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RESEARCH AND WORK EXPERIENCE

- 6.2010 –** **Mathematical Statistician.** Biometric Research Program, Division of Cancer Treatment and Diagnosis, National Cancer Institute – National Institutes of Health.
- 9.2005 – 5.2010** **Research Assistant to Professor Christopher Genovese.** Department of Statistics, Carnegie Mellon University.
- 9.2004 – 5.2010** **Teaching Assistant for Various Undergraduate and Graduate Statistics Courses.** Department of Statistics, Carnegie Mellon University.
- 5.2008 – 8.2008** **Biostatistics Summer Intern.** Early and Business Development, Genentech, Inc.
- 7.2005 – 8.2005;** **Summer Course Instructor for Experimental Design for Behavioral**
7.2006 – 8.2006 **and Social Sciences (Stat 36-309) and Statistical Reasoning and Practice (Stat 36-201).** Department of Statistics, Carnegie Mellon University.
- 9.2001 – 12.2001;** **Teaching Assistant for Multidimensional Calculus (Math 164).**
9.2002 – 5.2004 Department of Mathematics, University of Rochester.

EDUCATION

- 2010** **PhD in Statistics.** Carnegie Mellon University.
Dissertation: System-Oriented Characterization of the Human Primary Visual Cortex
- 2005** **MS in Statistics.** Carnegie Mellon University.
- 2004** **BS in Applied Mathematics with Minor in Music.** University of Rochester.

PEER-REVIEWED JOURNAL PUBLICATIONS

Huang EP, O'Connor JPB, McShane LM, Giger ML, Lambin P, Kinahan PE, Siegel EL, and Shankar LK. Criteria for the translation of radiomics into clinically useful tests. *Nature Reviews: Clinical Oncology* 2023; 20: 69-82.

Obuchowski NA, **Huang E**, deSouza NM, Raunig D, Delfino J, Buckler A, Hatt C, Wang X, Moskowicz C, Guimaraes A, Giger M, Hall TJ, Kinahan P, and Pennello G. A framework for evaluating the technical performance of multiparameter quantitative imaging biomarkers (mp-QIBs). *Academic Radiology* 2023; 30 (2): 147-158.

Raunig DL, Pennello GA, Delfino JG, Buckler AJ, Hall TJ, Guimaraes AR, Wang X, **Huang EP**, Barnhart HX, deSouza N, Obuchowski N, and the Alzheimer's Disease Neuroimaging Initiative. Multiparametric quantitative imaging biomarker as a multivariate descriptor of health: A roadmap. *Academic Radiology* 2023; 30 (2): 159-182.

Delfino JG, Pennello GA, Barnhart HX, Buckler AJ, Wang X, **Huang EP**, Raunig DL, Guimaraes AR, Hall TJ, deSouza NM, and Obuchowski N. Multiparametric quantitative imaging biomarkers for phenotype classification: A framework for development and validation. *Academic Radiology* 2023; 30 (2): 183-195.

Huang EP, Pennello G, deSouza NM, Wang X, Buckler AJ, Kinahan PE, Barnhart HX, Delfino JG, Hall TJ, Raunig DL, Guimaraes AR, and Obuchowski NA. Multiparametric quantitative imaging in risk prediction: Recommendations for data acquisition, technical performance assessment, and model development and validation. *Academic Radiology* 2023; 30 (2): 196-214.

Wang X, Pennello G, deSouza NM, **Huang EP**, Buckler AJ, Barnhart HX, Delfino JG, Raunig DL, Wang L, Guimaraes AR, Hall TJ, and Obuchowski NA. Multiparametric data-driven imaging markers: Guidelines for development, application, and reporting of model outcomes in radiomics. *Academic Radiology* 2023; 30 (2): 215-229.

Shankar LK, **Huang EP**, Litière S, Hoekstra OS, Schwartz L, Collette S, Boellaard R, Bogaerts J, Seymour L, de Vries EGE, for the RECIST FDG-PET Working Group. Meta-analysis of the test-retest repeatability of [18F]-fluorodeoxyglucose standardized uptake values: Implications for assessment of tumor response. *Clinical Cancer Research* 2023; 29 (1): 143-153.

Chihara D, Lin R, Flowers CR, Finnigan SR, Cordes LM, Fukuda Y, **Huang EP**, Rubinstein LV, Nastoupil LJ, Ivy SP, Doroshov JH, Takebe N. Early drug development in solid tumours: Analysis of National Cancer Institute-sponsored phase 1 trials. *Lancet* 2022; 400 (10531): 512-521.

Chihara D, **Huang EP**, Finnegan SR, Cordes LM, Skorupan N, Fukuda Y, Rubinstein LV, Ivy SP, Doroshov JH, Nastoupil LJ, Flowers CR, and Takebe N. Trends in Grade 5 toxicity and response in phase 1 trials in hematologic malignancy: 20-year experience from the Cancer Therapy Evaluation Program (CTEP) at the National Cancer Institute/National Institutes of Health. *Journal of Clinical Oncology* 2022; 40 (17): 1949-1957.

PEER-REVIEWED JOURNAL PUBLICATIONS (CONTINUED)

Huang EP and Shih JH. Assigning readers to cases in imaging studies using balanced incomplete block designs. *Statistical Methods in Medical Research* 2021; 30 (10): 2288-2312.

Beer LB, Sahin H, Bateman NW, Blazic I, Vargas HA, Veeraraghavan H, Kirby J, Fevrier-Sullivan B, Freymann JB, Jaffe CC, Brenton J, Miccò M, Nougaret S, Darcy KM, Maxwell GL, Conrads TP, **Huang E**, and Sala E. Integration of proteomics with CT-based qualitative and texture features in high-grade serous ovarian cancer patients: An exploratory analysis. *European Radiology* 2020; 30 (8): 4306-4316.

Veeraraghavan H, Vargas HA, Jimenez-Sanchez A, Miccò M, Mema E, Lakhman Y, Crispin-Ortuzar M, **Huang EP**, Levine DA, Grisham RN, Abu-Rustum N, Deasy JO, Snyder A, Miller ML, Brenton JD, and Sala E. Predicting high-grade serous ovarian cancer treatment outcomes using radiomic, genomic, and clinical variables: A retrospective study. *Cancers* 2020; 12 (11): 3403.

Litière S, Isaac G, de Vries E, Bogaerts J, Chen A, Dancey J, Ford R, Gwyther S, Hoekstra O, **Huang E**, Lin N, Liu Y, Mandrekar S, Schwartz L, Shankar L, Therasse P, and Seymour L. RECIST 1.1 for response evaluation apply not only to chemotherapy-treated patients but also to targeted cancer agents: A pooled database analysis. *Journal of Clinical Oncology* 2019; 37 (13): 1102-1110.

Paller CJ, **Huang EP**, Leuchtefeld T, Masset HA, Williams CC, Zhao J, Gravell AE, Tamashiro T, Reeves SA, Rosner GL, Carducci MA, Rubinstein L, and Ivy SP. Factors Affecting Combination Trial Success (FACTS): Investigator survey results on early-phase combination trials. *Frontiers in Medicine* 2019; 6 (122).

Huang EP, Lin FI, and Shankar LK. Beyond correlations, sensitivities, and specificities: A roadmap for demonstrating utility of advanced imaging in oncology treatment and clinical trial design. *Academic Radiology* 2017; 24 (8): 1036-1049.

Lin FI, **Huang EP**, Shankar LK. Beyond correlations, sensitivities, and specificities: Case examples of the evaluation of advanced imaging in oncology clinical trials. *Academic Radiology* 2017; 24 (8): 1027-1035.

Vargas HA, **Huang EP**, Lakhman Y, Ippolito J, Bhosale P, Mellnick V, Shinagare A, Anello M, Kirby J, Fevrier-Sullivan B, Freymann J, Jaffe C, and Sala E. Radiogenomics of high grade serous ovarian cancer: Multi-reader multi-institutional study from the Cancer Genome Atlas Ovarian Cancer (TCGA-OV) Imaging Research Group. *Radiology* 2017; 285 (2): 482-492.

Burnside ES, Drukker K, Li H, Bonaccio E, Zuley M, Ganott M, Net JM, Sutton EJ, Brandt KR, Whitman GJ, Conzen SD, Lan L, Ji Y, Zhu Y, Jaffee CC, **Huang EP**, Freymann JB, Kirby JS, Morris EA, and Giger ML. Using computer-extracted image phenotypes from tumors on breast magnetic resonance imaging to predict breast cancer pathologic stage. *Cancer* 2016; 122 (5): 748-757.

PEER-REVIEWED JOURNAL PUBLICATIONS (CONTINUED)

Li H, Zhu Y, Burnside ES, **Huang E**, Drukker K, Hoadley KA, Fan C, Conzen SD, Zuley M, Net JM, Sutton E, Whitman GJ, Morris E, Perou CM, Ji Y, and Giger ML. Quantitative MRI radiomics in the prediction of molecular classification of breast cancer subtypes in the TCGA/TCIA data set. *Nature Partner Journals Breast Cancer* 2016; 2 (16012).

Li H, Zhu Y, Burnside ES, Drukker K, Hoadley KA, Fan C, Conzen SD, Whitman GJ, Sutton EJ, Net JM, Ganott M, **Huang E**, Morris EA, Perou CM, Ji Y, and Giger ML. MR imaging radiomics signatures for predicting the risk of breast cancer recurrence as given by research versions of MammaPrint, Oncotype DX, and PAM50 gene assays. *Radiology* 2016; 281 (2): 382-391.

Schwartz LH, Seymour L, Litière S, Ford R, Gwyther S, Mandrekar S, Shankar L, Bogaerts J, Chen A, Dancey J, Hayes W, Hodi FS, Hoekstra OS, **Huang EP**, Lin N, Liu Y, Therasse P, Wolchok JD, and de Vries E. RECIST 1.1 – Standardization and disease-specific adaptations: Perspectives from the RECIST working group. *European Journal of Cancer* 2016; 62: 138-145.

Schwartz LH, Litière S, de Vries E, Ford R, Gwyther S, Mandrekar S, Shankar L, Bogaerts J, Chen A, Dancey J, Hayes W, Hodi FS, Hoekstra OS, **Huang EP**, Lin N, Liu Y, Therasse P, Wolchok JD, and Seymour L. RECIST 1.1 – Update and clarification: From the RECIST committee. *European Journal of Cancer* 2016; 62: 132-137.

Obuchowski NA, Reeves AP, **Huang EP**, Wang X-F, Buckler AJ, Kim HJ, Barnhart HX, Jackson EF, Giger ML, Pennello G, Toledano AY, Kalpathy-Cramer J, Apanasovich TV, Kinahan PE, Myers KJ, Goldgof DB, Barboriak DP, Gillies RJ, Schwartz LH, Sullivan DC, for the Algorithm Comparison Working Group. Quantitative imaging biomarkers: A review of statistical methods for computer algorithm comparisons. *Statistical Methods in Medical Research* 2015; 24 (1): 68-106.

Huang EP, Wang X-F, Roy Choudhury K, McShane LM, Gönen M, Ye J, Buckler AJ, Kinahan PE, Reeves AP, Jackson EF, Guimaraes AP, Zahlmann G, for the Meta-Analysis Working Group. Meta-analysis of the technical performance of an imaging procedure: Guidelines and statistical methodology. *Statistical Methods in Medical Research* 2015; 24 (1): 141-174.

Shinagare AB, Vikram R, Jaffe C, Akin O, Kirby J, **Huang E**, Freymann J, Sainani N, Sadow CA, Bathala TK, Rubin D, Oto A, Heller MT, Surabhi VR, Katabathina V, and Silverman SG. Radiogenomics of clear cell renal cell carcinoma: Preliminary findings of the Cancer Genome Atlas Renal Cell Carcinoma (TCGA-RCC) Research Group. *Abdominal Imaging* 2015; 40 (6): 1684-1692.

Sullivan DC, Obuchowski N, Kessler LG, Raunig DL, Gatsonis C, **Huang EP**, Kondratovich M, McShane LM, Reeves AP, for the Radiological Society of North America Quantitative Imaging Biomarkers Alliance (RSNA-QIBA) Metrology Working Group. Metrology standards for quantitative imaging biomarkers. *Radiology* 2015; 277 (3): 813-825.

PEER-REVIEWED JOURNAL PUBLICATIONS (CONTINUED)

Polley MC, Polley EC, **Huang EP**, Freidlin B, and Simon R. Two-stage adaptive cutoff (TACO) design for building and validating a prognostic biomarker signature. *Statistics in Medicine* 2014; 33 (29): 5097-5110.

Gutman DA, Cooper LAD, Huang SN, Holder CA, Gao J, Arora TD, Dunn Jr. WD, Scarpace L, Mikkelsen T, Jain R, Wintermark M, Jilwan M, Raghavan P, **Huang E**, Clifford RJ, Mongkolwat P, Kleper V, Freymann J, Kirby J, Zinn PO, Moreno CS, Jaffe C, Colen R, Rubin DL, Saltz J, Flanders A, and Brat DJ. MR imaging predictors of molecular profile and survival: Multi-institutional study of the TCGA glioblastoma data set. *Radiology* 2012; 267 (2): 560-569.

Huang EP, Fridlyand J, Lewin-Koh N, Yue P, Shi X, Dornan D, and Burington B. Statistical techniques to construct assays for identifying likely responders to a treatment under evaluation from cell line genomic data. *Biomed Central Cancer* 2010; 10 (586).

PRESENTATIONS

- 8.11.2022** **Invited Oral Presentation:** Multiparametric quantitative imaging—Use case 3: prediction. For the session *Statistical machine learning and artificial intelligence in multiparametric quantitative imaging. Joint Statistical Meetings*, Washington, DC.
- 11.29.2020** **Invited Oral Presentation:** Data for developing and validating AI and machine learning algorithms. For the featured presentation *Creating publicly accessible radiology imaging resources for machine learning and AI. Radiological Society of North America (RSNA) Annual Meeting* (virtual).
- 12.4.2019** **Invited Oral Presentation:** Statistical methodology for the integration of imaging and proteomics. For the educational course *Imaging in proteomics research. Radiological Society of North America (RSNA) Annual Meeting*, Chicago, IL.
- 12.4.2019** **Invited Oral Presentation:** Multivariate quantitative imaging biomarkers: A framework for estimating and testing technical performance. For the Quantitative Imaging Biomarkers Alliance (QIBA) Working Meeting. *Radiological Society of North America (RSNA) Annual Meeting*, Chicago, IL.
- 7.29.2019** **Invited Oral Presentation:** Assigning readers to cases in multi-reader multi-case imaging studies using balanced incomplete block designs. For the session *Recent advances in the design and analysis of multi-reader imaging studies. Joint Statistical Meetings*, Denver, CO.

PRESENTATIONS (CONTINUED)

- 5.17.2018** **Invited Oral Presentation:** From exploratory to clinically useful: Dos and don'ts for imaging test validation. *Quantitative Imaging Network (QIN) Annual Meeting*, Rockville, MD.
- 12.1.2016** **Invited Oral Presentation and Panel Discussion:** Statistical considerations for the analysis of imaging data from the Cancer Imaging Archive. For the educational course *Imaging integration with cancer genomics/proteomics: Methodologies leveraging the Cancer Imaging Archive*. *Radiological Society of North America (RSNA) Annual Meeting*, Chicago, IL.
- 5.13.2014** **Contributed Poster:** Validating human-made tumor characterizations based on diagnostic images for prognosis and disease management decision in the clinic. *The Cancer Genome Atlas (TCGA) Symposium*, Bethesda, MD.
- 11.29.2011** **Contributed Poster:** A novel statistical method for lossless compression of diagnostic imaging features. *Radiological Society of North America (RSNA) Annual Meeting*, Chicago, IL.
- 4.6.2010** **Contributed Poster:** Statistical methods for a system-oriented characterization of the human primary visual cortex. *Annual Banquet of the American Statistical Association (ASA)*, Pittsburgh, PA.
- 3.31.2009** **Contributed Poster:** Simultaneous estimation of response fields and impulse response functions. *Annual Banquet of the American Statistical Association (ASA)*, Pittsburgh, PA.

PROFESSIONAL ACTIVITIES

- Committees**
- Response Evaluation Criteria in Solid Tumors (RECIST) Committee (Member, 2012 –)
 - National Cancer Institute Clinical Imaging Steering Committee (Member, 2010 – 2024)
 - American College of Radiology Imaging Network (ACRIN) Data Safety and Monitoring Committee (Ex-officio Member, 2010 – 2024)
- Editorial Positions** *Statistics in Medicine* (Associate Editor, 2022 –)
- Referee Service**
- Biomed Central: Medical Research Methodology*
 - Cancers*
 - Journal of the National Cancer Institute*
 - Journal of Neuro-Oncology*
 - Statistics in Biopharmaceutical Research*

HONORS AND AWARDS

- 2004** National Science Foundation VIGRE Fellowship: full tuition plus \$1800 per month stipend for each semester of graduate school
Inducted into Phi Beta Kappa
Graduated Magna Cum Laude from the University of Rochester (final GPA: 3.90/4.00)
- 2003** Inducted into Golden Key National Honor Society

TECHNICAL SKILLS

Statistical Software	R/S-plus, Matlab, SPSS, Minitab
Programming	C, HTML, UNIX shell scripting
Document Preparation	LATEX, Microsoft Office, OpenOffice
Operating Systems	UNIX/LINUX, Microsoft Windows, Mac OS X