Pathology (USCAP), Boston, MA
- 2009 Epigenomics of Colorectal Cancer / Invited Lecture
Third International Epigenomics and Sequencing, Boston, MA
- 2009 Biostatistics, Epidemiology and Molecular Diagnostics / Workshop Presenter
Association for Molecular Pathology Meeting, Kissimmee, FL
- 2009 Molecular Classification and Molecular Testing in Colorectal Cancer / Invited Lecture
Association for Molecular Pathology Meeting, Kissimmee, FL
- 2010 Epigenomic Diversity of Colorectal Cancer / Invited Lecture
Epigenetics World Congress, Boston, MA
- 2010 Significance of Epigenomic Changes in Colorectal Cancer / Invited Lecture
Maastricht University, The Netherlands
- 2010 Significance of Genetic and Epigenetic Changes in Colorectal Cancer / Invited Lecture
University of Basel, Switzerland
- 2010 Epigenetic and Genetic Diversity of Colorectal Cancer / Invited Lecture
Colon Cancer in Murine Models and Humans III, Bar Harbor, ME
- 2010 Molecular Heterogeneity in Colorectal Neoplasia Pathways / Invited Lecture
NCI-sponsored Serrated Polyps Consensus Meeting, Cleveland OH
- 2011 Molecular Pathology of Colorectal Cancer: Deciphering Complex Multifactorial Diseases / Invited Lecture
US and Canadian Academy of Pathology (USCAP) Annual Meeting, San Antonio, TX
- 2011 NCI-Funded Cancer Prevention and Control Fellows Workshop / Invited Lecture
American Society of Preventive Oncology Annual Meeting, Las Vegas, NV
- 2011 Epigenetics of Colorectal Cancer / Invited Lecture
Epigenetics World Congress, Boston, MA
- 2011 Molecular Pathological Epidemiology of Colorectal Cancer: An Emerging Interdisciplinary Field / Invited Lecture

- International Symposium on Physiology and Diseases of the Digestive Tract, Sherbrooke, Canada
- 2011 Epigenomics and Molecular Pathological Epidemiology of Colorectal Cancer / Invited Lecture
Forth International Epigenomics and SNPomics, Boston, MA
- 2011 Mutation Nomenclature: Why Standardize? / Invited Lecture
Association for Molecular Pathology Annual Meeting, Grapevine, TX
- 2012 Molecular Pathological Epidemiology of Colorectal Cancer for Personalized Medicine / Invited Lecture
Seoul National University Cancer Hospital 1st Anniversary Symposium, Korea
- 2012 Molecular Pathological Epidemiology of Colorectal Cancer for Personalized Medicine / Invited Lecture
Kyoto University, Japan
- 2012 Molecular Pathological Epidemiology of Lifestyle Factors and Diseases / Invited Lecture
National Hospital Organization Kyoto Medical Center, Japan
- 2012 Molecular Pathological Epidemiology of Colorectal Cancer / Invited Lecture
Kumamoto University, Japan
- 2012 Molecular Pathological Epidemiology: Integrated Analysis of Host & Cancer Epigenetics / Invited Lecture
Epigenetics World Congress, Boston, MA
- 2012 Molecular Pathological Epidemiology of Epigenetics: Integrated Analysis of Etiologic Factors, Host and Disease / Invited Lecture
Epigenomics, Sequencing and SNIps Meeting, Boston, MA
- 2012 Molecular Pathological Epidemiology (MPE): Novel Integrative Molecular and Population Science / Invited Lecture
University of Bergen, Norway
- 2012 Molecular Pathological Epidemiology (MPE): Novel Integrative Pathological Science / Invited Lecture
Swedish Molecular Pathology Meeting, Uppsala, Sweden
- 2012 Molecular Pathological Epidemiology (MPE): Novel Integrative Science for Future Genetics and Epigenetics / Invited Lecture
Slovak Society of Medical Genetics and Slovak Medical Association 23rd Izakovič Memorial Meeting, Bratislava, Slovakia
- 2012 Novel Integrative Science of Molecular Pathological Epidemiology (MPE) of Cancer / Invited Lecture
Online Webinar
- 2013 Molecular Pathological Epidemiology (MPE): Novel Integrative Science / Invited Lecture
RIKEN Quantitative Biology Center, Osaka, Japan
- 2013 Molecular Pathological Epidemiology (MPE): Novel Integrative Science / Invited Lecture

University of Tokyo Global COE Program Retreat, Oiso, Japan

2013 Molecular Pathological Epidemiology (MPE) of Cancer: Novel Integrative Science / Invited Lecture

National Cancer Center, Tokyo, Japan

2013 Molecular Pathological Epidemiology (MPE): Novel Integrative Science / Invited Lecture

University of Tokyo Institute of Medical Sciences, Tokyo, Japan

2013 Molecular Pathological Epidemiology (MPE) of Cancer: Novel Integrative Science / Invited Lecture

The Japanese Foundation of Cancer Research Institute, Tokyo, Japan

2013 Molecular Pathological Epidemiology (MPE): Integrative Interdisciplinary Science / Lecture

The First International Molecular Pathological Epidemiology (MPE) Meeting, Boston, MA

2013 Molecular Pathological Epidemiology (MPE): Integrated Science of Host & Cancer

Epigenetics / Invited Lecture

Genomics Research Meeting, Boston, MA

2013 Molecular Pathological Epidemiology: A Paradigm Shift to Address Heterogeneity of Disease Etiologies and Pathogenesis / Invited Lecture

Society for Epidemiologic Research (SER) Annual Meeting, Boston, MA

2013 Molecular Pathological Epidemiology (MPE): A Paradigm Shift to Address Heterogeneity of Disease Etiologies for Future Epidemiology / Keynote Lecture

German Society of Epidemiology (DGEpi) Annual Meeting, Leipzig, Germany

2013 Molecular Pathological Epidemiology (MPE): Overview of Its Paradigm and Wide Applicability Even without Tumor Tissue / Lecturer (and Session Chair)

12th International AACR Frontiers in Cancer Prevention Research Meeting, National Harbor, MD

2013 Tumor Biomarker Discovery for Aspirin Chemoprevention by Molecular Pathological Epidemiology (MPE) Approach / Lecturer

12th International AACR Frontiers in Cancer Prevention Research Meeting, National Harbor, MD

2013 Useful and Practical Biostatistics in Molecular Pathology / Lecturer

Association for Molecular Pathology (AMP) Annual Meeting, Phoenix, AZ

2014 Molecular Pathological Epidemiology (MPE): Ubiquitous Population Science / Lecturer and Discussion Leader

American Society of Preventive Oncology (ASPO) Meeting, Arlington, VA

2014 Power of Molecular Pathological Epidemiology (MPE) Approach to Discover Tumor Biomarkers for Precision Medicine / Plenary Lecturer

Drug Discovery & Therapy World Congress 2014, Boston, MA

2014 Molecular Pathological Epidemiology (MPE): Integrative Science to Advance Biomedical and Health Sciences / Plenary Lecturer

EITA Conference on New Media and Biomedical Research, Boston, MA

- 2014 The Second International Molecular Pathological Epidemiology (MPE) Meeting (December 4-5)
Conference Chairperson
- 2014 Molecular Pathological Epidemiology (MPE): Meeting Aims, Opportunities, and Challenges
Lecturer
The Second International Molecular Pathological Epidemiology (MPE) Meeting, Boston, MA
- 2015 "Cancer Epi-NIM (Novelty, Impact, and Mechanism)" Session Chair and Opening Talk
Society for Epidemiologic Research (SER) Annual Meeting, Denver, CO (June 18)
- 2015 Pharmaco-MPE (Molecular Pathological Epidemiology) Paradigm for Global Precision Medicine
Plenary Lecturer
Drug Discovery & Therapy World Congress 2015, Boston, MA (July 22-25)
- 2015 Making Sense of Molecular Pathological Epidemiology (MPE) (including Integrative Immuno-epidemiology)
Guest Lecturer (and Lab Visit Workshop Leader)
AACR Integrative Epidemiology Workshop, Boston, MA (Aug 12)
- 2016 Molecular Pathological Epidemiology (MPE): Big Data Science to Study Etiologies and Pathogenesis
Invited Lecturer
The 4th International Symposium at the Japanese Society of Gastroenterology Meeting, Tokyo
- 2016 The Third International Molecular Pathological Epidemiology (MPE) Meeting
Boston, MA (May 12-13)
Conference Chairperson (I presented the introductory lecture)
- 2016 Immuno-MPE to Examine Etiologic Heterogeneity of Immune Response to Tumor
Lecturer
The Third International Molecular Pathological Epidemiology (MPE) Meeting, Boston, MA
- 2016 Molecular Pathological Epidemiology (MPE) of Colorectal Cancer Microbial and Immune Characteristics
Invited Lecturer
Colon Cancer Family Registry (CFR) Steering Committee Meeting, Honolulu, HI
- 2016 Molecular Pathological Epidemiology of Risk Factors and CRC Microbial and Immune Characteristics
Invited Lecturer
AACR Special Conference on Colorectal Cancer, Tampa, FL
- (anticipated)
- 2017 Emerging Microbial-, Immuno-, and Pharmaco-MPE (Molecular Pathological Epidemiology) for Precision Medicine
Invited Lecturer
The 5th International Symposium at the Japanese Society of Gastroenterology Meeting, Tokyo, Japan (April 20-22)

- 2017 Integration of Molecular Pathology, Microbiology, Immunology, and Population Science: How Can Diverse Approaches Synergize?
The 106th Annual Meeting of the Japanese Society of Pathology, Tokyo, Japan (April 27-29)
- 2017 Transforming Science Can Help Your Career Development: Molecular Pathological Epidemiology (MPE) as Example
The 106th Annual Meeting of the Japanese Society of Pathology, Tokyo, Japan (April 27-29)
- 2017 Paradigm Shift to Pharmaco-MPE (Molecular Pathological Epidemiology) and Precision Medicine
Plenary Lecturer
Drug Discovery & Therapy World Congress 2017, Boston, MA (July 20-22)

Report of Clinical Activities and Innovations

Current Licensure and Certifications

- 1993- Medical License, Japan
2000- Diplomate in Anatomic Pathology and Clinical Pathology, American Board of Pathology
2001- Diplomate in Molecular Diagnostics, American Board of Clinical Chemistry
2001- Medical License, Commonwealth of Massachusetts
2003- Diplomate in Molecular Genetic Pathology, American Board of Pathology

Practice activities

2001-2004	General Surgical Pathology	Department of Pathology, BWH	10 weeks per year
2004-2007	General Surgical Pathology	Department of Pathology, BWH	8 weeks per year
2004-2007	Molecular diagnostics	Department of Pathology, BWH	7 weeks per year
2007-2010	Molecular diagnostics	Department of Pathology, BWH	15 weeks per year
2011-2012	Molecular diagnostics	Department of Pathology, BWH	10 weeks per year
2012-2013	Molecular diagnostics	Department of Pathology, BWH	8 weeks per year
2013-2014	Molecular diagnostics	Department of Pathology, BWH	9 weeks per year
2014-2015	Molecular diagnostics	Department of Pathology, BWH	10 weeks per year
2015-	Molecular diagnostics	Department of Pathology, BWH	6 weeks per year

Clinical Innovations

1. Bayesian analysis to predict genetic risks

I have developed a number of new methods of calculating genetic risks based on family history and genetic testing results (Ogino et al. *Am J Med Genet* 2002; Ogino et al. *Hum Genet* 2003; Ogino et al. *J Med Genet* 2004; Ogino et al. *Genet Med* 2004; Ogino et al. *J Genet Counsel* 2007). Bayesian methods that I developed enable us to calculate genetic risk when genetic testing results are available in proband or relatives, or test sensitivity varies among family members. My methods have been useful for many diseases, including cystic fibrosis and spinal muscular atrophy as well as autosomal dominant diseases.

2. Standardized nomenclature system in pathology reporting for precision medicine

As an expert in nomenclature of genes and gene variants and alterations (Ogino et al. *J Mol Diagn* 2007), I have developed standardized molecular pathology reporting system. In Brigham and Women's Hospital Center for Advanced Molecular Diagnostics (CAMD), I have been serving as a consultant on mutation nomenclature in OncoMap and OncoPanel tests. Standardized nomenclature system in pathology reports has become very important as genomic pathology tests are becoming routine clinical practices. I have played a major role in CAP (College of American Pathologists) Molecular Oncology Committee, to standardize molecular testing surveys. I have also played a major role in AMP (Association for Molecular Pathology) and frequently given workshops at AMP annual meetings.

3. Development of Pyrosequencing assays to detect oncogene mutations in formalin-fixed paraffin-embedded (FFPE) tumors

I have developed sensitive sequencing assay based on Pyrosequencing technology for *KRAS* hot spot mutations (Ogino et al. *J Mol Diagn* 2005). This assay became a very common method in molecular pathology practice because of its sensitivity and robustness for solid tumor FFPE tissue with limited tumor cellularity (even with 10-20% neoplastic cellularity). The *JMD* 2005 article has been quoted more than 400 times. I subsequently developed similar assays for *BRAF* and *PIK3CA* mutations.

Report of Technological and Other Scientific Innovations

1. Establishment of transdisciplinary science "Molecular Pathological Epidemiology (MPE)" as one unified integrative field

Epidemiologic analyses between exposures and molecular changes in cancer had been performed under the umbrella of molecular epidemiology since 1980s. In addition, pathology training had not been adequate in education programs for epidemiology or population sciences. In order to fully develop this potential groundbreaking area, I established the concept of "Molecular Pathological Epidemiology (MPE)" (Ogino et al. *J Natl Cancer Inst* 2010; Ogino et al. *Gut* 2011; Ogino et al. *Nat Rev Clin Oncol* 2011; Field et al. *JAMA* 2013; Ogino et al. *Oncogene* 2014). I have been advancing the MPE field as the "Molecular Pathological Epidemiologist", as I had formal training in both molecular pathology and epidemiology. Through this unique combination of expertise, my long-term goal is to transform pathology and epidemiology in an integrative way for both education and research, towards our goal of precision medicine and public health. Based on this MPE paradigm, a number of new concepts have been generated as below; those not in the list below include "pharmaco-MPE", "nutritional MPE", "microbial MPE", "MPE health communication research", and "MPE comparative effectiveness research". Many of these areas are topics of my R35 CA197735 Outstanding Investigator Award grant.

2. Conceptualization of the "Unique Tumor Principle" and the "Unique Disease Principle"

I explicitly conceptualized "Unique Tumor Principle" (*Ogino et al. Int J Epidemiol 2012; Ogino et al. Expert Rev Mol Diagn 2012*), and more broadly, the "Unique Disease Principle" (*Ogino et al. Mod Pathol 2013*). Disease processes are influenced by many factors (including exogenous exposures and endogenous factors such as genomic variation) that differ from person to person, and some of these factors can be heterogeneous from place to place even within one individual. Hence, each disease process is unique. These concepts go along with the paradigm of precision medicine.

3. Conceptualization of the "GWAS-MPE approach"

Genome-wide association studies (GWAS) have shown numerous risk loci for many different diseases, but GWAS has had little impact on clinical practice. A major issue in GWAS is that heterogeneous disease subtypes with differing risk associations are typically lumped together into one disease entity, which can dilute effect estimates for risk variants for specific subtypes. Deep disease phenotyping had been recognized as one of important post-GWAS strategies. Therefore, I proposed the term of the GWAS-MPE approach (*Ogino et al. Gut 2011*) to further investigate causal mechanisms and refine effect estimates of risks for specific disease subtypes.

4. Creation of the "Colorectal Continuum" paradigm / model

The Colorectal Continuum Theory (*Yamauchi, Morikawa, et al. Gut 2012; Yamauchi, Lochhead, et al. Gut 2012*) underscores the importance of interplay of gut microbiota, host factors (diet, immunity, inflammation, etc.), and carcinogenesis. Gastroenterology research and practice have been based on the long-standing dogma of the dichotomy (proximal vs. distal colorectum) model. Thus, I created this new paradigm of colorectal continuum model, which has had substantial impacts on gastroenterology, oncology, epidemiology, and pathology.

5. Establishment of "MPE Working Group"

To transform pathology and epidemiology by the integrative MPE concept, I created the "MPE Working Group" in 2012, to establish standardized methodologies in MPE research and contribute to precision medicine. MPE Working Group currently consists of researchers in the MPE areas mainly based on Harvard T.H. Chan School of Public Health, the Broad Institute, and Harvard-affiliated hospitals. As the group leader, I organize bimonthly MPE Working Group meeting series to advance the MPE field.

6. Establishment of the International Molecular Pathological Epidemiology (MPE) Meeting Series

To expand opportunities and address challenges in MPE, I established the International Molecular Pathological Epidemiology (MPE) Meeting Series in 2013. I served as the chairperson for the first meeting (April 24, 2013), the second meeting (December 4-5, 2014), and the third meeting (May 12-13, 2016, with R13 CA203287 funded by NCI, NHGRI and NIEHS), all of which were successful. The proceedings of the second and third meetings are available (*Ogino et al. Cancer Causes Cont 2015; Campbell et al. Cancer Causes Cont 2017 in press*, respectively). The Fourth International MPE Meeting is planned on May 31 to June 1, 2018 in Boston, MA, USA.

7. Creation of the "etiologic field effect model"

The concept of MPE is integrated into the conventional field effect model to create the etiologic field effect model (*Lochhead et al. Mod Pathol 2015*). This new model can encompass not only somatic molecular changes but also various environmental, exogenous and endogenous exposures and accompanying microenvironmental changes as constituents of field effect.

8. Creation of the integrative field of "lifecourse-MPE"

The concept of molecular pathological epidemiology (MPE) is integrated into lifecourse epidemiology to create the integrative field of lifecourse-MPE (*Nishi et al. Am J Prev Med 2015*). This new model can address effects of various exposures during lifecourse of each individual on molecular pathology of disease, and can possibly help develop strategies of lifestyle modification and intervention in early life.

9. Development of statistical frameworks and methods to address etiologic heterogeneity

A major goal of medical and epidemiologic research is to investigate the relationship between exposures and disease risk. Cases of the disease are often considered a single outcome, and assumed to share a common etiology in the traditional research framework. However, evidence indicates that many human diseases arise and evolve through a range of heterogeneous molecular pathologic processes, influenced by diverse exposures, necessitating the molecular pathological epidemiology (MPE) approach. We have been developing analytic methods to study disease subtype heterogeneity in various scenarios where disease subtypes are categorical and ordinal, and for cohort studies, matched and unmatched case-control studies, and case-case study designs (*Wang et al. Stat Med 2016*). In addition, we have developed methods to deal with multiple disease subtyping markers simultaneously (*Wang et al. Am J Epidemiol 2015*). User-friendly software to implement the various methods is publicly available.

10. Creation of the integrative field of "causal inference - MPE"

Causal inference and molecular pathological epidemiology (MPE) are subspecialty fields of epidemiology, and share a common goal of elucidating causality in the association between exposure and disease, and can synergize by virtue of complementary strengths of each field. We have recently published how the MPE paradigm can easily solve paradoxes (*Nishihara et al. Eur J Epidemiol 2015*). Some of so-called paradoxical findings (eg, obesity paradox) have given vexing issues in clinical medicine as well as the causal inference area of epidemiology. Integrative causal inference - MPE has been addressing many other issues with ongoing projects.

11. Creation of the integrative field of "social MPE", to address health disparities

Although the evolving transdisciplinary field of molecular pathological epidemiology (MPE) can advance biomedical and health research, use of state-of-the-art genomic, epigenomic and other omic technologies and expensive drugs increases racial, ethnic and socioeconomic disparities. To address this, we have integrated molecular pathology, epidemiology, and social science (*Nishi et al. Expert Rev Mol Diagn 2016*). This integrative field termed "social MPE" can embrace sociology, economics and precision medicine, address global health disparities and inequalities, and elucidate biological effects of social environments, behaviors, and networks. We foresee advancements of molecular medicine, including molecular diagnostics, biomedical imaging, and targeted therapeutics, which should benefit individuals in a global population, by means of an interdisciplinary approach of social MPE.

12. Integration of immunology and molecular pathological epidemiology (immuno-MPE)

Immuno-MPE is an integrative field of immunology, molecular pathology and epidemiology. A new concept paper is under development; nonetheless, the basic concept has been introduced and discussed (*Ogino et al. Nat Rev Clin Oncol 2011; Ogino et al. Epidemiology 2016*). Innate and adaptive immunity plays major roles in human health and diseases including cancer. While immunotherapy is under intense investigation in oncology, strategies to prevent cancer and other diseases through immune modulators ("immuno-prevention") are also promising. Diet and lifestyle can be routine immunoprevention strategy,

since some modifiable factors can influence not only cancer risk but also host immunity. Local immune status is also influenced by microorganisms and host cells with unusual presentation of immunogenic antigens. For instance, tumor cells produce mutated peptides from somatic mutations, and elicit local adaptive immune reaction. Some of tumor cells develop strategies to evade immune reaction. Thus, we need to integrate analyses of environmental exposures, tumor molecular features, microbiota, and host immunity in cancer. We can utilize MPE analytical (epidemiologic and statistical) strategies to investigate the combined role of exposures and immunity in disease pathogenesis and progression.

13. Founding of the Division of MPE Molecular Pathological Epidemiology at Brigham and Women's Hospital

After working with the Department Chair (Jeffrey Golden, MD) for several months, I founded the Division of MPE Molecular Pathological Epidemiology in the Department of Pathology at Brigham and Women's Hospital in March 2016. I have been serving as the first Division Chief since then. The mission of the Division of MPE is to facilitate the transformation of pathology and epidemiology into an integrative pathobiology-based data-driven science, resulting in the enhancement of rigorous research and clinical practice in the era of precision medicine. Our ultimate goal is to advance pathology and epidemiology by means of seamless transdisciplinary integration in research and education. Currently, the Division has been developing various programs including educational courses for trainees and junior faculty members, consultation service in data science, and outreach programs. The Division of MPE also serves as the formal host of the International Molecular Pathological Epidemiology (MPE) Meeting Series.

Report of Scholarship

I am the first, last, co-first, or co-last author in 162 (61%) of the 264 research and concept papers together.

One very unique feature of my scholarly activities is the presence of 24 "concept papers" which do not describe original research but have provided new research areas, concepts, paradigms, models, and frameworks. "Concept papers" are listed separately after "Research Investigations" below. Often, those "concept papers" have been published under category of "review articles", but are quite different from ordinary reviews.

Peer-Reviewed Publications

Research Investigations

1. Kubo S, **Ogino S**, Fukushima T, Maruno M, Yoshimine T, Hasegawa H. Immunohistochemical detection of insulin-like growth factor II (IGF2) in choroid plexus papilloma: a possible marker for differential diagnosis. Clin Neuropathol 1999;18:74-79.
2. **Ogino S**, Cohen ML, Abdul-Karim FW. Atypical teratoid/rhabdoid tumor of the CNS: Cytopathology and immunohistochemistry of insulin-like growth factor-II, insulin-like growth factor receptor type 1, cathepsin D and Ki-67. Mod Pathol 1999;12:379-385.
3. Kubo S, **Ogino S**, Fukushima T, Olson PR, Kida M, Maruno M, Yoshimine T, Hayakawa T. Immunohistochemical study of insulin-like growth factor II (IGF2) and insulin-like growth factor binding protein-2 (IGFBP2) in choroid plexus papilloma. Neurol Res 1999;21:339-344.
4. **Ogino S**, Redline RW. Villous capillary lesions of the placenta: Distinctions between chorangioma, chorangiomatosis, and chorangiosis. Hum Pathol 2000;31:945-954.
5. **Ogino S**, Kubo S, Abdul-Karim FW, Cohen ML. Comparative immunohistochemical study of insulin-like growth factor (IGF)-II and IGF receptor type 1 in pediatric brain tumors. Pediatr Development Pathol 2001;4:23-31.
6. **Ogino S**, Leonard DGB, Rennert H, Gao S, Wilson RB. Heteroduplex formation in *SMN* gene dosage analysis. J Mol Diagn 2001;3:150-157.
7. **Ogino S**, Leonard DGB, Rennert H, Wilson RB. Spinal muscular atrophy genetic testing experience at an academic medical center. J Mol Diagn 2002;4:53-58.
8. **Ogino S**, Leonard DGB, Rennert H, Ewens WJ, Wilson RB. Genetic risk assessment in carrier testing for spinal muscular atrophy. Am J Med Genet 2002;110:301-307.
9. **Ogino S**, Wilson RB. Quantification of PCR bias caused by a single nucleotide polymorphism in *SMN* gene dosage analysis. J Mol Diagn 2002;4:185-190.
10. **Ogino S**, Wilson RB. Genotype and haplotype distributions of MTFHR 677C>T and 1298A>C single nucleotide polymorphisms: A meta-analysis. J Hum Genet 2003;48:1-7.

11. **Ogino S**, Gao S, Leonard DGB, Paessler M, Wilson RB. Inverse correlation between *SMN1* and *SMN2* copy numbers: Evidence for gene conversion from *SMN2* to *SMN1*. *Eur J Hum Genet* 2003;11:275-277. (Addendum in 2003;11:723)
12. Xu R, **Ogino S**, Lip V, Fang H, Wu B. Comparison of PCR-RFLP assay with allele-specific PCR in genetic testing for spinal muscular atrophy. *Genet Testing* 2003;7:277-281.
13. **Ogino S**, Wilson RB, Grody WW. Bayesian risk assessment for autosomal recessive diseases: fetal echogenic bowel and one or no detectable *CFTR* mutation. *J Med Genet* 2004;41:e70.
14. **Ogino S**, Wilson RB, Gold B, Hawley P, Grody WW. Bayesian analysis for cystic fibrosis risks in prenatal and carrier screening. *Genet Med* 2004;6:439-449.
15. Khurana JS, **Ogino S**, Shen T, Parekh H, Scherbel U, DeLong W, Feldman MD, Zhang PJ, Wolfe H, Alman BA. Bone morphogenetic proteins are expressed by both bone-forming and non-bone-forming lesions. *Arch Pathol Lab Med* 2004;128:1267-1269.
16. **Ogino S**, Wilson RB, Gold B. New insights on the evolution of the *SMN1* and *SMN2* genes: simulation and meta-analysis for allele and haplotype frequency calculations. *Eur J Hum Genet* 2004;12:1015-1023.
17. **Ogino S**, Flodman P, Wilson RB, Gold B, Grody WW. Risk calculations for cystic fibrosis risks in neonatal screening by immunoreactive trypsinogen and *CFTR* mutation tests. *Genet Med* 2005;7:317-327.
18. **Ogino S**, Kawasaki T, Brahmandam M, Yan L, Cantor M, Namgyal C, Mino-Kenudson M, Lauwers GY, Loda M, Fuchs CS. Sensitive sequencing method for *KRAS* mutation detection by Pyrosequencing. *J Mol Diagn* 2005;7:413-421.
19. **Ogino S**, Meyerhardt JA, Cantor M, Brahmandam M, Clark JW, Namgyal C, Kawasaki T, Kinsella K, Michelini AL, Enzinger PC, Kulke MH, Ryan DP, Loda M, Fuchs CS. Molecular alterations in tumors and response to combination chemotherapy with gefitinib for advanced colorectal cancer. *Clin Cancer Res* 2005;11:6650-6656.
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23. Meyerhardt JA, Heseltine D, **Ogino S**, Clark JW, Enzinger PC, Ryan DP, Earle CC, Zhu AX, Fuchs CS. Efficacy of cetuximab after treatment with oral epidermal growth factor receptor tyrosine kinase inhibitor-based chemotherapy in metastatic colorectal cancer. Clin Colorectal Cancer 2006;6:59-65.
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25. **Ogino S**, Brahmandam M, Kawasaki T, Kirkner GJ, Loda M, Fuchs CS. Epigenetic profiling of synchronous colorectal neoplasias by quantitative DNA methylation analysis. Mod Pathol 2006;19:1083-1090.
26. **Ogino S**, Odze RD, Kawasaki T, Brahmandam M, Kirkner GJ, Laird PW, Loda M, Fuchs CS. Correlations of pathologic features with CpG island methylator phenotype (CIMP) by quantitative DNA methylation analysis in colorectal carcinoma. Am J Surg Pathol 2006;30:1175-1183.
27. **Ogino S**, Kawasaki T, Kirkner GJ, Ogawa A, Dorfman I, Loda M, Fuchs CS. Down-regulation of p21 (CDKN1A/CIP1) is inversely associated with microsatellite instability and CpG island methylator phenotype (CIMP) in colorectal cancer. J Pathol 2006;210:147-154.
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32. **Ogino S**, Kawasaki T, Ogawa A, Kirkner GJ, Loda M, Fuchs CS. Cytoplasmic localization of p27 (cyclin-dependent kinase inhibitor 1B/KIP1) in colorectal cancer: inverse correlations with nuclear p27 loss, microsatellite instability, and CpG island methylator phenotype. Hum Pathol 2007;38:585-592.
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34. **Ogino S**, Kawasaki T, Ogawa A, Kirkner GJ, Loda M, Fuchs CS. Fatty acid synthase overexpression in colorectal cancer is associated with microsatellite instability, independent of CpG island methylator phenotype. Hum Pathol 2007;38:842-849.

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Narrative Report

I am a molecular pathological epidemiologist with a major research effort and 10% clinical effort in pathology. I have received awards and honors, including Ramzi Cotran Young Investigator Award in 2011 from United States and Canadian Academy of Pathology (USCAP); and Executive Officer's Award in 2004 and Meritorious Service Award in 2012 from Association for Molecular Pathology (AMP). I have been selected as "the Most Influential Scientific Minds" (2014) and Highly Cited Researcher (2015 and 2016) by Thomson Reuters. I have been an Elected Member of American Society for Clinical Investigation (ASCI) since 2014, and as a member of FASEB Excellence in Science Award Committee. I have been a recipient of NCI R35 Outstanding Investigator Award (2015-2022), to undertake paradigm-shifting high-risk high-impact research.

With unique combined expertise in both molecular pathology and epidemiology, I have been developing integrative interdisciplinary science of "Molecular Pathological Epidemiology (MPE)". I have been conducting MPE research with a particular focus on colorectal cancer. My MPE research program has continuously been funded by NIH. Highlights of my MPE research program include three studies published in the New England Journal of Medicine (NEJM) (Chan AT et al. 2007; Nishihara R et al. 2013; Liao X et al. 2012). I founded the International MPE Meeting Series in 2013, and have been serving as its Chairperson. "The Third International MPE Meeting" was held very successfully, with 20 expert speakers and over 150 participants from 17 countries and 21 U.S. States in May 2016. I continue to serve as the chairperson of The Fourth International MPE Meeting in 2018 in Boston. I have been developing new statistical framework and methods for MPE research in various settings (Wang M et al. Am J Epidemiol 2015; Wang M et al. Stat Med 2016). In addition to the establishment of MPE as a distinct field, I have been very innovative in research and have created novel paradigms, concepts and research framework, such as "the GWAS-MPE Approach" (Ogino S et al. Gut 2011), "the Unique Tumor Principle" (Ogino S et al. Expert Rev Mol Diagn 2012), "the Colorectal Continuum model" (Yamauchi M et al. Gut 2012), "the Unique Disease Principle" (Ogino S et al. Mod Pathol 2013), the "Etiologic Field Effect" model (Lochhead P et al. Mod Pathol 2015), the integrative field of "lifecourse - MPE" (Nishi A et al. Am J Prev Med 2015), the integrative field of "social MPE" (Nishi A et al. Expert Rev Mol Diagn 2016), and the integrative field of "pharmaco-MPE" (Ogino S et al. Epidemiology 2016). Other new frontiers that I have been establishing include "immuno-MPE" and "causal inference-MPE", which are themes of my NCI R35 grant.

With regard to educational contribution, I have been teaching integration of molecular and population science at Harvard Medical School and affiliated hospitals, and Harvard T.H. Chan School of Public Health. I have served as a mentor for trainees with a wide variety of backgrounds in my interdisciplinary research laboratory, including pathologists, oncologists, gastroenterologists, surgeons, epidemiologists, nutrition scientists, biostatisticians, and computational biologists.

In clinical service, I have been serving as a molecular pathologist, with special expertise in GI cancer molecular tests, as well as nomenclature of genes, gene products and mutations. I have been playing a major leadership role in molecular pathology and diagnostics locally and internationally (eg., for College of American Pathologists, Association for Molecular Pathology, and National Comprehensive Cancer Network).

In summary, my research contribution has been very unique in integrating molecular pathology and population sciences, and has demonstrated widespread impact on biomedical and public health sciences. In addition, I am an expert molecular pathologist with effort in clinical service and in teaching and education, in very unique manners.