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, M.D.)	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, Medical College of Pennsylvania
07/97-06/99	Resident	Anatomic and Clinical Pathology	Case Western Reserve University, University Hospitals of Cleveland
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

11/01-	Pathologist	Pathology	Brigham and Women's Hospital
11/01-06/16	Faculty Member	Medical Oncology	Dana-Farber Cancer Institute
07/16-	Faculty Member	Oncologic Pathology	Dana-Farber Cancer Institute

Other Professional Positions

2004-	Member	Dana-Farber / Harvard Cancer Center
2015-	Faculty Member	Program in Quantitative Genomics, Harvard T.H. Chan School of Public Health
2017-	Associate Member	Broad Institute of MIT and Harvard

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
2016-	Chief, Program in MPE Molecular Pathological Epidemiology, Department of Pathology, Brigham and Women's Hospital

International

2013-	Chair, The International Molecular Pathological Epidemiology (MPE) Meeting Series

Committee Service

Local

2010-	Member, CRIS/STIP Steering Committee, Dana-Farber Cancer Institute
2016-2017	Member, *Ad Hoc* Committee to review the proposed appointment of Jerrold R. Turner, M.D., Ph.D., as Professor of Pathology and Medicine at Harvard Medical School

Regional

2007-2008	Advisor, Japanese Researchers' Academic Network of Greater Boston
2007-2012	Member, Scientific Organizing Committee, International Epigenomics and Sequencing
2009-2015	Member, Program Committee, Boston Japanese Researchers Forum
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

1998-2011 College of American Pathologists (CAP)
- 2000-2001 Junior Member, Biochemical and Molecular Genetics Resource Committee
- 2007-2011 Member, Molecular Oncology Committee

1998- United States and Canadian Academy of Pathology (USCAP)
- 2009-2013 Member, Scientific Abstract Review Board

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 Research (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 Seciety, Belgium

Editorial Activities

Ad Hoc Reviewer (for a total of 230 journals)
The number of journals is excessively large because of my trans-inter-multidisciplinary expertise. Hence, I use Impact Factor (in preceding years, in general) as a general guide to separate journals into groups. I do not intend to use Impact Factor as a definitive metric of quality of journals.

Journals with Impact Factor 20 or greater
- JAMA
- Journal of Clinical Oncology
- Lancet
- Lancet Oncology
- Nature Medicine
- Nature Reviews Cancer
- Nature Reviews Clinical Oncology
- New England Journal of Medicine

Journals with Impact Factor 10 to 20
- American Journal of Gastroenterology
- American Journal of Human Genetics

Annals of Oncology
European Urology
Gastroenterology
Genome Biology
Gut
JAMA Oncology
Journal of Clinical Investigation
Journal of The National Cancer Institute
Nature Communications
Nature Reviews Gastroenterology and Hepatology
Nucleic Acids Research
PLOS Medicine
Progress in Lipid Research
Trends in Molecular Medicine

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
eLife
Environment International
Environmental Health Perspectives
Epidemiology
European Journal of Cancer
European Journal of Epidemiology
Genome Medicine
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
Nature Reviews Disease Primers
Neoplasia
Oncogene
Oncoimmunology
Oncotarget
PLoS Genetics
Proceedings of the National Academy of Sciences of the USA (PNAS)
Seminars in Cancer Biology

Other journals (for simplicity, divided into commonly-recognized fields)

Immunology
Cancer Immunology, Immunotherapy

Clinical and Developmental Immunology

Microbiology
- Bacterial Pathogenesis
- Infectious Agents and Cancer
- Journal of Infection and Public Health

Molecular Pathological Epidemiology
- Journal of MPE Molecular Pathological Epidemiology
- Journal of Pathology and Epidemiology

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
- Journal of Pathology: Clinical Research
- 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 Clinical Research Reports
- 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
- International Journal of Carcinogenesis and Mutagenesis
- Journal of 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
Oncologist
OncoTargets and Therapy
Onkologie
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
Cellular and Molecular Gastroenterelogy and Hepatology
Expert Review of Gastroenterology and Hepatology
Gastroenterology Research and Practice
ISRN Gastroenterology
Journal of Gastroenterology and its Complications
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
Postgraduate 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
- Epigenomics

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 Opinion on Pharmacotherapy
- Expert Review of Anticancer Therapy
- Expert Review of Clinical Pharmacology
- Pharmacogenomics and Personalized Medicine
- Pharmacological Research

Nutrition Science
- Alcohol
- Hepatobiliary Surgery and Nutrition
- Nutrients
- Nutrition Research

Biology / Biochemistry / Molecular Biology
- Analytical Chemistry
- Biomolecules
- BioTechniques
- Chemico-Biological Interactions
- DNA and Cell Biology
- Expert Review of Proteomics
- Journal of Biological Regulators and Homeostatic Agents
- Journal of Proteomics
- Non-coding RNA
- Organic Chemistry Insights

Informatics / Bioinformatics / Computational Biology
- Cancer Informatics

Computational Biology and Chemistry
Computer Methods and Programs in Biomedicine
Computers in Biology and Medicine
Interdisciplinary Sciences: Computational Life Sciences
Pattern Recognition

Systems Biology
Journal of Systems Biology Research

Computer Science / Cybernetics
IEEE Transactions on Cybernetics

Health and Medical Economics
Journal of Medical Economics

Intellectual Property and Patent
Expert Opinion on Therapeutic Patents

Multidisciplinary or Other Fields
Advancements in Genetic Engineering
Archives of Gynecology and Obstetrics
BioMed Research International
BOAJ Psycology
EBioMedicine
Evolution, Medicine, and Public Health
Frontiers in Biosciences
International Journal of Molecular Sciences
International Journal of Nanomedicine
International Journal of Nanomedicine and Nanosurgery
Journal of Cellular Physiology
Journal of Neurology
Molecules
Mutation Research - Fundamental and Molecular Mechanisms of Mutagenesis
PLoS ONE
Research and Reports in Urology
Scientific Reports
Sensors
Translational Research
World Journal of Ophthalmology
World Journal of Radiology

Other Editorial Roles

2005	Expert Reviewer	Genetics Home Reference, National Library of Medicine, NIH
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-	Editorial Board Member	Laboratory Investigation
2013-	Editorial Board Member	Clinical Epidemiology Reviews

2014-	Editorial Board Member	Gut
2014-	Editorial Board Member	British Journal of Cancer
2016-	Editorial Board Member	Matters
2017-	Editorial Board Member	Tranlational Research
2017-	Editorial Board Member	Expert Review of Precision Medicine and Drug Development

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)
2014-2017	The Most Influential Scientific Minds: 2014 and 2015; Highly Cited Researcher 2015, 2016, and 2017	Thomson Reuters and Clarivate Analytics (Web of Science)
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
2018	Outstanding Investigator Award	American Society for Investigative Pathology (ASIP)

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 Obesity-driven PDAC: A Comprehensive Study to Define Mechanisms and New Targets for 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.

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 were to integrate molecular pathology and health data science, address challenges and expand opportunities in transdisciplinary frontiers.

Current Funded Projects

2001-2020 Dietary and Hormonal Determinations of Cancer in Women
NCI/NIH P01 CA87969
Co-Investigator (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
Co-Investigator (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.

2012-2022 Cancer Epidemiology Cohort in Male Health Professionals
NCI/NIH U01 CA167552 (UM1 CA167552 in 2012-2017)
DFCI Site PI ($755,966 direct in 2012-2017; $507,605 direct in 2017-2022) (PI, Walter Willett, 2012-2017; PIs, Walter Willett and Lorelei Mucci, 2017-2022)
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 Ill 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, 2013-2016; PIs, Nabeel Bardeesy and Adam Bass, 2017-2018)
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 Site PI ($349,964 direct) (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)
This R35 Outstand 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, and explore new frontiers in integrative population science such as "immuno-MPE", "pharmaco-MPE", "causal inference-MPE", and "MPE-health communication research".

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)
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 15 years

Formally Supervised Trainees (with current positions)

2001-2002	Ruliang Xu, MD, PhD / Associate Professor of Pathology, and Director of GI and Liver Pathology, New York University, USA
2002-2003	Chong Xu, MD / Former Instructor, Harvard Medical School, USA
2005-2006	Taiki Yamaji, MD, MPH / Staff Scientist, National Cancer Center, Japan
2003-2007	Takako Kawasaki, MD, PhD / Physician, Singapore
2006-2008	Aditi Hazra, PhD, MPH / Assistant Professor, Harvard Medical School, USA
2007-2008	Mutsuko Ohnishi, MD / Postdoctoral Fellow, Harvard School of Dental Medicine, USA
2007-2010	Katsuhiko Nosho, MD, PhD / Assistant Professor of Medicine, Sapporo Medical University, Japan
2008-2009	Shoko Kure, MD / Resident in Pathology, Japan Medical University, Japan
2008-2009	Natsumi Irahara, PhD / Senior Medical Science Liaison Specialist, MSD Merck, Japan

2008-2010 Yoshifumi Baba, MD, PhD / Assistant Professor of Surgery, Kumamoto University, Japan
2008-2011 Kaori Shima, DDS, PhD / Assistant Professor, Kagoshima University, Japan
2009-2010 Noriko (Yamaguchi) Tanaka, PhD / Chief, Division of Biostatistics, National Center for Global Health and Medicine, Japan
2009-2010 Jung Eun Lee, ScD / Associate Professor, Seoul National University, South Korea
2009-2013 Kimmie Ng, MD, MPH / Assistant Professor, Dana-Farber Cancer Institute, USA
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, USA
2010-2011 Jing Xie, ScD
2010 Maiko Suzuki, DDS, PhD / Research Assistant Professor, Ohio State University, USA
2010-2014 Mai Yamauchi, PhD / Former Assistant Professor, University of Tokyo, Japan
2010-2012 Teppei Morikawa, MD, PhD / Assistant Professor of Pathology, University of Tokyo, Japan
2010-2013 Aya Kuchiba, PhD / Biostatistician, National Cancer Center, Japan
2010-2013 Yu Imamura, MD, PhD / Staff Surgeon, Japanese Foundation of Cancer Research, Japan
2010-2013 Xiaoyun Liao, MD, PhD
She published 2 original papers as the first author (including one in NEJM 2012).
2011-2017 Zhirong (Zhi Rong) Qian, MD, PhD / Professor at "100 Top Talents Program" of Sun Yat-sen University; Distinguished Professor, Fujian Medical University Union Hospital, PR China (zrqian@hotmail.com).
2011-2016 Reiko Nishihara, PhD / Assistant Professor of Pathology, Program in MPE Molecular Pathological Epidemiology, Brigham and Women's Hospital, and Harvard Medical School, USA.
She is PI of K07 CA190673 (2014-2019) under my mentorship, and Co-PI of the multi-institutional MPE Molecular Pathological Epidemiology Laboratory.
2011-2016 Akihiro Nishi, MD, DrPH / Assistant Professor, University of California Los Angeles, USA
2011-2012 Paul Lochhead, MBBCh, PhD, MRCP / Consultant, Massachusetts General Hospital, USA
2011-2012 Ruifang Sun, MB / Research Scholar, Xi'an Jiaotong University, PR China
2012-2015 Nadine J McCleary, MD / Assistant Professor, Dana-Farber Cancer Institute, USA
2012-2013 Seungyoun Jung, ScD / Assistant Professor of Epidemiology, University of Maryland, USA
2012-2015 Kentaro Inamura, MD, PhD / Staff Pathologist, Japanese Foundation of Cancer Research, Japan
2012-2013 Chen (Cindy) Wu, MD, PhD / Professor, National Key Laboratory of Molecular Oncology, National Cancer Center; Deputy Director, International Collaboration Department, Chinese Academy of Medical Sciences and Peking Union Medical College, PR China (chenwu@cicams.ac.cn).
2013-2014 Sung Kwan Shin, MD, PhD / Associate Professor, Department of Internal Medicine, Yonsei University College of Medicine, South Korea.
2013-2015 Kathryn C. Fitzgerald, ScD
2013-2015 Sun A Kim, MD, PhD / Pathology Resident, National Institutes of Health, USA
2013-2016 Kosuke Mima, MD, PhD / Staff Surgeon, Kumamoto University, Japan
2013-2015 Yasutaka Sukawa, MD, PhD / Staff Physician, Keio University Hospital, Japan
2013-2015 Ting-Ting Li, MD, PhD / Associate Chief Physician, Department of Geriatric Gastroenterology, and State Key Laboratory of Kidney Diseases, Chinese People's Liberation Army General Hospital, PR China (lilylismiling@126.com).
2013-2016 Xuehong Zhang, MD, ScD / Assistant Professor of Medicine, Brigham and Women's Hospital, and Harvard Medical School, USA.
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, USA

2014-2015	Atsuhiro Masuda, MD, PhD / Assistant Professor, Kobe University, Japan
2014-2015	Juhong Yang, PhD / Associate Professor at Tianjin Medical University; Associate Chief Physician, Department of Nephropathy, Tianjin Metabolic Diseases Hospital, PR China (megii0315@126.com).
2014-2015	Ruoxu Dou, MD, PhD / Attending Surgeon, Department of Colorectal Surgery, Sixth Affiliated Hospital, Sun Yat-sen University; Lecturer & Postgraduate Supervisor, Zhongshan School of Medicine, Sun Yat-sen University, PR China (dourx@mail.sysu.edu.cn).
2014-	Jonathan A. Nowak, MD, PhD / Instructor in Pathology, Brigham and Women's Hospital, and Harvard Medical School, USA.
2014-	Akiko Hanyuda, MD, MPH / Visiting Scientist, Harvard T.H. Chan School of Public Health, USA
2015-2017	Yin Cao, ScD / Assistant Professor, Department of Surgery, Washington University School of Medicine, USA
2015-2017	Yohei Masugi, MD, PhD / Assistant Professor of Pathology, Keio University, Japan.
2015-	David A. Drew, PhD / Research Fellow, Massachusetts General Hospital, USA
2015-	Annacarolina da Silva, MD, PhD / Pathology Resident, Brigham and Women's Hospital, USA
2015-2017	Wanwan Li, PhD
2015-2017	Mancang Gu, PhD / Associate Professor, School of Pharmacy, Zhejiang Chinese Medical University, PR China (gmancang@zcmu.edu.cn)
2015-	Tsuyoshi Hamada, MD, PhD / Research Fellow, Dana-Farber Cancer Institute, USA
2015-	Daniel Nevo, PhD / Research Fellow, Harvard T.H. Chan School of Public Health, USA
2015-2017	NaNa Keum, ScD / Assistant Professor, Department of Food Science and Biotechnology, Dongguk University, South Korea
2015-2017	Xinmeng Jasmine Mu, PhD / Principal Scientist, Pfizer Inc., USA
2016-2018	Li Liu, PhD / Research Fellow, Dana-Farber Cancer Institute, USA
2016-	Keisuke Kosumi, MD, PhD / Research Fellow, Dana-Farber Cancer Institute, USA
2016-	Thing Rinda Soong, MD, PhD / Pathology Fellow, Brigham and Women's Hospital, USA
2016-	Chunxia Du, MD / Research Fellow, Dana-Farber Cancer Institute, USA
2016-2017	Wenbin Li, MD, PhD / Associate Professor of Pathology, Cancer Hospital, National Cancer Center, Chinese Academy of Medical Sciences & Peking Union Medical College, PR China (liwenbin9631@hotmail.com; liwenbin@cicams.ac.cn)
2016-	Yang Chen, MD / Research Fellow, Dana-Farber Cancer Institute, USA
2016-2017	Hideo Koh, MD, PhD / Assistant Professor, Osaka City University, Japan
2016-	Iny Jhun, ScD / Post-sophomore Fellow, Brigham and Women's Hospital, USA
2017-	Hongli Liu, MD, PhD / Research Fellow, Dana-Farber Cancer Institute, USA
2017-	Chenxi Li, MD / Research Fellow, Dana-Farber Cancer Institute, USA
2017-	Wenjie Ma, MB, ScD / Research Fellow, Massachusetts General Hospital, USA
2017-	Xiaosheng He, MD / Research Fellow, Massachusetts General Hospital, USA
2017-	Peilong Li, MD, MS / Research Fellow, Dana-Farber Cancer Institute, USA
2017-	Andressa Dias Costa, MD / Research Fellow, Dana-Farber Cancer Institute, USA

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, and Immune) Useful to Study Cancer?
Invited Lecture
Channing Division of Network Medicine, Brigham and Women's Hospital

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 Tayloring Lifestyle to Enhance Efficacy of Immunoprevention and Immunotherapy / Cancer Center Grand Rounds
University of Michigan

2017 Integrative Tumor Epidemiology ≅ Molecular Pathological Epidemiology: Emerging Topics and Future Directions / Invited Lecture
Division of Cancer Epidemiology and Genetics, National Cancer Institute, NIH

2017 Integrative Molecular Pathological Epidemiology (MPE): Emerging Topics and Future Directions / Invited Lecture
Center for Cancer Research, National Cancer Institute, NIH

2017 Integrative Molecular Pathological Epidemiology: Emerging Topics and Future Opportunities / Grand Rounds
Roswell Park Cancer Institute

2017 Integrative Molecular Pathological Epidemiology (MPE) of Cancer: Emerging Topics on Microbiota and Immunity / Grand Rounds
University of Pittsburgh Medical Center

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
Third 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
U.S. and Canadian Academy of Pathology (USCAP) Annual Meeting, San Antonio, TX

2011 Career Opportunities in Biological and Population Sciences / Invited Lecture at NCI-Funded Cancer Prevention and Control Fellows Workshop
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, Blatislava, Slovakia

2012 Novel Integrative Science of Molecular Pathological Epidemiology (MPE) of Cancer / Invited Lecture
Online Webinar (hosted by Qiagen)

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 Molecular Pathological Epidemiology (MPE): Meeting Aims, Opportunities, and Challenges Opening Lecturer (and Conference Chairperson)
The Second International Molecular Pathological Epidemiology (MPE) Meeting, Boston, MA

2015 "Cancer Epi-NIM (Novelty, Impact, and Mechanism)" Session Chair and Lecturer
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)
Introductory Lecturer and Conference Chairperson

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

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 Transforming Pathology into Data Science → Broader Scientific Impact (e.g., Molecular Pathological Epidemiology)
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 an Example
The 106th Annual Meeting of the Japanese Society of Pathology, Tokyo, Japan (April 27-29)

2017 Emerging Pharmaco-MPE (Molecular Pathological Epidemiology) and Immuno-MPE for Precision Medicine
Plenary Lecturer
Drug Discovery & Therapy World Congress 2017, Boston, MA (July 20-22)

2017 *Fusobacterium*, Microsatellite Instability, and Exome-wide Neoantigen Load in Relation to Immune Response to Cancer
Lecturer
American Association for Cancer Research (AACR) Special Conference on Immunology and Immunotherapy, Boston, MA (October 1-4)

2017 Integrative Molecular Pathological Epidemiology: Emerging Topics and Future Opportunities
Invited Lecturer
2017 NCRI (National Cancer Research Institute) Cancer Conference, Liverpool, UK (Nov 5-8)

(anticipated)

2018 Integrative Analyses of Microbiota, Environment, and Tumor Immunity for Personalizing Immunotherapy
Invited Lecturer
ICI Boston Conference (March 20)

2018 Integrative Molecular Pathological Epidemiology: Creating Scientific Frontiers for Discovery from Large-Scale Pathobiological Studies
ASIP Outstanding Investigator Award Lecture
American Society for Investigative Pathology Annual Meeting at EB 2018, San Diego, CA (April 21-24)

2018 Introduction to the Fourth International MPE Meeting
Lecturer (Co-Chair of the meeting)
The Fourth International Molecular Pathological Epidemiology (MPE) Meeting, Boston, MA (May 31-June 1)

2018 Integrative Analyses of Environment, Microbiota, Tumor, and Immunity Can Inform Immuno-Oncology Research
Invited Speaker
Biomarkers and Immuno-Oncology World Congress 2018
Boston, MA (June 11-13)

2018 Molecular Pathological Epidemiology of Cancer: Overview, Emerging Topics, and Future Directions
Keynote Lecturer
Special Conference of Pathological Society of Great Britain and Ireland, and Dutch Pathology Society, Maastricht, The Netherlands (June 19-22)

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

(BWH, Brigham and Women's Hospital)

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 Councel 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 autosomal ressive and autosomal dominant diseases.

2. Standardized nomenclature system in pathology reporting for precision medicine

As an expert in nomenclature of genes and genetic alterations (Ogino et al. J Mol Diagn 2007), I have contributed to the development of standardized molecular pathology reporting system. In the Center for Advanced Molecular Diagnostics (CAMD) of the Brigham and Women's Hospital, I have been serving as a consultant on mutation nomenclature in 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 field 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 transformative 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" with 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. 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 heterogneous 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, especially molecular pathological characterization, 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 use molecular pathology technologies and 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 and Leading of the International Molecular Pathological Epidemiology (MPE) Meeting Series

To advance the integrative transdisciplinary science of 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*, 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 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 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 for binay, ordinal, and non-ordinal categorical subtypes, 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*). We also developed methods to address missing data in MPE research (Nevo et al. *Lifetime Data Anal* 2017). 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. We have implemented the inverse probability weighting (IPW) method into MPE research to address selection bias due to tissue data availability (*Liu et al. Eur J Epidemiol in press*). 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 pharmacoepidemiology and MPE

Under the precision medicine paradigm, each patient has unique pathologic processes resulting from

cellular genomic, epigenomic, proteomic, and metabolomic alterations, which are influenced by pharmacological, environmental, microbial, dietary, and lifestyle factors. Hence, to realize the promise of precision medicine, multi-level research methods that can comprehensively analyze many of these variables are needed. Addressing this gap, the integration of pharmacoepidemiology and MPE ("pharmaco-MPE") can improve our understanding of drug effects, and inform decision-making of drug use at both the individual and population levels (*Ogino et al. NPJ Precis Med* 2017). Such integrative research demonstrated potential benefits of aspirin in colorectal carcinomas with *PIK3CA* mutations (*Liao et al. N Engl J Med 2012*) and those with lower-level tumor *CD274* (PD-L1) expression (*Hamada et al. J Clin Oncol 2017*), providing the basis for new clinical trials. As immune checkpoint blockade targeting the *CD274* / *PDCD1* (PD-1) pathway for microsatellite instability-high (or mismatch repair-deficient) solid tumors has become standard of care, potential modifying effects of diets, lifestyle, microbial, and environmental factors on immunotherapy need to be studied, to further optimize treatment strategies. With its broad applicability, our integrative approach can provide insights into the interactive role of medications, exposures, and molecular pathology, and guide the development of precision medicine.

13. Integration of immunology and MPE ("immuno-MPE")

Immunology-MPE (immuno-MPE) is an integrative field of immunology, molecular pathology, and epidemiology (*Ogino et al. Gut in press*). The basic concept has been introduced and discussed (*Ogino et al. Nat Rev Clin Oncol 2011*). 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. Tumor cells produce mutated peptides from somatic mutations, some of which may elicit local adaptive immune reaction. Some tumor cells have been shown to develop strategies to evade immune reaction. Local immune status is also influenced by microorganisms. 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.

14. The Program in MPE Molecular Pathological Epidemiology at Brigham and Women's Hospital

I founded the Program in MPE Molecular Pathological Epidemiology in the Department of Pathology at Brigham and Women’s Hospital in 2016, and I have been its founding Chief. The mission of the Program in MPE is to facilitate the transformation of pathology and epidemiology into an integrative pathobiology-based data-driven science. Our ultimate goal is to achieve seamless transdisciplinary integration of pathology and epidemiology, which is expected to enhance education and rigorous research practice in the era of precision medicine. Currently, the Program in MPE has been developing various programs including educational courses for trainees and junior faculty members, consultation service in data science, and outreach programs. The Program in MPE also serves as the host of the International Molecular Pathological Epidemiology (MPE) Meeting Series.

Report of Scholarship

I am the first, last, or co-last author in 175 (59%) of the 295 research and concept papers together.

One very unique feature of my scholarly activities is the presence of 27 "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.

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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.

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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.

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23. **Ogino S**. Successful career development in science. Experimental Medicine (Jikken Igaku) 2015;33. (in Japanese)

Narrative Report

I am a molecular pathological epidemiologist with a major research effort and 10% clinical effort in molecular genetic pathology. I have received awards and honors, including Ramzi Cotran Young Investigator Award in 2011 from United States and Canadian Academy of Pathology (USCAP); Executive Officer's Award in 2004 and Meritorious Service Award in 2012 from Association for Molecular Pathology (AMP); and Outstanding Investigator Award from American Society for Investigative Pathology (ASIP) in 2018. I have been selected as "the Most Influential Scientific Minds" (2014) and Highly Cited Researcher (2015, 2016, and 2017) by Thomson Reuters and Clarivate Analytics. I have been an Elected Member of American Society for Clinical Investigation (ASCI) since 2014, and a member of FASEB Excellence in Science Award Committee since 2014. I have been a recipient of NCI R35 Outstanding Investigator Award (2015-2022), to conduct paradigm-shifting high-risk high-impact research.

With unique combined expertise in both molecular pathology and epidemiology, I have been developing integrative transdisciplinary science of “Molecular Pathological Epidemiology (MPE)”. I have been conducting MPE research using colorectal cancer as a disease model. My MPE research program has continuously been funded by NIH. Highlights of my MPE research program include (but certainly are not limited to) three studies published in the New England Journal of Medicine (Chan et al. 2007; Liao et al. 2012; Nishihara et al. 2013), which showed power of tumor biomarker analyses in large-scale population studies. I founded the International MPE Meeting Series in 2013, and have been serving as its Chairperson. 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 et al. Am J Epidemiol 2015; Wang et al. Stat Med 2016; Nevo et al. Lifetime Data Anal 2017). In addition to the conceptualization of the unified MPE field, I have been very innovative in research and have created novel paradigms, concepts and research framework, such as “the GWAS-MPE approach” (Ogino et al. Gut 2011), “the colorectal continuum model” (Yamauchi et al. Gut 2012), the "etiologic field effect” model (Lochhead et al. Mod Pathol 2015), the integrative field of "lifecourse - MPE” (Nishi et al. Am J Prev Med 2015), the integrative field of "social MPE" (Nishi et al. Expert Rev Mol Diagn 2016), the integrative field of “pharmaco-MPE” (Ogino et al. Epidemiology 2016; Ogino et al. NPJ Precis Oncol 2017), the “integrative immunology-MPE (immuno-MPE)” (Ogino et al. Gut in press), and the “causal inference-MPE” integration (Liu et al. Eur J Epidemiol in press). My research has been very unique in integrating molecular pathology and population sciences, and has demonstrated widespread impact on biomedical and public health sciences.

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. Many of my former mentees who learned the integrative scientific approaches in my MPE laboratory have attained independent positions in the U.S. and abroad.

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 played major leadership and advisory roles in molecular pathology and diagnostics locally and internationally, e.g., for College of American Pathologists, Association for Molecular Pathology, National Comprehensive Cancer Network, and American Joint Committee on Cancer.