

## Curriculum Vitae

### PART I: General Information

**Date Prepared:** February 2019

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**Place of Birth:** Akashi-City, Japan

### Education

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

### Postdoctoral Training

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

### Faculty Academic Appointments

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

**Appointments at Hospitals / Affiliated Institutions**

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

**Other Professional Positions**

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

**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, USA		

**International**

2013-2015	Chair, The International Molecular Pathological Epidemiology (MPE) Meeting Series		
2015-	Co-Chair, The International Molecular Pathological Epidemiology (MPE) Meeting Series		

**Committee Service****Local**

2010-	Member, CRIS/STIP Steering Committee, Dana-Farber Cancer Institute, USA		
2016-2017	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 Harvard Medical School, USA		

**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)  
 2016- Member, Advisory Board, Universal Scientific Education and Research Network (USERN)  
 2018-2019 Member, International Advisory Board, Drug Discovery & Therapy World Congress 2019  
 2019 Invited Nominator, Nobel Prize in Physiology or Medicine 2019

### 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 Listserve 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  
 2019 Member, Subcommittee for the AACR Think Tank on Combination Therapies  
 Federation of American Societies for Experimental Biology (FASEB)  
 2014-2020 Member, Excellence in Science Award Committee

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

### Research Grant Review Committees

2002	National Peer Reviewer Panel (Ad Hoc Member)	Arizona Disease Control Research Commission, USA
2006	Grant Reviewer Panel (Ad Hoc Member)	Association for International Cancer Research (AICR)
2008	Epidemiology of Cancer (EPIC) Study Section (Ad Hoc Member)	NIH, USA
2011	Biological Sciences Committee (Ad Hoc Reviewer)	Cancer Research UK, UK
2011	Study Section Member: Special Emphasis Panel For RFA-ES-10-002: Epigenomics of Human Health and Diseases	NIH, USA
2011	Training & Career Development Board (Ad Hoc Reviewer)	Cancer Research UK, UK
2011-2012	Grant Reviewer Board (External Referee)	The Netherlands Organisation for Health Research and Development, The Netherlands
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, USA
2016-2017	Biomedical Commission (External Referee)	Flemish Cancer Society, Belgium
2018	Study Section Member: Special Emphasis Panel for PAR-17-494 [2018/05 ZCA1 RTRB-C (M3)]: NCI R35 Outstanding Investigator Award	NIH, USA
2018	Study Section Member: NCI Special Emphasis Panel ZCA1 RTRB-R (J2) SEP-3 for Provocative Questions	NIH, USA

### Editorial Activities

**Ad Hoc Reviewer** (for a total of 270 journals)

The number of journals is excessively large because of my trans-inter-multidisciplinary expertise. I use Impact Factor (in preceding years, in general) as a general guide to classify journals, while recognizing that Impact Factor is not definitive metrics of quality of journals.

Journals with Impact Factor 20 or greater

- BMJ
- Gastroenterology
- JAMA
- JAMA Oncology
- 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
- Genome Biology
- Gut
- Journal of Clinical Investigation
- Journal of The National Cancer Institute
- Nature Communications
- Nature Reviews Gastroenterology and Hepatology
- Nucleic Acids Research
- PLOS Medicine
- Trends in Immunology
- 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
- Clinical Epidemiology
- Clinical Science
- 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  
Oncogene  
Oncoimmunology  
Oncologist  
Oncotarget  
PLoS Genetics  
Proceedings of the National Academy of Sciences of the USA (PNAS)  
Progress in Lipid Research  
Seminars in Cancer Biology

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

Immunology

Cancer Immunology, Immunotherapy  
Clinical and Developmental Immunology  
Expert Review of Clinical Immunology  
Immunologic Research  
Journal of Immunological Sciences

Microbiology

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

Molecular Pathological Epidemiology

Journal of MPE Molecular Pathological Epidemiology  
Journal of Pathology and Epidemiology

Informatics / Bioinformatics / Computational Biology

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

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  
Clinical Chemistry 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 / Cancer Research

Annals of Surgical Oncology  
BMC Cancer  
Cancer Biology and Medicine  
Cancer Biomarkers  
Cancer Clinical Research Reports  
Cancer Communications  
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  
Ecancermedicalseience  
Expert Review of Anticancer Research  
Expert Review of Anticancer Therapy  
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 Metastasis and Treatment  
Journal of Cancer Research and Clinical Oncology  
Journal of Cancer Research and Experimental Oncology  
Journal of Cancer Research and Therapeutics  
Journal of the Egyptian National Cancer Institute  
Molecular Cancer Research  
Molecular Carcinogenesis  
Neoplasia  
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

American Journal of Epidemiology  
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 Gastroenterology and Hepatology  
Digestion  
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  
Biomedicine and Pharmacotherapy  
BMJ Open  
Chronic Diseases and Translational Medicine  
European Medical Journal  
Expert Review of Precision Medicine and Drug Development  
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  
Genes to Cells  
Genetics Research International  
Genomics  
Heredity  
Journal of Genetics



Molecular Genetics and Metabolism  
OBM Genetics

Environmental Science  
International Journal of Environmental Research and Public Health

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 Medicinal Chemistry  
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 Clinical Pharmacology  
Journal of Physiology and Pharmacology  
Pharmacogenomics  
Pharmacogenomics and Personalized Medicine  
Pharmacological Research

Nutrition and Food Science  
Alcohol  
British Journal of Nutrition  
Critical Reviews in Food Science and Nutrition  
Hepatobiliary Surgery and Nutrition  
Journal of Functional Foods  
Nutrients  
Nutrition Research

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

## Systems Biology

Journal of Systems Biology Research  
WIREs Systems Biology and Medicine

## Computer Science / Cybernetics

IEEE Transactions on Cybernetics

## Proteomics

Open Journal of Proteomics and Genomics  
Proteomics – Clinical Applications

## 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 Psychology  
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 Cardiology and Cardiovascular Sciences  
Journal of Cardiovascular Medicine and Cardiology  
Journal of Cellular Physiology  
Journal of Child Psychology and Psychiatry  
Journal of Neurology  
Molecules  
Mini-invasive Surgery  
Mutation Research - Fundamental and Molecular Mechanisms of Mutagenesis  
National Science Review  
PeerJ  
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)
2014-2018	The Most Influential Scientific Minds: 2014 and 2015; Highly Cited Researcher 2015, 2016, 2017, and 2018	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	Runner-up for Mentor-of-the-Year Award	Dana-Farber Cancer Institute
2018	Outstanding Investigator Award	American Society for Investigative Pathology (ASIP)

### Report of Funded Projects

**Funding Information** (Abbreviations: DF/HCC, Dana-Farber Harvard Cancer Center; NCI, National Cancer Institute; NHGRI, National Human Genome Research Institute; NIEHS, National Institute of Environmental Health Sciences; NIH, National Institutes of Health; PI, Principal Investigator; SPORE, Specialized Program of Research Excellence)

### Past Funded Projects

2001-2007	A Prospective Study of Diet and Cancer NCI/NIH P01 CA55075 Co-Investigator (PI, Walter Willett)
2001-2006	A Prospective Study of Pancreatic Cancer Pathogenesis NCI/NIH R01 CA86102 Co-Investigator (PI, Charles Fuchs)

- 2007-2011 Molecular Epidemiology of Colorectal Cancer  
NCI/NIH K07 CA122826  
PI (\$556,000 direct; plus Administrative Supplement \$50,800 in 2009-2011)
- 2007-2012 Prospective Studies of Diet and Cancer in Men and Women  
NCI/NIH P01 CA55075  
Co-Investigator (PI, Walter Willett)
- 2007-2013 DF/HCC SPORE in Gastrointestinal Cancer  
NCI/NIH P50 CA127003  
Co-Investigator in Tissue and Pathology Core (PI, Charles Fuchs)
- 2008-2009 Gene Expression Profiling of Colorectal Cancer in Prospective Cohort Studies  
The Friends of the Dana-Farber Cancer Institute  
Co-PI (with Charles Fuchs)
- 2008-2013 Prospective Cohort Collaborative in Pancreatic Cancer Epidemiology and Pathogenesis  
NCI/NIH R01 CA124908  
Co-Investigator (PI, Charles Fuchs)
- 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)
- 2010-2015 The Influence of Diet and Lifestyle on Patients with Advanced Colorectal Cancer  
NCI/NIH R01 CA149222  
Co-Investigator (PI, Jeffrey Meyerhardt)
- 2010-2015 Epigenetic Events and Colorectal Cancer Epidemiology  
NCI/NIH R01 CA151993  
PI (\$1,821,170 direct)  
This grant was incorporated into NCI R35 CA197735 Outstanding Investigator Award.
- 2011-2015 Molecular and Genetic Analysis of Neuroendocrine Tumor Risk and Survival  
NCI/NIH R01 CA151532  
Co-Investigator (PI, Matthew Kulke)
- 2012-2013 Prospective Studies of Diet and Cancer in Men and Women  
NCI/NIH U19 CA55075  
Co-Investigator (PI, Walter Willett)
- 2012-2013 Molecular Predictors of Neuroendocrine Tumor Risk and Outcome  
Novartis CRAD001KUS172T  
Co-PI (PI, Matthew Kulke)
- 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

- 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
- 2015 Obesity-driven PDAC: A Comprehensive Study to Define Mechanisms and New Targets  
for Prevention and Therapy  
Lustgarten Foundation  
Co-Investigator (PI, Charles Fuchs)
- 2016-2017 The Third International Molecular Pathological Epidemiology (MPE) Meeting  
NCI/NHGRI/NIEHS/NIH R13 CA203287  
PI (\$20,000 direct)
- 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)

### 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).

- 2013-2019    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.
- 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 Outstanding Investigator Award (OIA) grant has two goals. First, I plan integrative molecular pathological epidemiology (MPE) research to examine tumor omics, microbiota, and intratumor heterogeneity, in relation to diet, lifestyle and environmental exposures, colorectal cancer incidence, and clinical outcome, using large prospective cohort studies. Second, I plan to develop new statistical methods, organize the International MPE Meeting Series, and explore new frontiers in population science such as "pharmaco-MPE", and "causal inference MPE".
- 2016-2019    Transdisciplinary Approach to Colorectal Cancer Immunity, Molecular Pathology, and Clinical Outcome  
 Nodal Award 2016-02, Dana-Farber Harvard Cancer Center (DF/HCC)  
 PI (\$98,000 direct) (no cost extension)  
 The aims of this project are: (1) To examine the associations between somatic molecular features and immune reaction patterns in CRC. (2) To examine the combined roles of immunity and CRC molecular features in patient survival. We hypothesize that high-level anti-tumor immunity and CRC molecular features may interact and modify patient survival and response to medications.
- 2018-2020    Integrating Diet, Lifestyle and Tumor Tissue Molecular Subtyping to Study the Role of Adolescent Calcium Intake on the Risk of Early Onset Colorectal Neoplasia  
 NCI/NIH        R21 CA230873  
 Co-PI (PIs, Shuji Ogino, Kana Wu)  
 We aim to examine calcium intake in adolescence in relation to incidence of early onset colorectal neoplasm. We will assess CASR (calcium sensing receptor) expression in tumor to gain insights into pathogenic mechanisms.
- 2018-2023    The Cellular Geography of Therapeutic Resistance in Cancer

NCI/NIH U2C CA233195

Co-Investigator (PIs, W Nicholas Haining, Aviv Regev) (PIs, Bruce Johnson, Aviv Regev, effective on 1/1/19)

The Boston Human Tumor Atlas Network Research Center (HTAN-RC) will create three comprehensive atlases of the cellular geography of human cancer to understand how changes in the tumor ecosystem lead to therapeutic resistance.

- 2019-2024 Grand Challenge: OPTIMISTIC: OPportunity To Investigate the Microbiome's Impact on Science and Treatment In Colorectal Cancer  
Cancer Research UK  
Co-Leader of Work Package 2 (PIs, Wendy Garrett, Matthew Meyerson)  
In this 5-year multidisciplinary proposal, we aim to comprehensively examine the role of microbiome in etiologies and pathogenesis of colorectal cancer. We will take broad approaches including experimental biology, genomics, immunology, pathology, clinical oncology, epidemiology, biostatistics, and computational biology.

(Pending Projects)

- 2019-2024 Program for Training in Cancer Epidemiology  
NCI/NIH T32 CA009001  
Preceptor (Co-PIs, Meir Stampfer, Rulla Tamimi)  
The mission of this Program, which has been funded since 1978, is to prepare a cadre of outstanding cancer epidemiologists through rigorous academic training in research methodology and the epidemiology and biology of cancer, and mentored research. Additional emphasis is placed on molecular and genetic epidemiology methods and applications. A distinguished faculty provides a variety of substantial opportunities for research experience.

## **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
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
2013-2015	Nutritional Epidemiology of Cancer Doctoral and Master students (ID510)	Harvard School of Public Health 2-hour session/2 years

### **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, Brigham and Women's Hospital, Harvard T.H. Chan School of Public Health, Broad Institute of MIT and Harvard	Daily mentorship for 16 years
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### 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 Noshio, 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 <u>NEJM</u> 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 (umksuna@gmail.com)
- 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).
- 2013-2018 Mingyang Song, MD, ScD / Assistant Professor, Harvard T.H. Chan School of Public Health, USA
- 2014-2015 Atsuhiko 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; Assistant Professor, Department of Ophthalmology, Keio University, Japan
- 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 / Instructor in Medicine, 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)

2015-2018 Tsuyoshi Hamada, MD, PhD / University of Tokyo, Japan

2015-2018 Daniel Nevo, PhD / Senior Lecturer, Department of Statistics and Operations Research, Tel Aviv University, Israel

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., San Diego, USA

2015-2018 Yan Shi, MD / Associate Professor, Chinese PLA General Hospital, Beijing, PR China (shibaiwan12@vip.sina.com)

2016-2018 Li Liu, PhD / Associate Professor, Department of Epidemiology and Biostatistics, and the Ministry of Education Key Lab of Environment and Health, School of Public Health, Huazhong University of Science and Technology, Wuhan, P.R. China (liul2012@hust.edu.cn; gracefulliuly@163.com)

2016-2018 Keisuke Kosumi, MD, PhD / Kumamoto University, Japan

2016-2018 Thing Rinda Soong, MD, PhD / Acting Assistant Professor, University of Washington, USA (tsoong@uw.edu)

2016-2018 Chunxia Du, MD / GI Medical Oncologist, National Cancer Center/National Clinical Research Center for Cancer/Cancer Hospital, Chinese Academy of Medical Sciences and Peking Union Medical College, Beijing, P.R. China (retinadcx@vip.163.com)

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)

2016-2018 Yang Chen, MD / Medical Oncologist, Department of Medical Oncology, Chinese People's Liberation Army's Hospital, Beijing, PR China (Yang\_Chen0325@hotmail.com)

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

2017-2018 Hongli Liu, MD, PhD / Professor, Cancer Center, Wuhan Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, Hubei, PR China (hongli\_liu@hust.edu.cn)

2017-2018 Chenxi Li, MD / Attending Doctor, Assistant Professor, the First Affiliated Hospital of PLA General Hospital, Beijing, PR China (lichenxi301@126.com).

2017- Wenjie Ma, MB, ScD / Research Fellow, Massachusetts General Hospital, USA

2017- Xiaosheng He, MD / Research Fellow, Massachusetts General Hospital, USA

2017-2018 Peilong Li, MD / Doctoral Student, The Second Hospital of Shandong University, Jinan, PR China (lipeilong@whu.edu.cn; li.peilong@163.com)

2017- Andressa Dias Costa, MD / Research Fellow, Dana-Farber Cancer Institute, USA

2018 Jiaqi Huang, BS / MS (Bioinformatics) Student, Northeastern University, USA

2018- Carino Dias Gurjao, MS / Bioinformatics Analyst, Dana-Farber Cancer Institute, USA

2018- Mai Chan Lau, PhD / Research Fellow, Dana-Farber Cancer Institute, USA

2018- Kenji Fujiyoshi, MD, PhD / Research Fellow, Dana-Farber Cancer Institute, USA

2018- Koichiro Haruki, MD, PhD / Research Fellow, Dana-Farber Cancer Institute, USA

2018- ChunGuang Guo, MD / Research Fellow, Dana-Farber Cancer Institute, USA

2018- Kota Arima, MD, PhD / Research Fellow, Dana-Farber Cancer Institute, USA

2018- Melissa Zhao, MD / MS (Computational Biology and Quantitative Genetics) Student, Harvard T.H. Chan School of Public Health, USA

2018- Junko Kishikawa, MD, PhD / Research Fellow, Dana-Farber Cancer Institute, USA

2018- Tiffany Y Chen, MD / Pathology Resident, Brigham and Women's Hospital, USA

2018- Simeng Gu, MB / Research Fellow, Dana-Farber Cancer Institute, USA

2018- Jooyoung Lee, PhD / Research Fellow, Harvard T.H. Chan School of Public Health, USA

2018- Saina Aminmzaffari, MD / Research Fellow, Dana-Farber Cancer Institute, USA

2018- Shan-shan Shi, PhD / 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- $\beta$ 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
2018	Statistical Principles for Pathology and Laboratory Medicine Clinical Pathology Conference	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, USA 2-hour session / year
2007-2009	Advanced Genetic Risk Assessment Students in Master in Genetic Counseling Program	Boston University, USA 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, USA
- 2005 Molecular Epidemiology and Outcomes of Colorectal Cancer / Research Seminar  
Department of Medical Oncology, Dana-Farber Cancer Institute, USA
- 2006 Epigenetic and Epidemiologic Research on Colorectal Cancer / Research Seminar  
Department of Medical Oncology, Dana-Farber Cancer Institute, USA
- 2007 Molecular Pathologic Epidemiology of Colorectal Cancer / Special Lecture  
Harvard School of Public Health, USA
- 2008 Molecular Pathology and Epidemiology of Colorectal Cancer / Invited Lecture  
Harvard School of Public Health, USA
- 2008 Molecular Epidemiology of Colorectal Cancer / Invited Lecture  
Harvard Biotechnology Club, USA
- 2009 Molecular Pathologic Epidemiology of Cancer: An Evolving Field / Invited Lecture  
Department of Epidemiology, Harvard School of Public Health, USA
- 2009 Significance of Inflammation and Immune Reaction in Colorectal Cancer / Invited Lecture  
Dana-Farber Cancer Institute, USA
- 2010 Genome-Wide Expression Profiling of Colorectal Cancer / Invited Lecture  
Channing Laboratory, Department of Medicine, Brigham and Women's Hospital, USA
- 2011 Molecular Pathological Epidemiology (MPE) of Colorectal Cancer / Invited Lecture  
Channing Laboratory, Department of Medicine, Brigham and Women's Hospital, USA
- 2012 Molecular Pathological Epidemiology (MPE) Adds New Dimension to Nutrition Analysis / Invited  
Lecture  
Department of Nutrition, Harvard School of Public Health, USA
- 2012 Molecular Pathological Epidemiology (MPE): Integrated Molecular and Population Science /  
Invited Lecture  
Department of Epidemiology, Harvard School of Public Health, USA
- 2012 Molecular Pathological Epidemiology (MPE) for Current and Future Pathology / Grand Rounds  
Department of Pathology, Brigham and Women's Hospital, USA
- 2014 Molecular Pathological Epidemiology (MPE) of Colorectal Cancer / Lecture  
Molecular and Cellular Oncology Division, Dana-Farber Cancer Institute, USA
- 2014 Molecular Pathological Epidemiology (MPE): Insights into Vitamin D and Cancer Immunity /  
Invited Lecture

Department of Nutrition, Harvard School of Public Health, USA

- 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, USA
- 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, USA
- 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, USA
- 2017 Translational Microbial- and Immuno-MPE (Molecular Pathological Epidemiology) Invited Lecture  
Gastrointestinal Oncology Conference, Dana-Farber Cancer Institute, USA
- 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, USA

## **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, USA
- 2002 Risk Assessment in Genetic Testing / Invited Lecture  
Boston Law and Genetics Group Meeting, USA
- 2004 Genetic Testing: An Update and Future Perspectives / Invited Lecture  
Boston Japanese Researchers Forum, USA
- 2006 Molecular Diagnostics in Research and Clinical Practice / Invited Lecture  
Wellesley College, USA
- 2007 Molecular Classification of Colorectal Cancer: An Update / Grand Rounds  
Weill Cornell Medical College and New York Presbyterian Hospital, USA
- 2007 Career Paths in Medical Science and Practice / Invited Lecture  
Japanese Researchers Academic Network of Greater Boston, USA
- 2007 Road to Independent Investigator / Invited Lecture  
Japanese Researchers Academic Network of Greater Boston, USA
- 2008 Career Development in Life Science / Invited Lecture  
Japanese Researchers Academic Network of Greater Boston, USA
- 2010 Large-Scale Genetic and Epigenetic Analyses of Colorectal Cancer / Invited Lecture

Qiagen Symposium Series 2010, Cambridge, USA

2012 Molecular Pathological Epidemiology (MPE) Adds New Dimensions to Nutritional Science / Invited Lecture

Tufts University USDA Human Nutrition Research Center Retreat, Boston, USA

2012 Molecular Pathological Epidemiology (MPE): Novel Integrative Science / Keynote Lecture  
Chinese American Biomedical Association (CABA) Expert Forum and Regulatory Training Graduation, Boston, USA

2016 Transforming Science Can Help Your Career Development: Molecular Pathological Epidemiology as an Example / Keynote Lecture

Boston Japanese Researchers Forum, Cambridge, USA

2018 Go Beyond Your Comfort Zone and Transform Science by Yourself  
Lecturer and Panelist

Symposium for Career Development, Boston Japanese Researchers Forum and Consulate General of Japan in Boston, Cambridge, USA

### **National**

2006 Molecular Insights into Colorectal Cancer / Grand Rounds  
Department of Pathology, Case Western Reserve University, USA

2006 Molecular Classification and Diagnostics of Colorectal Cancer / Invited Lecture  
Department of Pathology, Cleveland Clinic Foundation, USA

2006 Molecular Classification of Colorectal Cancer / Grand Rounds  
The University of Texas M.D. Anderson Cancer Center, USA

2009 Molecular Epidemiologic Pathology of Colorectal Cancer / Grand Rounds  
Department of Pathology, Thomas Jefferson University, USA

2009 Mutation Nomenclature / Invited Lecture  
Department of Pathology and Laboratory Medicine, University of Pennsylvania, USA

2009 Colorectal Cancer "Molecular Epidemiologic Pathology" / Invited Lecture  
Department of Pathology and Laboratory Medicine, University of Pennsylvania, USA

2011 Molecular Pathological Epidemiology of Cancer: New Research Opportunities / Invited Lecture  
Department of Pathology, University of Alabama at Birmingham, USA

2013 Molecular Pathological Epidemiology (MPE): Integrative Analysis of Environment, Host and Cancer / Invited Lecture  
Division of Cancer Epidemiology and Genetics, National Cancer Institute, National Institutes of Health, USA

2014 Molecular Pathological Epidemiology (MPE): Integrative Science to Analyze Host (Immunity), Environment, and Tumor / Invited Lecture  
Center for Cancer Research, National Cancer Institute, National Institutes of Health, USA

- 2015 Molecular Pathological Epidemiology (MPE) for Novel Integrative Scientific Framework, Paradigms and Methods / Invited Lecture  
Icahn Medical School of Mount Sinai, USA
- 2015 Integration of Molecular Pathology and Big-Data Health Science: How and What Can We Do? / Invited Lecture  
Columbia University, USA
- 2015 Integration of Molecular Pathology and Big-Data Health Science: How Can We Synergize Diverse Approaches / Invited Lecture  
University of Minnesota, USA
- 2016 Integration of Molecular Pathology and Big-Data Health Science: How Can Diverse Approaches Synergize? / Invited Lecture  
Fred Hutchinson Cancer Research Center, USA
- 2016 Tailoring Lifestyle to Enhance Efficacy of Immunoprevention and Immunotherapy / Cancer Center Grand Rounds  
University of Michigan, USA
- 2017 Integrative Tumor Epidemiology  $\cong$  Molecular Pathological Epidemiology: Emerging Topics and Future Directions / Invited Lecture  
Division of Cancer Epidemiology and Genetics, National Cancer Institute, National Institutes of Health, USA
- 2017 Integrative Molecular Pathological Epidemiology (MPE): Emerging Topics and Future Directions / Invited Lecture  
Center for Cancer Research, National Cancer Institute, National Institutes of Health, USA
- 2017 Integrative Molecular Pathological Epidemiology: Emerging Topics and Future Opportunities / Grand Rounds  
Roswell Park Cancer Institute, USA
- 2017 Integrative Molecular Pathological Epidemiology (MPE) of Cancer: Emerging Topics on Microbiota and Immunity / Grand Rounds  
University of Pittsburgh Medical Center, USA
- 2018 Integrative Computational Analysis of Environment, Genetics, and Disease Pathology (including Microbiota and Immunity) Can Inform Precision Medicine  
Stanford University, USA
- (anticipated)
- 2019 Integrative Analyses of Environment, Microbiome, Genomics, and Immunity: New Opportunities  
Indiana University, USA (March 21)
- 2019 Integrative Analyses of Environment, Microbiome, Genomics, and Immunity: Pathology Needs to Go Beyond Pathology  
Department of Pathology, Indiana University, USA (March 22)



**International (including lectures at international meetings)**

- 2004 Molecular Epidemiologic Data from Nurses' Health Study / Invited Lecture  
Association for Molecular Pathology Meeting, Los Angeles, CA, USA
- 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, USA
- 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, USA
- 2006 Bayesian Genetic Risk Analysis / Invited Lecture  
Association for Molecular Pathology Meeting, Orlando, FL, USA
- 2007 CpG Island Methylator Phenotype (CIMP) in Colorectal Cancer / Invited Lecture  
Third International Quantitative PCR Meeting and Epigenomics Meeting, San Diego, CA, USA
- 2007 Epigenetic Profiling of Colorectal Cancer / Invited Lecture  
Digestive Disease Week (American Gastroenterological Association), Washington, DC, USA
- 2007 Epigenetic Profiling of Colorectal Cancer in a Large-Scale Study / Invited Lecture  
First International Epigenomics & Sequencing, Boston, MA, USA
- 2007 Mutation Nomenclature / Invited Lecture  
Association for Molecular Pathology Meeting, Los Angeles, CA, USA
- 2007 Methods of CpG Methylation Testing / Invited Lecture  
Association for Molecular Pathology Meeting, Los Angeles, CA, USA
- 2008 CpG Island Methylator Phenotype (CIMP) / Workshop Panelist  
American Association for Cancer Research (AACR) Cancer Epigenetics Meeting, Boston, MA, USA
- 2008 Significance of Epigenomic Aberrations in Colorectal Cancer / Invited Lecture  
Second International Epigenomics and Sequencing , Boston, MA, USA
- 2008 Epigenetics of Colorectal Cancer / Invited Lecture  
Colorectal Cancer Summit, Cleveland, OH, USA
- 2008 Bayesian Analysis Workshop / Invited Lecture  
Association for Molecular Pathology Meeting, Grapevine, TX, USA
- 2008 LINE-1 Hypomethylation in Colorectal Cancer / Invited Lecture  
Association for Molecular Pathology Meeting, Grapevine, TX, USA
- 2009 Clinical and Pathological Significance of Epigenomic Changes in Colorectal Cancer / Invited Lecture  
United States and Canadian Academy of Pathology (USCAP), Boston, MA, USA
- 2009 Epigenomics of Colorectal Cancer / Invited Lecture  
Third International Epigenomics and Sequencing, Boston, MA, USA
- 2009 Biostatistics, Epidemiology, and Molecular Diagnostics / Workshop Presenter  
Association for Molecular Pathology Meeting, Kissimmee, FL, USA
- 2009 Molecular Classification and Molecular Testing in Colorectal Cancer / Invited Lecture  
Association for Molecular Pathology Meeting, Kissimmee, FL, USA
- 2010 Epigenomic Diversity of Colorectal Cancer / Invited Lecture  
Epigenetics World Congress, Boston, MA, USA

- 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, USA
- 2010 Molecular Heterogeneity in Colorectal Neoplasia Pathways / Invited Lecture  
NCI-sponsored Serrated Polyps Consensus Meeting, Cleveland, OH, USA
- 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, USA
- 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, USA
- 2011 Epigenetics of Colorectal Cancer / Invited Lecture  
Epigenetics World Congress, Boston, MA, USA
- 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, USA
- 2011 Mutation Nomenclature: Why Standardize? / Invited Lecture  
Association for Molecular Pathology Annual Meeting, Grapevine, TX, USA
- 2012 Molecular Pathological Epidemiology of Colorectal Cancer for Personalized Medicine / Invited  
Lecture  
Seoul National University Cancer Hospital 1st Anniversary Symposium, Seoul, 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, USA

- 2012 Molecular Pathological Epidemiology of Epigenetics: Integrated Analysis of Etiologic Factors, Host, and Disease / Invited Lecture  
Epigenomics, Sequencing and SNiPs Meeting, Boston, MA, USA
- 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 (hosted by Qiagen, Inc.)
- 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, USA
- 2013 Molecular Pathological Epidemiology (MPE): Integrated Science of Host & Cancer Epigenetics / Invited Lecture  
Genomics Research Meeting, Boston, MA, USA
- 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, USA

- 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 / Lecture (as Session Chair)  
12th International AACR Frontiers in Cancer Prevention Research Meeting, National Harbor, MD, USA
- 2013 Tumor Biomarker Discovery for Aspirin Chemoprevention by Molecular Pathological Epidemiology (MPE) Approach / Lecture  
12th International AACR Frontiers in Cancer Prevention Research Meeting, National Harbor, MD, USA
- 2013 Useful and Practical Biostatistics in Molecular Pathology / Invited Lecture  
Association for Molecular Pathology (AMP) Annual Meeting, Phoenix, AZ, USA
- 2014 Molecular Pathological Epidemiology (MPE): Ubiquitous Population Science / Invited Lecture  
American Society of Preventive Oncology (ASPO) Meeting, Arlington, VA, USA
- 2014 Power of Molecular Pathological Epidemiology (MPE) Approach to Discover Tumor Biomarkers for Precision Medicine / Plenary Lecture  
Drug Discovery & Therapy World Congress 2014, Boston, MA, USA
- 2014 Molecular Pathological Epidemiology (MPE): Integrative Science to Advance Biomedical and Health Sciences / Plenary Lecture  
EITA Conference on New Media and Biomedical Research, Boston, MA, USA
- 2014 Molecular Pathological Epidemiology (MPE): Meeting Aims, Opportunities, and Challenges / Opening Lecture (as Conference Chair)  
The Second International Molecular Pathological Epidemiology (MPE) Meeting, Boston, MA, USA
- 2015 "Cancer Epi-NIM (Novelty, Impact, and Mechanism)" / Lecture  
Society for Epidemiologic Research (SER) Annual Meeting, Denver, CO, USA
- 2015 Pharmaco-MPE (Molecular Pathological Epidemiology) Paradigm for Global Precision Medicine / Plenary Lecture  
Drug Discovery & Therapy World Congress 2015, Boston, MA, USA
- 2015 Making Sense of Molecular Pathological Epidemiology (MPE) (including Integrative Immunopathology) / Invited Lecture (and Lab Visit Workshop Leader)  
AACR Integrative Epidemiology Workshop, Boston, MA, USA
- 2016 Molecular Pathological Epidemiology (MPE): Big Data Science to Study Etiologies and Pathogenesis / Invited Lecture  
The 4<sup>th</sup> International Symposium at the Japanese Society of Gastroenterology Meeting, Tokyo
- 2016 Introduction to the Third International MPE Meeting / Lecture (as Conference Chair)  
The Third International Molecular Pathological Epidemiology (MPE) Meeting, Boston, MA, USA
- 2016 Immuno-MPE to Examine Etiologic Heterogeneity of Immune Response to Tumor / Lecture

- The Third International Molecular Pathological Epidemiology (MPE) Meeting, Boston, MA, USA
- 2016 Molecular Pathological Epidemiology (MPE) of Colorectal Cancer Microbial and Immune Characteristics / Invited Lecture  
Colon Cancer Family Registry (CFR) Steering Committee Meeting, Honolulu, HI, USA
- 2016 Molecular Pathological Epidemiology of Risk Factors and CRC Microbial and Immune Characteristics / Invited Lecture  
AACR Special Conference on Colorectal Cancer, Tampa, FL, USA
- 2017 Emerging Microbial-, Immuno-, and Pharmaco-MPE (Molecular Pathological Epidemiology) for Precision Medicine / Invited Lecture  
The 5<sup>th</sup> 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) / Invited Lecture  
The 106<sup>th</sup> 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 / Invited Lecture  
The 106<sup>th</sup> 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 Lecture  
Drug Discovery & Therapy World Congress 2017, Boston, MA, USA (July 20-22)
- 2017 *Fusobacterium*, Microsatellite Instability, and Exome-wide Neoantigen Load in Relation to Immune Response to Cancer / Invited Lecture  
American Association for Cancer Research (AACR) Special Conference on Immunology and Immunotherapy, Boston, MA, USA (October 1-4)
- 2017 Integrative Molecular Pathological Epidemiology: Emerging Topics and Future Opportunities / Invited Lecture  
2017 NCRI (National Cancer Research Institute) Cancer Conference, Liverpool, UK (Nov 5-8)
- 2018 Evolving Paradigms of Pharmaco-MPE (Molecular Pathological Epidemiology) and Immuno-MPE for Precision Medicine / Plenary Lecture  
Drug Discovery 2018 (Online Virtual Event) (February 21-22)
- 2018 Integrative Analyses of Microbiota, Environment, and Tumor Immunity for Personalizing Immunotherapy / Invited Lecture  
ICI Boston Conference, Boston, MA, USA (March 20)
- 2018 Integrative Immunology-MPE (Molecular Pathological Epidemiology): Frontier for Pathobiologic Discovery from Big Data / ASIP Outstanding Investigator Award Lecture  
American Society for Investigative Pathology Annual Meeting at EB 2018, San Diego, CA, USA
- 2018 Integrative Immunology-MPE (Molecular Pathological Epidemiology) to Expand Pathology and Population Sciences / Invited Lecture  
Hiroshima University, Japan (May 2)

- 2018 Need for Integrative Analyses of Exposome (including Microbiome)-Tumor-Immune Interactions / Lecture  
The Fourth International Molecular Pathological Epidemiology (MPE) Meeting, Boston, MA, USA
- 2018 Integrative Analyses of Environment, Microbiota, and Tumor Immunity Can Inform Immuno-Oncology Research / Invited Lecture  
Biomarkers and Immuno-Oncology World Congress 2018, Boston, MA, USA (June 11-13)
- 2018 MPE Transforms Pathology, Integrating Genomics, Microbiome, and Immunology / Keynote Lecture  
Special Conference of Pathological Society of Great Britain and Ireland, and Dutch Pathology Society, Maastricht, The Netherlands (June 19-22)
- 2018 Integrated Analyses of Environmental, Microbial, Tumor, and Immune Factors for Precision Immuno-Oncology  
Tumor Models Summit, Boston, MA, USA (July 17-19)
- 2018 Integrative Analyses of Environment, Microbiome, Genomics, and Immunity: New Opportunities in Cancer Science  
Western Japan Cancer Society Meeting, Tokushima, Japan (August 11)
- 2018 Integrative Analyses of Microbiota, Environment, and Tumor Immunity for Precision Immuno-Oncology / Invited Lecture  
Sixth Annual Immuno-Oncology Summit, Boston, MA, USA (August 27-31)
- 2018 Integrative Analyses of Environment, Microbiome, Genomics, and Immunity: New Opportunities in Pathology  
Korean Society of Pathology 70<sup>th</sup> Annual Meeting, Seoul, Republic of Korea (Nov 1)
- 2018 Integrative Dana Science: Immunology-MPE (Molecular Pathological Epidemiology) Frontier for Pathobiological Discovery from Big Data / Keynote Lecture  
Laboratory Medicine Congress & Exhibition & Korean Society of Laboratory Medicine 59th Annual Meeting (LMCE 2018), Seoul, Republic of Korea (Nov 1-3)
- 2018 Making Sense of Statistics for Laboratory Medicine / Symposium Lecture  
Laboratory Medicine Congress & Exhibition & Korean Society of Laboratory Medicine 59th Annual Meeting (LMCE 2018), Seoul, Republic of Korea (Nov 1-3)
- 2018 Future Direction and New Opportunities in Nutritional Epidemiology  
Seoul National University College of Human Ecology, Seoul, Republic of Korea (Nov 2)
- 2018 Integrative Analyses of Environment, Microbiome, Genomics, and Immunity: New Opportunities in Cancer Science  
National Cancer Center Graduate School of Cancer Science and Policy, Seoul, Republic of Korea
- 2018 Integrative Analyses of Environment, Microbiome, Genomics, and Immunity: New Opportunities in Pathology and Cancer Science  
Seoul National University College of Medicine, Seoul, Republic of Korea (Nov 6)
- 2018 Transdisciplinary Public Health & Epidemiology for Society, Health, and Medicine in the Future

Kyoto University School of Public Health, Kyoto, Japan (Dec 19)

(anticipated)

- 2019 Integrative Analyses of Environment, Microbiome, Genomics, and Immunity for Precision Medicine: New Opportunities  
Tumor Immunology Meets Oncology (TIMO) XV, Halle, Germany (April 25-27)
- 2019 Integrative Analyses of Microbiota, Environment, Tumor, and Immunity by Transdisciplinary Approach  
German Cancer Research Center, Heidelberg, Germany (April 29)
- 2019 Integrative Analyses of Microbiota, Environment, Tumor, and Immunity by Interdisciplinary Science  
Japanese Society of Pathology Annual Meeting, Tokyo, Japan (May 9-11)
- 2019 Interdisciplinary Approach to Cancer Immunoprevention  
Japanese Society of Pathology Open Symposium for Citizens, Tokyo, Japan (May 11)
- 2019 Integrative Analyses of Environment, Microbiome, Genomics, and Immunity: New Opportunities in Cancer Science  
The Chinese Digestive Disease Week, Guangzhou, PR China (Nov 9)
- 2019 Integrative Analyses of Environment, Microbiome, Genomics, and Immunity for Precision Medicine  
Drug Discovery-2019, Newton, MA, USA (Nov 22)

## **Report of Clinical Activities and Innovations**

### **Practice activities**

(BWH, Brigham and Women's Hospital, USA)

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 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 can be used for autosomal recessive and autosomal dominant diseases.

### 2. 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, which has been quoted nearly 500 times as of December 2018). 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).

### 3. 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 served 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 often given workshops at AMP annual meetings.

## Report of Technological and Other Scientific Innovations

### 1. Development of transdisciplinary molecular pathological epidemiology (MPE) as one unified integrative field

Using unique combined expertise in molecular pathology and epidemiology, I have been developing transdisciplinary science of MPE (Ogino et al. *J Natl Cancer Inst* 2010; Ogino et al. *Gut* 2011; Ogino et al. *Annu Rev Pathol* 2019), to unleash full potential of the integrated research approach and to transform pathology and epidemiology towards our goal of precision medicine. Based on this MPE paradigm, a number of new concepts have emerged as below. Expanding population science with the MPE paradigm is the main theme of my R35 CA197735 Outstanding Investigator Award grant.

MPE-type research has become quite prevalent. However, most epidemiologists who conduct MPE research do not use the term MPE as they do not have expertise in pathology. In addition, without integrated expertise in molecular pathology and epidemiology, it is difficult to appreciate true power of the MPE approach. Therefore, the value and influence of MPE have been severely underappreciated and underestimated.

The existence of a distinct name of a scientific field indicates that a specific set of education, training, knowledge, and expertise is needed to conduct research in that field. For example, an investigator who studies HPV epidemiology needs to gain adequate knowledge and expertise in both microbiology (virology) and epidemiology. However, not all researchers who study HPV epidemiology may have such combined expertise. There are substantial pitfalls in non-expert's conducting research studies. That is the reason why I have created distinct names of MPE and related disciplines as below.

## 2. Conceptualization of the unique tumor principle and the unique disease principle

I explicitly conceptualized the uniqueness of each tumor (Ogino et al. *Expert Rev Mol Diagn* 2012), which led to 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, necessitating precision medicine.

## 3. Conceptualization of the GWAS-MPE approach

Although genome-wide association studies (GWAS) have revealed numerous risk loci for many diseases, a major issue is that biologically and etiologically heterogeneous disease subtypes with differing risk associations are typically lumped together into one disease entity. Hence, deep disease phenotyping, especially molecular pathological characterization, had been recognized as one of important post-GWAS strategies. 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. We have published proof-of-concept studies (Nan et al. *JNCI* 2013; Garcia-Albeniz et al. *Carcinogenesis* 2013; Khalili et al. *Carcinogenesis* 2015).

## 4. Creation of the colorectal continuum model

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

## 5. Creation, management, and leading of the 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-type research. MPE Working Group currently consists of researchers mainly based on Harvard T.H. Chan School of Public Health, the Broad Institute, and Harvard-affiliated hospitals. As the group leader, I continue to organize bimonthly MPE Working Group meeting series to advance the MPE field.

## 6. Creation, management, and Leading of the International Molecular Pathological Epidemiology (MPE) Meeting Series

To advance the integrative transdisciplinary science of MPE, I established the International MPE Meeting Series in 2013. I served as the Chair or a Co-Chair for the four past meetings, all of which were successful. The proceedings of the second and third meetings have been published (Ogino et al. *Cancer Causes Cont* 2015; Campbell et al. *Cancer Causes Cont* 2017, respectively). The Fifth International MPE Meeting is planned to be held in June 2020 in Boston, MA, USA, with five Co-Chairs (Christine Ambrosone, Peter T. Campbell, Montserrat Garcia-Closas, Shuji Ogino, and Timothy Rebbeck). Our

major goals have been to provide unique educational and networking opportunities and to accelerate transdisciplinary population cancer science.

#### 7. Conceptualization of the etiologic field effect model

The concept of MPE has been 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 of cancer susceptibility. This concept is useful in designing precision cancer prevention strategies.

#### 8. Creation of the integrative field of lifecourse MPE

The concept of MPE has been 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

To investigate the relationship between exposures and disease risk in traditional epidemiological framework, cases of the disease are often considered a single outcome, and assumed to share a common etiology. Based on the newer paradigm of MPE, we have developed analytic methods to study disease subtype heterogeneity for binary, 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), as well as methods to deal with multiple disease subtyping markers simultaneously (Wang et al. *Am J Epidemiol* 2015). We have also developed methods to address missing data in MPE-type research (Nevo et al. *Lifetime Data Anal* 2018; Nevo et al. *Biostatistics*, in press). User-friendly software to implement the various methods is publicly available.

#### 10. Integration of the causal inference model and MPE

Both causal inference and MPE are subspecialty fields of epidemiology that share a common goal of elucidating causality in an association between exposure and disease. We have conceived that the two fields can synergize by virtue of complementary strengths of each field. We have illustrated how the MPE paradigm can easily solve epidemiological paradoxes (Nishihara et al. *Eur J Epidemiol* 2015). 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* 2018). The integrative field of causal inference MPE has substantial potential in addressing causality in medical and public health sciences.

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

Although the evolving transdisciplinary field of MPE can advance biomedical and health research, use of state-of-the-art technologies may increase racial, ethnic and socioeconomic disparities. To address this, we have integrated social science and MPE (Nishi et al. *Expert Rev Mol Diagn* 2016). This integrative field termed social MPE can address global health disparities and inequalities, and elucidate biological effects of social environments, behaviors, and networks. The interdisciplinary approach of social MPE aims to utilize advancements of molecular medicine to benefit individuals in a global population.

#### 12. Integration of pharmacoepidemiology and MPE

Under the precision medicine paradigm, each patient has a unique pathologic process that is influenced by pharmacological, environmental, microbial, dietary, and lifestyle factors. Hence, multi-level research methods that can comprehensively analyze many of these variables are needed. I have proposed the integration of pharmacoepidemiology and MPE ("pharmaco-MPE") to improve our understanding of drug effects at both the individual and population levels (Ogino et al. NPJ Precis Med 2017). Such integrative research demonstrated potential benefits of aspirin to prevent and treat colorectal carcinomas with PTGS2 (cyclooxygenase-2) overexpression (Chan et al. NEJM 2007; Chan et al. JAMA 2009), PIK3CA mutations (Liao et al. NEJM 2012) and lower-level tumor CD274 (PD-L1) expression (Hamada et al. J Clin Oncol 2017). The integrative pharmaco-MPE 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 into immunology-MPE, encompassing immunogenomics

Immunology-MPE (immuno-MPE) is an integrative field of immunology, molecular pathology, and epidemiology (Ogino et al. Gut 2018; Ogino et al. Lancet 2018). Diet and lifestyle can be routine immunoprevention strategies, since some modifiable factors can influence not only cancer risk but also host immunity. 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. Integration of microbiology and MPE into microbiology-MPE

Microbiology-MPE is an integrative field of microbiology, molecular pathology, and epidemiology (Hamada et al., commissioned by J Pathol, under review). Microorganisms play an essential role in human health and diseases. Analyses of the microbiota in biospecimens including stools, tissue, and body fluids, combined with immunology-MPE strategies for the exposome and immunity, can generate a wealth of information on disease etiologies and pathogenesis.

### 15. Creation, management, and leading of the Program in MPE Molecular Pathological Epidemiology at Brigham and Women's Hospital

I founded the Program in MPE in the Department of Pathology at Brigham and Women's Hospital in 2016, and I have been its founding Chief. With no defined membership, the Program has no intellectual or physical boundary, and intends to serve for all department members. The mission of the Program is to facilitate the transformation of pathology and epidemiology into an integrative pathobiology-based data-driven science, thereby ultimately enhancing education and rigorous research practice in the era of precision medicine. The Program develops educational lectures and courses, the project for "redefining statistical significance", consultation service in data science, and outreach programs. The Program in MPE also serves as the host of the International MPE Meeting Series.

## **Report of Scholarship**

I am the first, last, or co-last author in 187 (56%) of the 329 research and concept papers together.

One very unique feature of my scholarly activities is the presence of 30 "concept papers" which do not describe original research but have provided new research areas, paradigms, models, methods, 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.
20. **Ogino S**, Brahmandam M, Cantor M, Namgyal C, Kawasaki T, Kirkner G, Meyerhardt JA, Loda M, Fuchs CS. Distinct molecular features of colorectal carcinoma with signet ring cell component and colorectal carcinoma with mucinous component. Mod Pathol 2006;19:59-68.
21. **Ogino S**, Kawasaki T, Brahmandam M, Cantor M, Kirkner GJ, Spiegelman D, Makrigiorgos GM, Weisenberger DJ, Laird PW, Loda M, Fuchs CS. Precision and performance characteristics of bisulfite conversion and real-time PCR (MethyLight) for quantitative DNA methylation analysis. J Mol Diagn 2006;8:209-217.
22. **Ogino S**, Cantor M, Kawasaki T, Brahmandam M, Kirkner GJ, Weisenberger DJ, Campan M, Laird PW, Loda M, Fuchs CS. CpG island methylator phenotype (CIMP) of colorectal cancer is best characterised by quantitative DNA methylation analysis and prospective cohort studies. Gut 2006;55:1000-1006.
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.

24. **Ogino S**, Brahmandam M, Kawasaki T, Kirkner GJ, Loda M, Fuchs CS. Combined analysis of COX-2 and p53 expressions reveals synergistic inverse correlations with microsatellite instability and CpG island methylator phenotype in colorectal cancer. Neoplasia 2006;8:458-464.
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.
28. **Ogino S**, Kawasaki T, Kirkner GJ, Loda M, Fuchs CS. CpG island methylator phenotype-low (CIMP-low) in colorectal cancer: possible associations with male sex and KRAS mutations. J Mol Diagn 2006;8:582-588.
29. Priolo C, Tang D, Brahmandam M, Benassi B, Sicinska E, **Ogino S**, Farsetti A, Porrello A, Finn S, Zimmermann J, Febbo P, Loda M. The isopeptidase USP2a protects human prostate cancer from apoptosis. Cancer Res 2006;66:8625-8632.
30. **Ogino S**, Kawasaki T, Kirkner GJ, Yamaji T, Loda M, Fuchs CS. Loss of nuclear p27 (CDKN1B/KIP1) in colorectal cancer is associated with microsatellite instability and CIMP. Mod Pathol 2007;20:15-22.
31. **Ogino S**, Wilson RB, Gold B, Flodman P. Bayesian risk assessment in genetic testing for autosomal dominant disorders with age-dependent penetrance. J Genet Counsel 2007;16:29-39.
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.
33. **Ogino S**, Kawasaki T, Ogawa A, Kirkner GJ, Loda M, Fuchs CS. TGFBR2 mutation is correlated with CpG island methylator phenotype in microsatellite instability-high colorectal cancer. Hum Pathol 2007;38:614-620.
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.
35. Meyerhardt JA, Clark JW, Supko J, Eder P, **Ogino S**, Stewart C, D'Amato F, Dancey J, Enzinger PC, Zhu A, Ryan DP, Earle C, Mayer R, Kinsella K, Fuchs CS. Phase I study of gefitinib, irinotecan, 5-fluorouracil and leucovorin in patients with metastatic colorectal cancer. Cancer Chemotherapy Pharmacol 2007;60:661-670.

36. **Ogino S**, Kawasaki T, Kirkner GJ, Kraft P, Loda M, Fuchs CS. Evaluation of markers for CpG island methylator phenotype (CIMP) in colorectal cancer by a large population-based sample. J Mol Diagn 2007;9:305-314.
37. Chan AT, **Ogino S**, Fuchs CS. Aspirin and the risk of colorectal cancer in relation to the expression of COX-2. N Engl J Med 2007;356:2131-2142. (I am the sole pathologist in this study.)
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**Concept Papers** (These papers have provided original concepts, paradigms, framework, and models):

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2. **Ogino S**, Goel A. Molecular classification and correlates in colorectal cancer. J Mol Diagn 2008;10:13-27. (This paper explained the concept that each tumor is unique, leading to the unique tumor principle.)
3. **Ogino S**, Stampfer M. Lifestyle factors and microsatellite instability in colorectal cancer: the evolving field of molecular pathological epidemiology. J Natl Cancer Inst 2010;102:365-367. (This is the first paper to describe "molecular pathological epidemiology (MPE)" as a unified and distinct scientific field.)
4. **Ogino S**, Chan AT, Fuchs CS, Giovannucci E. Molecular pathological epidemiology of colorectal neoplasia: an emerging transdisciplinary and interdisciplinary field. Gut 2011;60:397-411. (This paper is the first to propose the "GWAS-MPE" approach.)

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## Narrative Report

I am a molecular pathological epidemiologist with a major research effort and 10% clinical effort in molecular genetic pathology. I have received a number of awards and honors as already listed. I have been a recipient of NCI R35 Outstanding Investigator Award (2015-2022), to conduct paradigm-shifting 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). The existence of a distinct name of a scientific field indicates that a specific set of education, training, knowledge, and expertise is needed to conduct research in that field. Hence, MPE researchers must have expertise in both molecular pathology and epidemiology. My long-term goal is to address an increasing need for transdisciplinary education system for future science.

I have been serving to manage tumor biobanks and databases for large-scale prospective cohort studies, namely the Nurses' Health Study (NHS) and the Health Professionals Follow-up Study (HPFS). I conduct MPE research using colorectal cancer as a disease model. I founded the International MPE Meeting Series in 2013, and have been serving as its Chair or Co-Chair. I continue to serve as one of the Co-Chairs of the Fifth International MPE Meeting in June 2020 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* 2018; Nevo et al. *Biostatistics* (in press)]. In addition to the conceptualization of the unified MPE field, I have created several novel paradigms, concepts and research frameworks, 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. *npj Precis Oncol* 2017), the integrative immunology-MPE (Ogino et al. *Gut* 2018; Ogino et al. *Lancet* 2018), the causal inference MPE integration (Liu et al. *Eur J Epidemiol* 2018), and microbiology-MPE (Hamada et al., commissioned by *J Pathol*, under review). The MPE paradigm can transform and expand pathology (Ogino et al. *Annu Rev Pathol* 2019). My research has been very unique in integrating molecular pathology and population sciences, and has demonstrated widespread impact on biomedical and public health sciences.

My research has been tightly linked to my educational and mentoring activities. I have been a strong advocate of education and training to achieve standardization of clinical practice and research, attested by my tutorial papers on Bayesian analysis (e.g., Ogino et al. *J Mol Diagn* 2004) and statistical testing to examine disease heterogeneity (Wang, et al. *Stat Med* 2016). Years before the era of clinical genomic testing, I emphasized the importance of education and training for standardization of nomenclature of genes, gene products, and mutations (Ogino et al. *J Mol Diagn* 2007). As an active teacher in both Harvard T.H. Chan School of Public Health and Harvard Medical School, I proposed to establish integrative education system to provide training of pathology, epidemiology, and statistics (Ogino et al. *Am J Epidemiol* 2012). As a staunch advocate for rigor and reproducibility in research, I have emphasized the importance of education of data science, study design, epidemiology, and statistics in clinical and research training programs (Ogino et al. *Clin Chem* 2016).

My mentoring contribution has been very unique, as I have mentored faculty members and trainees in a wide variety of fields, including pathology, laboratory medicine, epidemiology, immunology, nutrition science, biostatistics, computational biology, oncology, gastroenterology, surgery, cancer biology, endocrinology, and social science. Over 50 past trainees under my formal mentorship have attained faculty (assistant professor or above), leadership (such as division chief), and/or independent positions around the world. I have considerably influenced career development of many mentees, and encouraged each mentee to become a unique researcher and conduct rigorous transdisciplinary research.

In clinical service, I have been serving as a molecular pathologist, with special expertise in gastrointestinal cancer molecular and immune 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 the College of American Pathologists (CAP), the Association for Molecular Pathology (AMP), the National Comprehensive Cancer Network (NCCN), the American Joint Committee on Cancer (AJCC), and the American Cancer Society, Inc.