

FRIDAY, FEBRUARY 2, 2024

AI IN MEDICINE SYMPOSIUM

HARKNESS AUDITORIUM, 333 CEDAR ST, NEW HAVEN



Yale SCHOOL OF MEDICINE

Biomedical Informatics and Data Science

AGENDA

- MORNING SESSION -

Opening Remarks **8:30 - 9 AM**

Nancy J. Brown, MD and Lucila Ohno-Machado, MD, MBA, PhD

Lightning Talks I **9 - 10 AM**

Biomedical Imaging and Computer Vision

Panel Session I **10 - 11 AM**

Generative AI in Medical Education, Basic Science and Clinical Practice

Coffee Break **11 - 11:15 AM**

Lightning Talks II **11:15 AM - 12:15 PM**

Generative AI & Natural Language Processing (NLP)

- LUNCH -

Lunch and Poster Session **12:15 - 1:15 PM**

- AFTERNOON SESSION -

Lightning Talks III **1:15 - 2:15 PM**

Clinical Applications of AI

Panel Session II **2:15 - 3:15 PM**

YNHHS-Yale School of Medicine AI Partnerships

Coffee Break **3:15 - 3:30 PM**

Lightning Talks IV **3:30 - 4:30 PM**

Clinical Applications & Bioinformatics

- CLOSING SESSION -

Closing Remarks **4:40 - 4:45 PM**

Reception & Poster Session **4:45 - 6 PM**

PANEL I

GENERATIVE AI IN MEDICAL EDUCATION, BASIC SCIENCE AND CLINICAL PRACTICE

MODERATOR

ANNIE (MARY-ANNE) HARTLEY, MD, PHD, MPH

Assistant Professor of Biomedical Informatics and Data Science;
Affiliated Faculty, Yale Institute for Global Health

PANELISTS

HUA XU, PHD, FACMI

Robert T. McCluskey Professor of Biomedical Informatics and Data Science; Vice Chair for Research and Development, Section of Biomedical Informatics and Data Science; Assistant Dean for Biomedical Informatics, Yale School of Medicine

ROHAN KHERA, MD, MS

Assistant Professor of Medicine (Cardiovascular Medicine) and of Biostatistics (Health Informatics); Clinical Director, Center for Health Informatics and Analytics, YNHH/Yale Center for Outcomes Research & Evaluation (CORE); Director, Cardiovascular Data Science Lab (CarDS)

MARK GERSTEIN, PHD

Albert L. Williams Professor of Biomedical Informatics; Professor of Molecular Biophysics & Biochemistry; Professor of Computer Science; Professor of Statistics & Data Science

PANEL II

YNHHS-YALE SCHOOL OF MEDICINE AI PARTNERSHIPS

MODERATOR

WADE SCHULZ, MD, PHD

Assistant Professor; Director of Informatics, Laboratory Medicine; Director, CORE Center for Computational Health, Center for Outcomes Research & Evaluation (CORE)

PANELISTS

LEE SCHWAMM, MD

Associate Dean, Digital Strategy and Transformation, Office of the Dean, Yale School of Medicine; Professor in Biomedical Informatics & Data Sciences at Yale School of Medicine; Senior Vice President and Chief Digital Health Officer, Yale New Haven Health System

ALLEN HSIAO, MD, FAAP, FAMIA

Professor of Pediatrics (Emergency Medicine) and of Emergency Medicine; Interim Chief, Pediatric Emergency Medicine; Chief Health Information Officer, Yale School of Medicine & Yale New Haven Health, Yale School of Medicine

DANIELLA MEEKER, PHD

Associate Professor of Biomedical Informatics and Data Science; Chief Research Information Officer, Yale School of Medicine and Yale New Haven Health System

LIGHTNING TALKS MODERATORS

LIGHTNING TALKS I: BIOMEDICAL IMAGING & COMPUTER VISION

ROHAN KHERA, MD, MS

Assistant Professor of Medicine (Cardiovascular Medicine) and of Biostatistics (Health Informatics); Clinical Director, Center for Health Informatics and Analytics, YNHH/Yale Center for Outcomes Research & Evaluation (CORE); Director, Cardiovascular Data Science Lab (CarDS)

LIGHTNING TALKS II: GENERATIVE AI & NATURAL LANGUAGE PROCESSING

ARMAN COHEN, PHD

Assistant Professor of Computer Science, Yale University; Research Scientist, Allen Institute for AI (AI2)

LIGHTNING TALKS III: CLINICAL APPLICATIONS OF AI

DENNIS L. SHUNG, MD, MHS, PHD

Assistant Professor of Medicine (Digestive Diseases); Assistant Professor of Biomedical Informatics & Data Science; Director of Digital Health, Digestive Diseases; Director of Applied Artificial Intelligence, Yale Center for Healthcare Simulation

LIGHTNING TALKS IV: CLINICAL APPLICATIONS & BIOINFORMATICS

ANDREW TAYLOR, MD, MHS

Associate Professor of Emergency Medicine; Associate Professor of Biomedical Informatics and Data Science; Associate Professor of Biostatistics; Director, ED Clinical Informatics and Analytics

LIGHTNING TALKS I

BIOMEDICAL IMAGING & COMPUTER VISION

Enhancing Brain Positron Emission Tomography Image Quality with Artificial Intelligence Head Motion Correction

Eléonore V. Liefbrig, *Biomedical Engineering*

A Multimodality Video-Based Artificial Intelligence Biomarker for Aortic Stenosis Development and Progression

Evangelos K. Oikonomou, MD, DPhil, *Internal Medicine (Cardiology)*

Enhancing Prostate Cancer Diagnosis from Medical Imaging via Image Geometry-Informed Deep Learning

Joanna Chen, *Biomedical Engineering, MD-PhD Program*

Valvular Flow MRI: 2D Phase-Contrast of the Tricuspid Valvular Flow with Automated Valve-Tracking by Deep Learning

Dana Peters, PhD, *Radiology*

LIGHTNING TALKS II

GENERATIVE AI &

NATURAL LANGUAGE PROCESSING (NLP)

Call It A Night: Leveraging Natural Language Processing to Evaluate User Experiences with a Digital Sleep Intervention to Reduce Drinking

Frances J. Griffith, PhD, *Psychiatry*

Assessing the Usability of GutGPT: A Simulation Study of an AI Clinical Decision Support System for Gastrointestinal Bleeding Risk

Colleen Chan and Sunny Chung, MD, *Statistics & Data Science*

Rethink Biomedical Literature Search and Visualization in the Era of Large Language Models – A Prototype Development

Huan He, PhD, *Biomedical Informatics & Data Science*

Me LLaMA: A Suite of Large Language Models, Datasets, and Tools for Medical Application

Qianqian Xie, PhD, *Biomedical Informatics & Data Science*

LIGHTNING TALKS III

CLINICAL APPLICATIONS OF AI

Enhancing Clinical Decision Support Accuracy Through a Retrieval Augmented Generation Pipeline for Large Language Models

Mauro Giuffrè, MD, *Internal Medicine (Digestive Disease)*

MEDAGENTS: Large Language Models as Collaborators for Zero-Shot Medical Reasoning

Xiangru Tang, *Computer Science*

ECG-GPT: Automated Complete Diagnosis Generation from ECG Images Using Novel Vision-Text Transformer Model

Akshay Khunte, *Computer Science, Internal Medicine (Cardiovascular Medicine)*

Neural Networks for Kidney Injury Decision Making

William J. Zhang, *Chronic Disease Epidemiology*

LIGHTNING TALKS IV

CLINICAL APPLICATIONS & BIOINFORMATICS

RCT-Twin-GAN Generates Digital Twins of Randomized Control Trials Adapted to Real-World Patients to Enhance Their Inference and Application

Phyllis Thangaraj, MD, PhD, *Cardiology*

A Roadmap to Artificial Intelligence (AI): Methods for Designing and Building AI Ready Data to Promote Fairness

Farah Kidwai-Khan, DEng, *General Internal Medicine, Biomedical Informatics & Data Science*

Quantum Clique Detection in Biological Graph Networks

Sarah N. Dudgeon, *Computational Biology & Bioinformatics*

Grappling with 10^{60} : Geometric Deep Learning for Drug Discovery & Indication Expansion

Dhananjay Bhaskar, PhD, *Genetics*

POSTERS

BIOMEDICAL IMAGING

Artificial Intelligence in Medical Imaging Physics: PET, SPECT, and CT

Chi Liu, PhD

Artificial Intelligence-Based Morpho-Volumetric Analysis of Pre- and Post-EVAR Infrarenal Abdominal Aortic Aneurysms Characterized on Computed Tomography Angiography

David Weiss, MD; Thomas Hager, BS; Mariam Aboian, MD, PhD; MingDe Lin, PhD; Daniel Renninghoff, MSc; Wolfgang Holler, MSc; Uwe Fischer, MD, PhD; Cornelius Deuschl, MD; Sanjay Aneja, MD; Edouard Aboian, MD

Evaluating the Utility of Federated Learning Algorithms for Diagnostic Medical Imaging in Oncology

Durga V. Sritharan, BS; Ryan Maresca, BS; Saahil Chadha, BA; Nicholas S. Moore, MD; Victor Lee, MD; Thomas Hager, MS; Sanjay Aneja, MD

A Novel Vision Transformer-Based Pipeline for Direct Inference on Single-Lead Electrocardiographic Spectrograms

Elizabeth Knight MS; Evangelos K. Oikonomou MD, DPhil; Akshay Khunte; Arya Aminorroaya, MD, MPH; Lovedeep Singh Dhingra, MBBS; Andreas Coppi, PhD; Rohan Khera, MD, MS

Neuroimage Analysis in Autism: From Model-based Estimation to Data-Driven Learning

Jiyao Wang, Nicha Dvorak, Xiaoxiao Li, Juntang Zhuang, Larry Staib, Denis Sukhodolsky, Pam Ventola, James S Duncan

Integrating Multimodal Data to Automatically Segment Lesions in Prostate MRI

Jiayang Zhong; Lawrence H. Staib, PhD; Rajesh Venkataraman, PhD; John A. Onofrey, PhD

Identification of Hypertrophic Cardiomyopathy on Electrocardiographic Images with Deep Learning

Lovedeep Singh Dhingra, MBBS; Veer Sangha, BS; Evangelos K. Oikonomou, MD, DPhil; Arya Aminorroaya, MD, MPH; Nikhil V. Sikand, MD, FACC; Sounok Sen, MD; Harlan M. Kumholz, MD, SM; Rohan Khera, MD, MS

POSTERS

BIOMEDICAL IMAGING

Beyond Result Reporting on the Testing Set: Enhancing AI-Assisted Medical Imaging Diagnostic Workflow, External Validations, and Continued Training

A Case Study on AI-Assisted Age-Related Macular Degeneration Diagnosis

Qingyu Chen, PhD; Tiarnan D. L. Keenan, BM, BCh, PhD; Michael F. Chiang, MD, MA; Michelle R. Hribar, PhD; Emily Y. Chew, MD; Zhiyong Lu, PhD

Evaluating the Utility of Self-Configuring Capsule Networks for Brain Image Segmentation

Saahil Chadha, BA; Arman Avesta, MD, PhD; Durga Sritharan, BS; Sajid Hossain, MS; Rahul D'Souza; MingDe Lin, PhD; Mariam Aboian, MD, PhD; Harlan Krumholz, MD, SM; Sanjay Aneja, MD

Semi-Automatic Approach to Estimate the Severity of Steatosis from Ultrasound Images

Simone Kresevic, Mauro Giuffrè, MD; Milos Ajcevic, PhD; Carlo Moretto; Lory Saveria Crocè, MD; Dennis L. Shung, MD, MHS, PhD; Agostino Accardo, MEng

Monte-Carlo Frequency Dropout for Predictive Uncertainty Estimation in Deep Learning

Tal Zeevi; Lawrence H. Staib, PhD; John A. Onofrey, PhD

Lymph Node Metastasis Prediction with Non-Small Cell Lung Cancer Histopathology Imaging

Victor Lee, MD; Amber Loren O. King, MD; Durga Sritharan, BS; Nicholas S. Moore, MD; Saahil Chadha, BA; Ryan Maresca, BS; Tommy Hager, MS; Henry S. Park, MD, MPH; Sanjay Aneja, MD

Attention Mechanisms Integrated Deep Learning for Differential Diagnosis of Hepatocellular Carcinoma on Multiphase Liver CT

Yuenan Wang, PhD, DABR

Automated Image Segmentation of Electron Microscopy Images from Hemostatic Thrombi Formed in vivo

Ziyi Huang; Meghan Roberts; Catherine House; Sandra J. Young; Maurizio Tomaiuolo, PhD; Timothy J. Stalker, PhD; Lu Lu, PhD; Talid Sinno, PhD

POSTERS

CLINICAL APPLICATIONS

Development and Multinational Validation of a Machine Learning-Based Optimization for Efficient Screening for Elevated Lipoprotein(a)

Arya Aminorroaya MD, MPH; Lovedeep Singh Dhingra, MBBS; Evangelos K. Oikonomou, MD, DPhil; Seyedmohammad Saadatagah, MD; Phyllis Thangaraj, MD, PhD; Sumukh Vasisht Shankar, MS; Erica S. Spatz, MD, MHS; Rohan Khera, MD, MS

Evaluating the Efficacy of Open-Source Large Language Models in Generating Patient Referral Letters for Specialist Psychiatric Evaluation

Brennan Gibson

Using Machine Learning to Predict Early Substance Use Using a Nationally Representative Sample of U.S. Adolescents

Gaoqianxue Liu; Catherine Jeon; Jenny Meyer; Uzochukwu Imo; Kammarauche Aneni, MBBS, MHS

Machine Learning-Based Prediction of Inhibitors and Activators of Alpha-glucosidase as Therapeutics for Type 2 Diabetes Mellitus and Pompe Disease

Gertrude Asumpaame Alayine

CarDS-Plus ECG Platform: Development and Feasibility Evaluation of a Multiplatform Artificial Intelligence Toolkit for Portable and Wearable Device Electrocardiograms

Sumukh Vasisht Shankar, MS; Evangelos K. Oikonomou, MD, DPhil; Rohan Khera, MD, MS

A Multicenter Evaluation of the Impact of Procedural and Pharmacological Interventions on Deep Learning-Based Electrocardiographic Markers of Hypertrophic Cardiomyopathy

Lovedeep Singh Dhingra, MBBS; Veer Sangha, BS; Arya Aminorroaya, MD, MPH; Robyn Bryde, MD; Andrew Gaballa, MD; Adel H. Ali, MD; Nandini Mehra, MD; Harlan M. Krumholz, MD, SM; Sounok Sen, MD; Christopher M. Kramer, MD; Matthew W. Martinez, MD; Milind Y. Desai, MD, MBA; Evangelos K. Oikonomou, MD, DPhil; Rohan Khera, MD, MS

The Art of the Discharge: Proposal for Implementing Generative AI in Healthcare

Daniel Fitzgerald

POSTERS

CLINICAL APPLICATIONS

PRESENT-SHD, An Ensemble Deep Learning Model to Automate Screening for Multiple Structural Heart Diseases on 12-Lead Electrocardiograms

Lovedeep Singh Dhingra, MBBS; Arya Aminorroaya, MD, MPH; Akshay Khunte; Veer Sangha, BS; Sounok Sen, MD; Norrisa Haynes, MD, MPH; Harlan M. Krumholz, MD, SM; Rohan Khera, MD, MS

An Artificial Intelligence Clinical Decision Support System in a Medical Simulation: Qualitative Feedback

Niroop Rajashekar; Yeo Eun Shin; Yuan Pu; Sunny Chung; Kisung You; Mauro Giuffrè, MD; Colleen E. Chan; Theo Saarinen; Allen Hsiao; Jasjeet Sekhon; Ambrose H. Wong; Leigh V. Evans; Rene F. Kizilcec; Loren Laine; Terika McCall; Dennis L. Shung, MD, MHS, PhD

Personalizing the Empiric Treatment of Gonorrhea Using Machine Learning Models

Rachel Murray-Watson, PhD

Prognostic Biomarkers of Intracerebral Hemorrhage Identified Using Targeted Proteomics and Machine Learning Algorithms

Shubham Misra, PhD; Yuki Kawamura; Praveen Singh; Shantanu Sengupta; Manabesh Nath; Zuhair Rahman; Pradeep Kumar; Amit Kumar; Praveen Aggarwal; Achal K. Srivastava; Awadh K. Pandit; Dheeraj Mohania; Kameshwar Prasad; Nishant Kumar Mishra, MD, PhD; Deepti Vibha

Lessons from Clinical Communication for Human Centered AI

Zahra Abba Omar

Pilot Surveillance for Herbal Natural Product Use and Interactions Assessment: Methodology and Insights from an Expanded National U.S. Database

Yuelei (Emily) Fu; Termeh Feinberg, PhD, MPH

Predictive Modeling of Racial Disparity in Teenage Hospitalizations

Ryan Wu, MS; Azadeh Miran, MS; Yan Cheng, PhD; Yijun Shao, PhD; Joseph L. Goulet, PhD; Qing Zeng-Treitler, PhD

DocuMental: Enhancing Mental Health Documentation Through a Secure, Generative AI Workflow

Thomas Fernandez, MD

POSTERS

CLINICAL APPLICATIONS

The Endorsement of General and Artificial Intelligence Reporting Guidelines in Medical Informatics Journals: A Meta-Research Study

Alyssa Grimshaw, MSLIS, MBA; Dennis L. Shung, MD, MHS, PhD

Clinical Characteristics and Outcomes of Patients with Post-Stroke Epilepsy: Protocol for an Individual Patient Data Meta-Analysis

Nishant Kumar Mishra, MD, PhD; Patrick Kwan, MD; Tomotaka Tanaka, MD, PhD; Katherina Sunnerhagen, MD; Jesse Dawson, MD; Yize Zhao, PhD; Shubham Misra, PhD; Selena Wang, PhD; Vijay K. Sharma, MD; Rajarshi Mazumder, MD; Melissa C. Funaro, MS; Masafumi Ihara, MD; John-Paul Nicolo, MD; David S. Liebeskind, MD; Clarissa L. Yasuda, MD, PhD; Fernando Cendes, MD; Terence J. Quinn, MD; Zongyuan Ge, PhD; Fabien Scalzo, PhD; Johan Zelano, MD; Scott E. Kasner, MD

Enhancing Algorithmic Equity by Capturing Sources of Outcome Variance in Minoritized Populations

Christopher Fields, PhD

Transfer Learning on Physics-Informed Neural Networks for Tracking the Hemodynamics in the Evolving False Lumen of Dissected Aorta

Mitchell Daneker; Shengze Cai; Ying Qian; Myzelev; Arsh Kumbhat; Xiaoning Zheng; He Li; Lu Lu

Closing the AI Implementation Gap

Jessica Morley, PhD

Exploring Convolutional Neural Networks for Facial-Image-Based Diagnosis of Marfan Syndrome

John A. Elefteriades, MD; Danny Saksenberg, BS; David Aronowitz, MBA; Mohammad A. Zafar, MBBS; Bulat A. Ziganshin, MD, PhD; Asanish Kalyanasundaram, MD

You, Too, Can Responsibly Use Generative AI

Michael Ljung

Detection of Multiple Structural Heart Diseases Using a Novel Artificial Intelligence-Driven Algorithm for Noisy Real-World Single-Lead ECGs

Arya Aminorroaya, MD, MPH; Akshay Khunte; Lovedeep Singh Dhingra, MBBS; Veer Sangham, BS; Evangelos K. Oikonomou, MD, DPhil; Sounok Sen, MD; Norrisa Haynes, MD, MPH; Harlan M. Krumholz, MD, SM; Rohan Khera, MD, MS

Novel Application of Flow Matching to Model Dynamic Risk in ICU Patients with Sepsis

Yuan Pu

POSTERS

NATURAL LANGUAGE PROCESSING

Using Artificial Intelligence to Identify Opportunities to Include Sex and Gender Content in Medical Education

Aeka Lakshmi Guru; Haleigh Larson; Kelsey Martin, MD; Margaret Pisani, MD; Carolyn Mazure, PhD

Supporting Hematologic Tissue Bank Research Through LLM-Based Information Extraction from Real-World Data

Erin Lee; Ahmad Kiwan, MD/PhD; Martin Matthews; Jennifer VanOudenhove, PhD; Sarah N. Dudgeon; Patrick Young, PhD; Thomas Durant, MD; Wade Schulz, MD, PhD; Stephanie Halene, MD, Dr Med

Accelerated Extraction of Cardiac MRI Parameters Using Open-Source Clinical Large Language Models

James L. Cross; Ruben Mora, MD; David van Dijk, PhD, MSc; Jennifer M. Kwan, MD/PhD

Inductive Thematic Analysis of Healthcare Qualitative Interviews Using Open-Source Large Language Models: How Does It Compare To Traditional Methods?

Walter S. Mathis, MD

Natural Language Processing of Radiology Reports for Retrospective Classification of Oligometastatic Non-Small Cell Lung Cancer

Nicholas S. Moore, MD; James H. Laird, MD; Nipun Verma, MD, PhD; Thomas Hager, MS; Durga Sritharan, BS; Ryan Maresca, BS; Victor Lee, MD; Saahil Chadha, BA; Henry S. Park, MD, MPH; Sanjay Aneja, MD

Clinical and Biomedical Named Entity Recognition Using Generative Pre-Trained Transformer Models

Vipina Keloth, PhD

A Deep Learning Approach for Automated Extraction and Categorization of Functional Status and New York Heart Association Class for Heart Failure Patients During Outpatient Encounters

Philip Adejumo, BS; Lovedeep Singh Dhingra, MBBS; Arya Aminorroaya, MD, MPH; Xinyu Zhao, BS; Rohan Khera, MD, MS

A Systematic Evaluation of Large Language Models for Biomedical Natural Language Processing: Benchmarks, Baselines, and Recommendations

Qingyu Chen, PhD; Jingcheng Du, PhD; Yan Hu; Vipina Kuttichi Keloth, PhD; Xueqing Peng, PhD; Kalpana Raja, PhD, MRSB, CSci; Qianqian Xie, PhD; Aidan Gilson; Maxwell Singer, MD; Ron A. Adelman, MD, MPH, MBA, FACS; Rui Zhang, PhD; Zhiyong Lu, PhD, FACMI; Hua Xu, PhD, FACMI



Yale SCHOOL OF MEDICINE

Biomedical Informatics and Data Science